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Annexure_3.4.5

Criterion III – Research, Innovations and Extension

Key Indicators - 3.4 Research Publications and Awards

Metric No. 3.4.5_ Number of research papers per teacher in the Journals notified on UGC website during the last five years

IoT Security Architecture with TEA for DoS Attacks Prevention

Vishal Sharma and Anand Sharma

Abstract The Internet of Things (IoT) is important in now a day's development of wireless networks enabling to acquire information from the environment, devices, and machines. A number of applications have been implemented in various kinds of technologies. IoT has high coverage to security attacks and threats. There are a number of requirements in terms of security. Confidentiality is one of the main concerns in the wireless network. Integrity and availability are key matters along with the confidentiality. This research focuses on identifying the DoS attacks that can occur in IoT. This paper uses Tiny Encryption Algorithm (TEA) to address these above mentioned security matters. From the algorithms, our proposed solutions can control DoS attack on IoT and any other networks of small devices.

Keywords DoS attack · IoT · Security · TEA

1 Introduction

As we know that the Internet of Things (IoT) is a new standard that is hastily growing in the area of wireless communications [1], we can be defined IoT as it make connection between daily life's things with each other automatically to complete a new task [2].

The time-bound data like temperature, pressure, etc. are gathering using the IoT devices. Using these collected data, we are able to observe and control of all types of devices in the network.

In the context of these benefits of IoT, this method is used in different fields of smart building, environmental monitoring, smart city, and healthcare monitoring

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© Springer Nature Singapore Pte Ltd. 2021
V. Goar et al. (eds.), *Advances in Information Communication Technology and Computing*, Lecture Notes in Networks and Systems 135,
https://doi.org/10.1007/978-981-15-5421-6_22

Advances and Applications in Mathematical Sciences
Volume 20, Issue 1, November 2020, Pages 1-13
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A NOVEL COMPARISON OF CONSENSUS ALGORITHMS IN BLOCKCHAIN

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Abstract

Blockchain is a main technology for different cryptocurrencies. Today blockchain has main research interest in the field of security due to its features like, stability, security, inalterable and decentralization. In blockchain technology, the transactions can be done securely with the help of consensus algorithms in a distributed system which has P2P connections of blocks, without interference of mediator [1]. So the consensus algorithms are playing a key role for preserving the security and integrity of a distributed network in blockchain technology. It is basically used for maintaining the trust in blockchain technology. The consensus algorithms are divided into two types, proof based and voting based. In this paper we have presented the some of the main consensus algorithms of these two types, and examine the weaknesses, strengths and also the types of blockchain in which these algorithms are applicable.

I. Introduction

In the year of 2008, the Satoshi Nakamoto was introducing the original concept of blockchain technology. Nakamoto was used this technology for very first cryptocurrency which was called bitcoin distributed ledger [15].

2010 Mathematics Subject Classification: Please provide
Keywords: blockchain, consensus algorithm, cryptocurrencies.
Received Please provide

06/12/2021
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Journal of Thermal Analysis and Calorimetry
https://doi.org/10.1007/s10973-021-10705-6

Assessment of alumina/water nanofluid in a glazed tube and sheet photovoltaic/thermal system with geothermal cooling

Sanjeev Jakhar[1] · Mukul Kant Pallwal[1] · Nilesh Purohit[2]

Received: 1 November 2020 / Accepted: 21 February 2021
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Abstract
This article presents evaluation of alumina/water nanofluid (NF) in a glazed tube and sheet photovoltaic/thermal (PV/T) system with ground-coupled heat exchanger (GCHE) in semi-arid region of Pilani, Rajasthan (India). Conventionally in the literature, the cooling performance of NF is reported compared to the normal fluid cooling under equal Reynolds number (Re) comparison criterion. However, according to many researchers, equal pumping power-based evaluation is more pragmatic and is explored here. The first law of thermodynamics analysis is invoked to appropriately assess the replacement of water with NF in the PV/T system coupled with GCHE. Nanoparticle concentration is varied from 0.5% to 6% by volume fraction and the Re from 3000 to 9000. Temperature of PV panel, temperature difference in PV/T outlet and inlet, electrical efficiency, thermal efficiency and Bejan number in PV as well as in GCHE are computed using a validated mathematical model for both equal Re and equal pumping power evaluation criteria. The performance of PV/T system with NF is found superior under equal Re comparison. The improvement observed are reduction in PV panel temperature by 2 °C, reduction in temperature difference in PV/T outlet and inlet by 6 °C, rise in electrical efficiency by 0.1% and a rise in thermal efficiency by 4%. However, the performance of PV/T system with NF is found inferior under equal pumping power evaluation criterion.

Keywords Solar energy · Photovoltaic/thermal (PV/T) · Ground-coupled heat exchanger (GCHE) · Alumina nanofluid · Pumping power · Electrical and thermal efficiency

Abbreviations

a_f	Equivalent diameter of base fluid molecule (m)	f	Friction factor for smooth pipes
a_p	Nanoparticle diameter (m)	$G(I)$	Global solar radiation (W m^{-2})
A_c	Area of PV/T (m^2)	h	Convection heat transfer coefficient (W m^{-2} K^{-1})
B	Width of absorber plate (m)	k	Thermal conductivity (W m^{-1} K^{-1})
		k_s	Thermal conductivity of soil (W m^{-1} K^{-1})

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Materials Today: Proceedings xxx (xxxx) xxx

Contents lists available at ScienceDirect

Materials Today: Proceedings

journal homepage: www.elsevier.com/locate/matpr

A framework based on BWM for big data analytics (BDA) barriers in manufacturing supply chains

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ARTICLE INFO

Article history:
Available online xxxx

Keywords:
Big data analytics
Barriers
Manufacturing supply chains
Best worst method (BWM)

ABSTRACT

Due to its potential utility, Big Data (BD) recently attracted researchers and practitioners in decision-making. Big Data analytics (BDA) becomes more common among manufacturing companies because it lets them gain insight and make decisions based on BD. Given the importance of both BD and BDA, this study aims to identify and analyse essential BDA adoption barriers in supply chains. This study explores the current knowledge base using a BWM (Best Worst Method) to discuss these barriers. Data were obtained from five Indian manufacturing companies. Research findings show that data-related barriers are most significant. The findings will help managers understand the exact nature of the challenges and possible advantages of the BDA and implement BDA policies for the growth and output of supply chain operations.
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Selection and peer-review under responsibility of the scientific committee of the 3rd International e-Conference on Frontiers in Mechanical Engineering and nanoTechnology.

1. Introduction

Today, manufacturing companies perceive the safe and successful use of Big Data Analytics (BDA) as a significant factor in global firms' performance [1]. Companies need to build long-term sustainability by creating successful operations and digital supply networks in today's growing digital global business climate. The volume of extensive data has also increased rapidly due to developments in information and communication technology (ICT) such as Web 2.0 and the Internet of Things (IoT). BDA can also provide the supply chains with conscious decisions, control and reduce risks, enhance operating processes, marketing new products and so on [2,3].

Big data denotes massive data sets whose size is so huge that they surpass the computer's memory used by an organization with minimal hardware resources. Cumulative data contains data of all kinds from any source. The supply chain of a company is the network of companies involved in manufacturing and distributing a product. Each product the final customer purchases reflects multiple organizations' collective effort. Therefore, supply chain activities include everything from product development, manufacturing and logistics to consumer satisfaction maximization and sustainable competitive advantage.

Numerous manufacturing concerns desire to employ BD to boost the efficiency of their supply chains. They may be unsuccessful because of inadequate understanding of BDA due to the dearth of BDA infrastructure or many supply chains problems.

It is needed to examine BDA barriers in the manufacturing sector's supply chain in a contemporary, technologically advanced and competitive world. A detailed study of the BDA barriers will help manufacturers create productive strategies. In industrial supply chains, there are very few studies into the barriers to BDA. [4] submitted a qualitative review of the barriers in adopting BDA. [5] qualitatively studied BDA 's telecommunications issues in South Africa. This research's unique contribution is the application of BWM to measuring BDA barriers in Indian manufacturing supply chains.

The aim of this research is:

a) to recognize barriers in adopting BDA in the Indian manufacturing supply chain.

b) to quantitative examining of barriers using the Best Worst Method (BWM).

As below, the rest of this article is structured. Section 2 provides the literature. Section 3 puts forward the proposed BWM approach. Section 4 shows the solution's application. Section 5 discusses the

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https://doi.org/10.1016/j.matpr.2021.03.374
2214-7853/© 2021 Elsevier Ltd. All rights reserved.
Selection and peer-review under responsibility of the scientific committee of the 3rd International e-Conference on Frontiers in Mechanical Engineering and nanoTechnology.

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ORIGINAL RESEARCH PAPER

Analysis of Barriers to Green Manufacturing Using Hybrid Approach: An Investigatory Case Study on Indian Automotive Industry

Sudhir Kumar Pathak[1] · Kritika Karwasra[1] · Vikrant Sharma[2] · Vikram Sharma[1]

Received: 12 October 2020 / Revised: 15 January 2021 / Accepted: 18 January 2021
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Abstract
Due to natural resource shortages, global warming, and waste management issues, manufacturing faces the challenge of adhering to strict environmental legislation. The driving force for producers worldwide to implement green manufacturing practices is the growing environmental concerns and awareness. The activities involved in green manufacturing (GM) are the basis for making goods green and environmentally friendly. However, there are many critical barriers to implementing GM. So, the prioritization is needed to eliminate these critical barriers systematically. This paper aims to define eleven barriers based on literature and practitioners' views on GM issues. In this paper, the role of the hierarchical and contextual links between GM barriers was understood using a hybrid interpretive structural modelling (ISM) and the Decision Making Trial and Evaluation Laboratory (DEMATEL). The results depict that lack of necessary tools and management skills, and need of training for the implementation of sensitive environmental processes as the critical barriers set out in the new ISM-DEMATEL methodology. We hope that the current study will allow the manufacturing sector to address potential barriers that can affect GM practices implementation.

Keywords Automotive industry · Barriers · Green manufacturing · ISM-DEMATEL · India

Introduction

Manufacturing plays a crucial role in the economies of the advanced nations of the world. However, it has come under intense pressure to tackle the increasing demand for sustainability to the environment. The manufacturing sector has to look up to a sustainable formula to adapt to manufacturing in a way that does not cause any harm the environment and does not hamper productivity. Thus, green manufacturing (GM) strategy is getting popular in current times. Green manufacturing (GM) is "a set of manufacturing practices which do not harm the environment during any phase of the journey" (Srivastava 2007). GM's main objective is to have minimal adverse environmental impacts and minimize product costs. The manufacturing industry accounts for 84% of the energy-related CO_2 emissions as compared to others. Also, it consumes 90% of the energy from the industry (Duflou et al. 2012). The concept of GM has received tremendous global attention. Many nations, businesses, and organizations invest time and resources to improve environmental safety and sustainable development efforts. Producers are interested in achieving sustainable GM production practices in contemporary business environments, meeting their requirements for liability and positioning them in their competitive markets (Linke et al. 2012). Apart from its impact on environmental, operational, and corporate efficiency, GM guides the companies to gain maximum support from numerous partners, including clients, NGOs and the government (Poret 2019).

Several government policies control the waste generation industries that must abide by the Government Tribunals' en-

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Modeling the Interactions Among Critical Criteria of a Cellular Manufacturing System

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***Abstract*—*The aim of this article is to investigate the interactions between the critical criteria of implementation of the cellular manufacturing system (CMS). In this article, 15 critical criteria are chosen on the basis of literature review and opinion of experts from the manufacturing industry, which was analyzed for their interactions and dominant relationships using the interpretive structural modeling (ISM) methodology and interpretive ranking process (IRP) methodology, respectively. These distinct modeling approaches have been employed to study the appropriate relationship among the CMS implementation criteria and their ranking considering key performance areas. The study marks is an attempt to fulfill the gap in the literature, as the literature majorly focuses on CMS implementation, but pays no attention to models considering such critical criteria. The ISM model particularly highlighted the importance of employee training over other critical criteria, which will in turn ensure the success of CMS implementation, while the IRP model revealed CAD/CAM as the most important criterion when evaluated against various performance areas. The study, thus, paves a new way for manufacturing organization's management to be aware of critical criteria and analyze those that might be important for the future survival of the organization.*

IEEE DOI 10.1109/EMR.2020.3042801

1. INTRODUCTION

CELLULAR manufacturing (CM) is an approach for improving operations in job shop production and batch shop production. CM is a physical grouping of machines, or cells, each being devoted to the production of a product family [Greene and Sadowski, 1984]. Typically, machines in each cell are dissimilar in their functions. Industry implements CM for two primary reasons; one is a response to the customer in a competitive market, and the second is to make the system more productive [Alford, 1994]. The aim of CM is to increase system flexibility and production efficiency by utilizing processing similarities of the parts with two fundamental characteristics: components are classified into different families and the arrangement of machines into groups [Dekkers, 2018]. In spite of this, CM does not have the flexibility of job shops in making an extensive variety of items, but it has a high production rate and efficient flow [Liu *et al.*, 2018].

Even though the increased competition faced by the manufacturers of today has made them very accessible to ideas that promise competitive advantage, CM implementation in an organization is still considered a more robust and challenging job than cell designing [Sharma and Gidwani, 2019]. The implementation of CM in job or batch production involves the translation of all or a portion of a firm's manufacturing system to cells but while implementing CM, it is essential to involve all the levels of different

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Recent Advances in Computer Science and Communications 2019, *12*, 1-00

RESEARCH ARTICLE

Prediction of Breast Cancer Using Machine Learning

Somil Jain[1,*] and Puneet Kumar[1]

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ARTICLE HISTORY

Received: March 25, 2019
Revised: April 19, 2019
Accepted: May 20, 2019

DOI:
10.2174/2213275912666190617160834

Abstract: ***Background*:** Breast cancer is one of the diseases which cause number of deaths ever year across the globe, early detection and diagnosis of such type of disease is a challenging task in order to reduce the number of deaths. Now a days various techniques of machine learning and data mining are used for medical diagnosis which has proven there metal by which prediction can be done for the chronic diseases like cancer which can save the life's of the patients suffering from such type of disease. The major concern of this study is to find the prediction accuracy of the classification algorithms like Support Vector Machine, J48, Naïve Bayes and Random Forest and to suggest the best algorithm.

***Objective*:** The objective of this study is to assess the prediction accuracy of the classification algorithms in terms of efficiency and effectiveness.

***Method*:** This paper provides a detailed analysis of the classification algorithms like Support Vector Machine, J48, Naïve Bayes and Random Forest in terms of their prediction accuracy by applying 10 fold cross validation technique on the Wisconsin Diagnostic Breast Cancer dataset using WEKA open source tool.

***Results*:** The result of this study states that Support Vector Machine has achieved the highest prediction accuracy of 97.89 % with low error rate of 0.14%.

***Conclusion*:** This paper provides a clear view over the performance of the classification algorithms in terms of their predicting ability which provides a helping hand to the medical practitioners to diagnose the chronic disease like breast cancer effectively.

Keywords: Health Care, ICT, Breast cancer, Machine Learning, Classification, Data mining.

1. INTRODUCTION

Health Care sector is the area where the governments of every developing country are showing their specific dedication in terms of allocating the specific budgets for the sector to provide seamless and less expensive treatments to the patients, but as the use of ICT is concerned this sector is lagging far behind in some of the countries [1]. As the chronic diseases like cancer are spreading with a rapid rate across the globe causing a number of deaths every year, so early detection of this type of disease symptoms can save a lot of patient's life's [2]. ICT (Information and communications technology) and use of various IT tools can be helpful for the medical practitioners to take the proper medical decision based on the results at the early stages and also provides a cost-effective means of treatments to the patients [1,3].

Nowadays, the most common disease found in women is breast cancer. It is the second major cause of death after the lung cancer [4-7]. It is accountable to be 16% of the total deaths worldwide [8]. In this type of cancer, characteristics of the cells which are present in the human body tend to change and start to behave abnormally. As this is spreading with a rapid rate, so to prevent the losses of life, early detection of breast cancer is very important and necessary [2, 6-7, 9-10]. There are two types of treatments generally used for treating the breast cancer [5] *i.e.* local & systematic; radiation therapy & Surgery are the type of local treatments whereas chemo and hormonal therapy are considered as the systematic treatments. Breast cancer can be either in benign or malignant stage. A benign tumor is considered non-cancerous as it will not penetrate to different parts of the body, surgery is required at this stage as diagnosis. A malignant tumor has the ability to spread to other parts of the body if it is not properly diagnosed [8].

Due to the enormous amount of data, the traditional approaches [2, 8, 10] are not suitable or we can say that these approaches are not able to analyze, find the correlated patterns and to detect the hidden information and facts. So in this type of situation, various machine learning and data mining techniques gave a new hope for the industry as well as the suffering patients too. These methods are helpful in early detection, avoidance, prediction, reduction in cost and to take decisions

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2213-2759/19 $58.00+.00

07/12/2019
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Dogo Rangsang Research Journal
ISSN: 2347-7180

UGC Care Group I Journal
Vol-10 Issue-07 No. 14 July 2020

Performance Enhancement of De-duplication In Cloud Environment

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Abstract— **Data generation growth in current usage of social networking site by internet with is huge (Big Data). So Internet service providers faces a problem of de-duplication of data over different users. Data De- duplication has play a critical role in cost effective storage and effective bandwidth usage by de-duplication processing . If we handle the data effectively like remove the redundant data before storing into the storage media we can avoid data handling overhead and we can improve the system performance. This paper discusses the information about data deduplication for the cloud based systems. It includes the methods that are used to achieve cost effective storage and effective bandwidth usage by deduplication. This work will perform de-duplication on the basis of roles assigned to users along with attributes of contents. It will support for different type of contents like text, images, etc.**

Keywords: De-duplication, Attribute Based De-duplication, Role Based De-duplication, Content Based De-duplication, Fast Indexing, Data compression Storage optimization, Big data

I. INTRODUCTION

Cloud storage provides customers with highly available, scalable and low cost data storage with adaptable provisioning and usage-based pricing [1]. It achieves economy of scale from multi-tenancy in which multiple customers are served from a shared pool of resources; each customer, which could be an enterprise or government, is referred to as a tenant [2]. Indeed, many enterprises are moving to cloud storage services such as Google Drive [3], Dropbox [4] or Mozy [5] rather than using their on-premise storage server. Individual users, usually the employees of a company, are thereby provided with ubiquitous file-sharing and backup services by the outsourcing of data to the cloud storage. The fast growth of data volumes from users raises a challenging issue to minimize costs of storing outsourced data in the cloud storage. Data de-duplication techniques [6] can achieve this goal by allowing a cloud storage service provider (CSP) to eliminate redundant data on the storage. Since this technique saves more than 80-90% of resources, most storage service providers take advantage of it [7][8]. Data de-duplication (henceforth de-duplication), is the process of eliminating copies of repeating data, thus reducing both the intra-file- and inter-file data redundancies [9]. *"By identifying common chunks of data both within and between files and storing them only once, de-duplication can yield cost savings by increasing the utility of a given amount of storage[10]."* Data deduplication is a technique for eliminating duplicate copies of repeating data. A related and somewhat synonymous term is single-instance storage[25].

Big Data is a term that refers to data sets or combinations of data sets whose size (volume), complexity (variability), and rate of growth (velocity) make them difficult to be captured, managed, processed or analysed by conventional technologies and tools, such as relational databases and desktop statistics or visualization packages, within the time necessary to make them useful. While the size used to determine whether a particular data set is considered big data is not firmly defined and continues to change over time, most analysts and practitioners currently refer to data sets from 30-50 terabytes(10 12 or 1000 gigabytes per terabyte) to multiple petabytes (1015 or 1000 terabytes per petabyte) as big data. Figure No. 1 gives Layered Architecture of Big Data System. It can be decomposed into three layers, including Infrastructure Layer, Computing Layer, and Application Layer from top to bottom.

3 Vs of Big Data

Volume of data: Volume refers to amount of data. Volume of data stored in enterprise repositories have grown from megabytes and gigabytes to petabytes.

Variety of data: Different types of data and sources of data. Data variety exploded from structured and legacy data stored in enterprise repositories to unstructured, semi structured, audio, video, XML etc.

Velocity of data: Velocity refers to the speed of data processing. For time-sensitive processes such as catching fraud, big data must be used as it streams into your enterprise in order to maximize its value[20].

This frame work is used to improve storage utilization and can also be applied to network data transfers to reduce the number of bytes that must be sent. In the deduplication process, unique chunks of data, or byte patterns, are identified and stored during a process of analysis. The effectiveness of de-duplication varies widely across the different de-duplication algorithms and different data sets. The governing cooperation of large naval, fishing, oil, etc. Fleets requires information to flow from their management system(s) to their fleet in a robust manner, likewise the fleets have information required by the governing entity. The information necessitates the need to differentiate between different recipients; the captain requires some documents, while crewmembers have differing needs. The research work proposes a framework for role and attribute based de-duplication for cloud content. In this work we will perform de-duplication on the basis of roles assigned to users along with attributes of contents. It will support for heterogeneous type of contents like text, images, etc. Proposed prototype of the system will apply own encryption scheme on the basis of various parameters like roles, attributes and type of data. The use of cloud for storing data by companies for backup and common people for sharing information among friends has increased drastically over the past few years. This has created a challenge to the cloud service providers to maintain all this massive data and to offer these services at lower price to the customers. In reality most of the data stored in the servers is often repeated. For example, a service may

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Adoption of Artificial Intelligence in Industrial Sectors and Its Impact

Somil Jain and Puneet Kumar

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12.1 Introduction

Artificial intelligence is used in fields with an intent to automate the process—in other words, to make machines capable to work like a human being. This technology was introduced over six decades ago [1]. AI has recorded its strong presence in areas like computer, mathematics, industry, psychology, etc. [2]. The concept of AI was generated from Turing machines by Alan Turing in 1912–1954, with the tagline: "thinking machines"—machines that think like humans [3]. As the entire world moves toward digital technological advancements rapidly, there is a need for intelligent technologies that provide innovation, competitiveness, and ability to handle complex data to keep up [4]. Here, AI will act as a helping hand through automation of various tasks that result in an efficient and faster outcome. This technology can be used in various sectors like education, transportation, telecommunication, healthcare, R&D, etc. [5]. If we take the example of industries associated with power and energy, this technology can be used to predict optimal energy utilization by developing various energy computing models [6]. On the other hand, if the transportation sector considers AI, then it can help create voice-automated vehicles and built-in GPS that generate real-time traffic information, reducing the number of road accidents and improving the flow of traffic [7]. Citizens' safety can be

advanced through high-tech surveillance cameras with GPS at public places (malls, roads, etc.) to reduce crime rate and identify criminals by live tracking [8].

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12.2 Application of Artificial Intelligence in Various Domains

12.2.1 Public Healthcare

AIP Conference Proceedings

Second law analysis of an integrated parabolic trough photovoltaic thermal system

Cite as: AIP Conference Proceedings **2273**, 050008 (2020); https://doi.org/10.1063/5.0025117
Published Online: 02 November 2020

Nikhil Gakkhar, Manoj K. Soni, and Sanjeev Jakhar

View Online Export Citation

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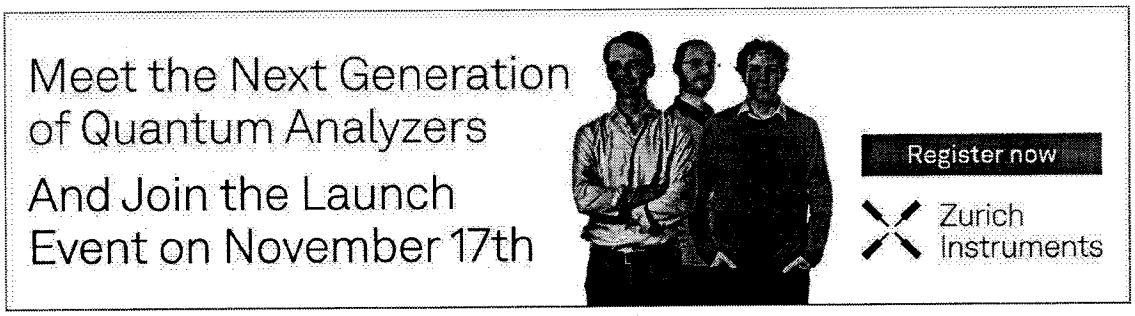

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Modelling and Simulation of Photovoltaic Thermal Cooling System Using Different Types of Nanofluids

Sanjeev Jakhar, Mukul Kant Paliwal, and Atul Kumar

Abstract Solar technologies like flat plate solar collectors are being widely used for low-grade thermal energy for household purposes. These days, photovoltaic thermal (PV/T) collectors are also gaining momentum as source of combined heat and electric power. Commonly used base fluid in PV/T collector is water which have low thermal conductance, and thus, addition of nanoparticles in base fluid will lead to the enhancement in overall thermal conductance. Keeping this as main focus, a research has been carried out to evaluate the performance of PV/T system with different nanoparticles. For that, the simulation was carried out by performing grid test and then simulated on ANSYS to obtain results. For the same, nanofluids with 20 nm particle dimensions and 299 K inlet temperature were loaded with 0.5, 1 and 1.5% particle volume fraction with different Reynolds numbers varying from 250 to 1500. The simulated model was validated with the literature, and obtained results showed that the heat transfer coefficient (HTC) without any nanoparticles ranges from 245.5 to 519.8 W/m^2 K for Reynolds number of 250–1500, respectively. On other hand, with nanoparticles, the HTC increases and ranges between 250.6–529.20 W/m^2 K, 255.42–539.8 W/m^2 K and 261.1–550.8 W/m^2 K for 0.5%, 1.0% and 1.5% volume fraction, respectively, for Reynolds number of 250–1500. In the end, it is concluded that the simulation results are in good agreement with the literature.

Keywords Laminar flow · Photovoltaic thermal (PV/T) · Heat transfer coefficient (HTC) · Solar energy

Nomenclature

C Specific heat (J kg^{-1}K^{-1})
ρ Density kg m^{-3}
μ Dynamic viscosity (Pa s)

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M. Ramgopal et al. (eds.), *Advances in Air Conditioning and Refrigeration*, Lecture Notes in Mechanical Engineering, https://doi.org/10.1007/978-981-15-6360-7_1

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Machine Learning based Diagnostic System for Early Detection of Parkinson's Disease

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An intuitive graphical user interface for the Parkinson's Disease patients
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Abstract:
Early detection is an approach which enables initiation of diagnosis interventions. The objective of the study is to give an insight to diagnostic parameters of Biosignals which is used for finding brain and muscle defects of a Parkinson's Disease(PD) patient. As PD occurs due to very less productionof dopamine in substantia nigra of brain leading to disturbed limb movements by affecting the muscles, Electroencephalogram and Electromyogram based GUI model would be an effective tool and true justification for early detection of PD. EEG and EMG was collected from early stages PD and healthy patients using Biophysical recording device. Features of EEG and EMG were extracted and classified using Artificial Neural Network. Designed model is a novel approach to classify PD from non-PD and monitor disease progression. There are various models available, but the work presented here gives the biosignals interpretations together with other parameters like those of radiological tools for disease diagnosis.

Published in: 2020 International Conference on Computational Performance Evaluation (ComPE)

Date of Conference: 2-4 July 2020 **INSPEC Accession Number:** 20014827

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Theft Security System for Automatic Teller Machines Using IoT

Vinay Verma, Anjali Verma, Gaurav Sharma, and Anand Sharma

Abstract This research paper suggests a system that efficiently and effectively provides a mechanism of anti-theft ATM by using Internet of things and fog computing by considering two solution: First, a instant solution at the beginning of stealing using fog computing and second, cloud-based messages technique system for ATM security and preventing from being stolen by thieves and unsocial elements. As we know that technology reaches its successful step when it fulfills every section of the public or society. As nowadays, it is very common in India that the entire ATM with public money is being stolen by some unsocial elements or thieves. So, this paper proposes an ATM safety while it is being tempered and gives a new system that works using the Internet of things and fog computing methods that would make the ATM and its places very secure and establishes entirely new technologies in ATMs which provides a Theft proof system. The system gives an instant solution while the machine system is being tempered and when criminals try to steal it. Once the ATM experience any vibration, the preventive mechanism will activate and the nearby police station will receive notification messages of the location of the ATM using the cloud. The text message comprises of GPS location of ATMs and also a cautionary message. The fog computing method activates to close the outer shutter of the ATM and the microcontroller to activate the ATM in a new mode of theft preventing by switching on an inbuilt backup supply of the ATM. The remarkable advantage of this system provides the banking system a new way of anti-theft management for money and ATM as well.

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V. Goar et al. (eds.), *Advances in Information Communication Technology and Computing*, Lecture Notes in Networks and Systems 135,
https://doi.org/10.1007/978-981-15-5421-6_37

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SAML Enabled Single Sign-On (SSO) Multifactor Authentication (MFA) in Cloud Computing

Rajesh Yadav, Dr. Anand Sharma

PDF

Issue
Vol. 63 No. 5 (2020)

Section
Articles

Abstract

From the last few years, the computation has transformed from centralized to distributed to Cloud computing.Organizations adopting the cloud and enhanced benefits like scalability, reliability, cost-effectiveness, and flexibility. With these benefits, various kinds of issues are also creating problems like network attacks and privacy issues. The traditional authentication (password) technique is not enough for the new attacking techniques, so arobust authentication is a topmostconstraint for the cloud that controls the prohibited access. The previous SSO technique is not enough for the current scenario especially in the cloud there we work on heterogeneous environments. For more safety and security use the multi-layer authentication that provides more safety and security but that creates other issues for the users. Users have required remembering lots of passwords for inserting and accessing the services. It's reduced the performance and increase the time duration of the task. SAML is a standard

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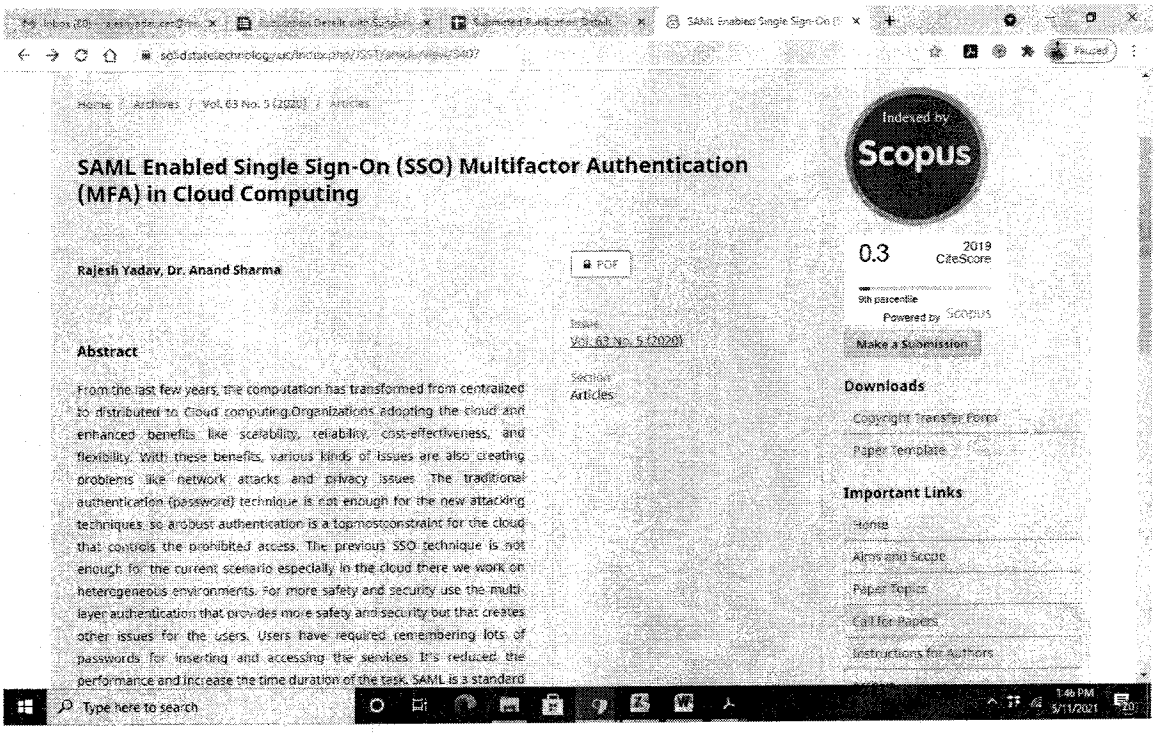

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SAML Enabled Single Sign-On (SSO) Multifactor Authentication (MFA) in Cloud Computing

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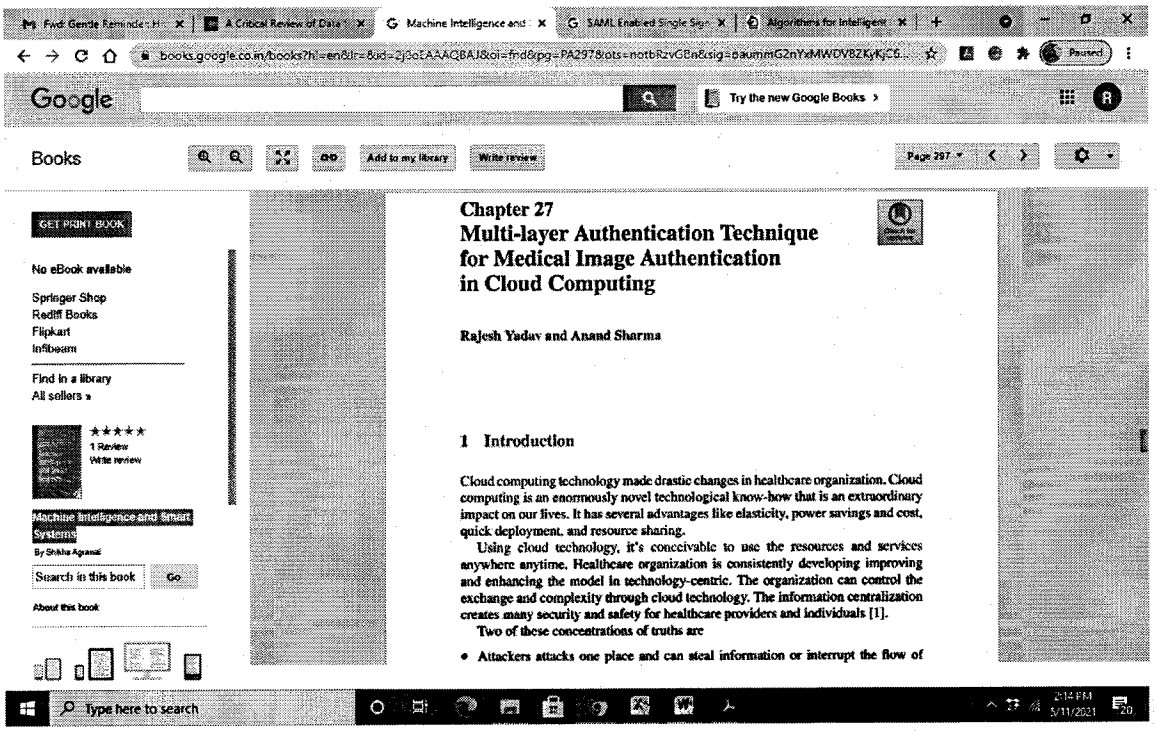

Chapter 27
Multi-layer Authentication Technique for Medical Image Authentication in Cloud Computing

Rajesh Yadav and Anand Sharma

1 Introduction

Cloud computing technology made drastic changes in healthcare organization. Cloud computing is an enormously novel technological know-how that is an extraordinary impact on our lives. It has several advantages like elasticity, power savings and cost, quick deployment, and resource sharing.

Using cloud technology, it's conceivable to use the resources and services anywhere anytime. Healthcare organization is consistently developing improving and enhancing the model in technology-centric. The organization can control the exchange and complexity through cloud technology. The information centralization creates many security and safety for healthcare providers and individuals [1].

Two of these concentrations of truths are

- Attackers attacks one place and can steal information or interrupt the flow of

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RESEARCH ARTICLE

Performance Estimation of a Wireless Sensor Network with a Mobile Sink Moving in Different Trajectories at Different Velocities

Vikas Raina[*,a], Ranjana Thalore[b] and Jeetu Sharma[c]

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ARTICLE HISTORY

Received: March 14, 2019
Revised: October 16, 2019
Accepted: October 21, 2019

DOI:
10.2174/2666255813666191211115247

Abstract: ***Background:*** Throughout the past few years, numerous Medium Access Control (MAC) protocols, routing protocols, node deployment mechanisms and duty cycle variation schemes have been designed for achieving high throughput, low delay and jitter, and long network lifetime in Wireless Sensor Networks (WSNs). In a WSN with static sink, voluminous sensors transmit their sensed data to the sink node. The coordinators mutually present in the range of sensors and sink have to forward a number of packets, which cause rapid depletion of their battery. These coordinators become dead too early resulting in the breakage of the communication channel and formation of energy holes. However, to save energy with a static sink, the duty cycle should be short. A mobile sink is a better option than a static sink if the duty cycle is long, as it balances energy consumption among the sensors. It is well observed that the mobile sink is capable of acquiring homogeneous energy depletion leading to stretched lifetime enhancing network performance.

Methods: The vital benefaction of this paper is to present a simulation-based analysis of the network performance with a mobile sink having different trajectories of path traversed at different velocities. The intent is to find out the most appropriate and efficient trajectory and a particular velocity for a specific WSN with 100 nodes. The terrain area of the network is 210×210 m^2 with the communication range of 20 m. The routing, network and MAC protocols implemented are Ad hoc On-Demand Distance Vector (AODV), Internet Protocol version 4 (IPv4) and Institute of Electrical and Electronics Engineers (IEEE) 802.15.4 respectively. This paper has evaluated and analyzed the influence of lawn mower, elliptical and circular trajectories of a mobile sink moving at different velocities of 0.5, 1 and 2 m/s. The optimum performance is achieved at the velocity of 2 m/s for a circular trajectory of the mobile sink. It is observed that performance has significantly varied with the variation of trajectories and velocities. The notion of precise utilization of sink mobility improves the performance than a static sink. It is equally important to determine the most effective mechanism to implement mobile sinks and to find out the most appropriate scheme out of them.

Results: The attainment parameters just as total messages received, average end to end delay (seconds), jitter (seconds), throughput (bits per second), number of packets dropped, number of packets dropped due to channel access failure, residual battery (mAh) and network lifetime (hours) for different trajectories such as lawn mower, elliptical and circular at different speeds of 0.5, 1 and 2 m/s of the sink node are evaluated and compared. The simulation results present that the circular trajectory and the velocity of 2 m/s have provided optimum performance.

Conclusion: The objective was to precisely analyze and evaluate the influence of different trajectories of a mobile sink moving at different velocities in a WSN of 100 nodes to determine the most effective and appropriate trajectory and velocity to optimize the attainments. The intent is to uniform the power exhaustion amidst the sensors. The purpose was to gain the attention of researchers of this field to significantly contribute to novel research.

Keywords: Mobile sink, IEEE 802.15.4, zigbee, energy-hole problem, AODV protocol, QualNet 6.1, lawn mower trajectory, elliptical trajectory, circular trajectory, wireless sensor network.

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Detection of DDoS Attacks Using Machine Learning in Cloud Computing

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Abstract. Cloud Computing is basically the use of software and hardware to provide a service over an internet network. Users use applications or can access files from any device with the help of cloud computing. The main thing is that device must be connected through the Internet. Cloud computing has many advantages like scalability, less maintenance, virtualization and requested resources to the users with reduced infrastructure cost, and greater flexibility. It faces many drawbacks like security attack as Distributed Denial of Service (DDoS).

DDoS attack is well-defined as a way of attack that includes multiple conceded computer systems attack a goal, like a server, any resource and website, and due to this a denial of service for the end users of the intended resource. The fake connection requests, flooding of inward messages, or distorted packets forces the whole system to slow down and shut down, in that way denying service to genuine end users and systems. In this paper we have analyzed and proposed the machine learning algorithms for detecting DDoS attack in cloud computing environment. This paper is using isolation forest anomaly detection technique and then the correlation will be used to for detection of DDoS attack.

Keywords: DDOS attack · Machine learning · Cloud computing

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1 Introduction

Cloud computing defined as an Internet-based computing that gives ability to share a wide group of resources like memory, network bandwidth, user applications, and processing of computer with less infrastructure cost and less maintenance [1–3]. The services of the cloud computing can be characterized into the three models [4]: Platform-as a Service (PaaS), Software-as-a-service (SaaS), and Infrastructure-as-a- Service (IaaS).

It is arranged in any network as public based, private based, and community based or hybrid types of cloud. The cloud service providers are hosted the services for the businesses or the ultimate users to exploit the uses over a connection of network at the data centre. They are the companies that are offering distinct services in the cloud environment. In the area of cloud computing the security attacks is one of the disadvantages. This problem is because of the storage of data at diverse geographical extents in the cloud computing environment.

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A. K. Luhach et al. (Eds.): ICAICR 2019, CCIS 1076, pp. 260–273, 2019.
https://doi.org/10.1007/978-981-15-0111-1_24

2020 International Conference on Emerging Trends in Communication, Control and Computing (ICONC3)
Mody University of Science and Technology, Lakshmangarh, Feb 21-22, 2020

A Detail Dominant Approach for IoT and Blockchain with their Research Challenges

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Abstract—**Internet of things (IoT) is a pool of various devices, objects, humans, services those might be interconnected and that can communicate with each other, share data and information to succeed a common aim in different applications and areas. The idea of the IoT is to allow devices to work together on the Internet. In IoT now days the main issue is the security, in our paper we have found many research challenges related to our area and the security challenges of IoT faces are becoming more and more severe as IoT uses is growing in almost all applications. If IoT devices are not secured properly, the privacy and security of data will remain major issues in the present world in which things are interconnected. The main motive of our paper is to review the present research challenges related to IoT and the developments in the field of IoT security with Blockchain. Blockchain can be a very good option, it provides wide range of security solutions for IoT ecosystems, including trustworthiness, privacy, integrity, transparency, data availability. The Blockchain technology is basically based on the concept of decentralization, security and transparency of the system that has developed as a proficient technology to resolve the serious issues those generally occurred in the fundamental centralized networks and secure the IoT technologies. Some interesting research directions of the use of blockchain in IoT can be found in our very recent survey paper. In this work, the effects of the blockchain on an extensive range of IoT security from the latest research papers and at last a model has been provided for the security of IoT using blockchain.**

Keywords— Data security, Device Security, IoT, Security, Blockchain

I. INTRODUCTION

Internet technology is connecting devices, machines and tools to the internet by way of wireless technologies [4]. In IoT, the physical things embedded with various network connectivity, electronics devices, sensor nodes, computing storage, controllers, different software used for data and information collection and for communicating between connected things [5] with a unique identities (UUID) over the internet. Over 9 million of "Things" connected to internet, as of now and things connected to internet are projected to cross 20 million in the coming era [6].

Unification of technologies such as low power embedded system, cloud computing, big data, machine learning and networking [1]. As the technology become advance, IoT is surely a step forward of the predecessor technologies in every domain of life everywhere technology is involved, the main component of the IoT is shown in Figure 1 with IoT features.

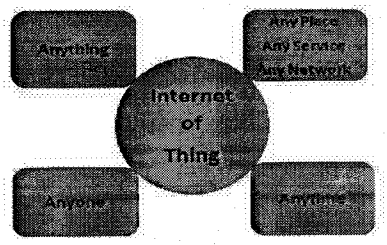

Fig. 1. Internet of Thing [2]

A. IoT Security

IoT security provides the technological space for protection of IoT connected objects and data. In IoT, all objects are connected through the internet with digital machines, devices for computing purposes on electrical, mechanical, humans, animals, homes, etc. with a unique identifier and data transfer capability automatically over a network. If these IoT objects are not connected properly, then there may a number of serious vulnerabilities [11]. The main purpose of IoT security is to confirm the data security, preserve privacy, confidentiality, infrastructures security, devices security and availability of services provided in IoT environment [23].

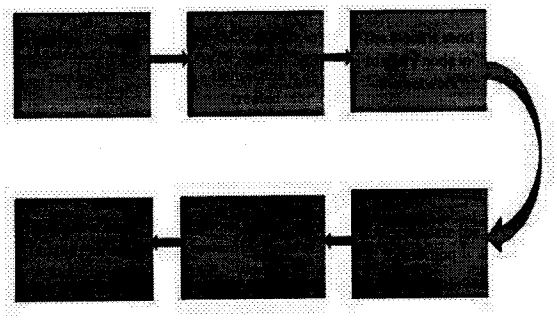

Fig. 2. Blockchain platform [27]

B. Blockchain

A blockchain concept can be mentioned as a distributed ledger, in which the data and transactions are not under the control of any intermediary. All the transactions in this framework are entirely recorded permanently and the verifiable way in the public ledger. The first introduction of the blockchain was firstly introduced by Satoshi Nakamoto as the main part for Bitcoin cryptocurrency. It is not essential to use a blockchain for developing a

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International Journal for Research in Engineering Application & Management (IJREAM)
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Technological Review on Green Fuel

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Abstract- Nowadays demand of energy is increasing in the industry, farming and households. Excessive use of fossil fuel is leads to the depletion of their reserves and which result in the deterioration of environment. Thus clean green fuels are developed. Biomass is measure renewable resources of energy. Developed countries are investing money on a high scale for alternative fuel whereas under developed countries are still following the old ways due to which critical environmental issues has occurred. Today many people are of the view that fuel cell technology is going to create a new technological renaissance. Such development will have significant environmental and economical effect. This paper would be discussing the latest innovations in green fuel technologies. It would also be giving short history of green fuels and some different technologies.

Keywords- Green fuel technology, bio fuels, global warming

I. INTRODUCTION

Mankind relies mostly on fossil fuels as major energy source since the energy sources has been discovered. Petroleum, coal, diesel etc. are some of the fuels that are included under fossil fuel. This fuel takes many years say million years for their formation. Therefore if they would get diminished then it would be very difficult to renew it. That is why it should be used wisely and judiciously. As the population rises the requirement for fuel sources also rises. On the contrary the reserves of fossil fuel are very limited and those which exist can sustain only for few hundred years. Therefore the upcoming generation would definitely face the fuel crisis and the present generation would somehow manage to meet the demands of fuel.

Not only extinction of fuel sources but critical environmental issues of fossil fuels also being faced presently. Fossil fuel is widely is used as motor oil or gasoline. Air pollutants like carbon monoxide, nitrogen oxide, particulate matter, volatile organic compounds and benzene are discharged or emitted into the environment because of the combustion of fossil fuel. These air pollutants contribute problems to the urban cities like quality of air gets affect for example photo chemical smog and affects adversely on human health.

That is why because of these problems alternative sources of energy are required, which are renewable and are not hazardous to the environment.

Bio fuel generally refers to different types of alternate energy resources that could supplement and even can substitute fossil fuels. Normally there are three categories of bio fuels: solid biomass, liquid fuel and bio gases. Each group not only describes the form of the fuel but also gives hint at uses for which the fuel is intended.

Ethanol is most common liquid bio fuel, which is extended by fermenting sugar or starch. This could also be generated by cellulosic combustion of bagasse and non-food energy crops.

The Potential In India for Biofuels

Strengths	Weaknesses
• Alternate fuel source • Energy security of the country • Less GHG emissions, environment friendly • Higher Cetane number and better lubricating effect for biodiesel	• Wasteland requirements • Need for engine modifications in higher blends • Market still in nascent stage • Still in field trial stage in India
Opportunities	**Threats**
• National Biodiesel policy • Keen interest of private players • R&D across the sector • Less dependency on depleting fossil fuels	• The discovery of huge gas reserves in India may push biofuels on the back foot • Food vs. fuel debate • Cost effectiveness of Biofuels • Raw material

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 DOI : 10.18231/2454-9150.2019.0536 © 2019, IJREAM All Rights Reserved.

International Journal for Research in Engineering Application & Management (IJREAM)
ISSN : 2454-9150 Special Issue - TMRI - 2019

Performance Characteristics of Diesel Engine on Sesame Oil- Diesel Blended Fuel

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Abstract- In this world where technology moves faster than anything else, demand of energy resources are increasing for cop up with our requirement. Our earth has vast sources of energy which could provide as much best as possible. But these resources does not gives us guarantee that it could support us in growth of our economy and at the same time provide better environment conditions. We have to choose those options which give us optimum results and help us to reaching our goal of energy security, economic growth and environment safety. In transportation sector, to meet our global requirement, demand of liquid fuel is very high. Although presently we are working on production of third generation biofuel, like algal biofuel, hydrogen fuel, but its implementation would require huge technological challenges to overcome. Until that we can use first and second generation biofuels to fulfil global oil demand and secure oil reserves for future purpose. This study provides utilization of vegetable oil (sesame oil) blend with diesel and its effect on performance parameters of diesel engine.

Keywords **—blending, brake specific fuel consumption, brake thermal efficiency, diesel, sesame oil**

I. INTRODUCTION

Now a day, due to limited resources of fossil fuels, rising crude oil prices and the increasing concern for environment, there has been renewed focus on vegetable oil as a substitute to petroleum fuel. Fossil fuel is primarily dominating due to its high combustion efficiency, fuel adoptability and handling facility [1]. However the deep concern about fossil fuel is its toxic pollutant generation that links to the global warming, climate change and even some impasse diseases [2]. From the point of view of protecting the global environment and the concern for long term supplies of the conventional diesel fuel, it become necessary to develop alternative fuel comparable with conventional fuels. Diesel fuel drives the transport, farming; commercial, households and industrial sector for the generation of power and replacing a tiny fraction of total consumption by alternative fuels will have a significant impact on the economy and the environment [3]. Petroleum and diesel come in the category of non- renewable fuel and will be exhausted in few decades. These non-renewable also emit pollutants in the form of oxide of nitrogen, oxide of Sulphur, oxide of carbon, lead, hydrocarbon etc. Biodiesel an alternative fuel to commercial diesel which can be evaluated for emission results. However major disadvantage of vegetable oil is its viscosity, which is order of magnitude higher than of mineral diesel [4]. Literature study reveals that vegetable oil can replace for mineral oil if viscosity is reduced by mixing it with diesel or by esterification or by preheating of oil [5]. Biodiesel has low Sulphur contents and hence cause lass environment damage than diesel.

II. MATERIALS AND METHOD

Sesame is originated in Africa, Turkey, India, China, Sudan, Burma, Tunisia, Egypt, Thailand, Mexico, Guatemala, Afghanistan, Pakistan, Bangladesh and etc. The oil content is about 57-63% [9, 10]. Sesame is world's ancient oilseed. This warm- season annual crop is primarily found in well drained soils. India being the largest producer of sesame oil exports around 6,80,000 metric tonne annually. It is unusually high in oil thus decrease in protein content. On one side it is environmentally sustainable to use this fuel on the other hand it will also encourage farmers to plant this crop along with regular food crop. They can also make use of and waste lands for cultivation. Globally, more than 350 oil-bearing crops are identified as potential source of biodiesel which can be classified as edible and non-edible [13] due to diversity of oil bearing crop; it is a challenge to select the potential sources of biodiesel. Hence several of research is ongoing. A number of sources from edible oil are already dominating in several countries. For instance, canola and soybean are used in USA, Palm oil in Malaysia, rapeseed oil in Europe etc. [13, 14]. Sunflower, peanut, coconut and sesame are few other examples of edible oils. The KSRTC began trials of edible oil such as groundnut,

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Impact of Internet of Things (IoT) on Automobile

Mody University International Journal of Computing and Engineering Research
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Published: 2019
Author(s) Name: Vivek Pandey, Atul Kumar, Mukul Kant Paliwal and Vikrant Sharma | **Author(s) Affiliation:** Assist. Prof., Dept. of Mech. Engg, Mody Univ. of Science and Tech., Rajasthan, India.

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Abstract

The Internet of Things (IoT) is revolutionizing our lives by connecting various devices and equipment's with people and with intelligence pooling. IoT has got enormous capacity to change the people's way of living. IoT has opened ways for newer possibilities and applications in the field of driver less vehicles, parking, connected vehicular traffic, supply chain of transport system etc. This paper envisages the effect of IoT in terms of the automobile sector to provide intelligent traffic system and management, supply chain management in auto and transport sector, new generation vehicles etc.

Keywords: Automobile, Connected cars, Electric cars, IoT.

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STM JOURNALS

Journal of Production Research & Management
ISSN: 2249-4766 (Online), ISSN: 2347-9930 (Print)
Volume 9, Issue 3
www.stmjournals.com

A Survey on the Status of Cellular Manufacturing System Implementation in Indian Manufacturing Industries

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Abstract

Increasing of worldwide competition and changing customer needs force producers to enhance their manufacturing activities in terms of effectiveness, flexibility and productivity with minimal incremental expenditure of time and capital. Cellular manufacturing (CM), which applies the principles of group technology to production, has been acknowledged as a promising alternative to traditional manufacturing technologies, such as job shops and flow lines, in meeting the demands of competitive industries that presently prevail wordwide. A large number of articles on the design issues of the CM system have been published. Unfortunately, the comprehensive CM study has not been implemented very well in developing nations such as India. This article provides the outcomes of a study in Indian manufacturing sectors to find out the status of CM implementation.

06/12/2021

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Keywords: *Cellular manufacturing, group technology, manufacturing industries, production*

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INTRODUCTION

India is rapidly becoming one of manufacturing industry's most lucrative options for economic success. Manufacturers are now continually searching for ways to gain competitive advantages. As competition exaggerates, they need to increase the quality, flexibility and cost of their manufacturing. As a result, they have become increasingly open to new and novel ideas propagated in order to yield competitive profits. For organisational performance and survival, a culture of continuous improvement is essential [1]. Companies need to review their procedures to ensure they are robust and updated to promote the customer's voice.

It is influenced to raise the level of each manufacturing due to high or smart productivity. One of the solutions to increasing productivity for manufacturing is the layout and design of plants. The varieties of enhancement techniques to be applied in the manufacturer were explored by many researchers.

Due to the emergence of the age of mass customization of products around the globe, batch production has been common and dominant in past few years. High-level product range and tiny manufacturing lot sizes are available for batch manufacturing. In order to compete to the worldwide market, productivity in small batch manufacturing sectors needs to be improved. To this end, some creative techniques are required to decrease product price, time throughput and improve flexibility and product quality in order to help enhance profitability and market share. One way to accomplish this mix of goals is to restructure the production system as considered in the Group Technology (GT) principles.

A GT implementation, cellular manufacturing has appeared as a promising alternative production system. GT is a management strategy aimed at grouping components that require similar activities and machines that correspond to those activities, resulting in part families and machine cells. It is possible to group a large sum of components (machines)

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Implementation model for cellular manufacturing system using AHP and ANP approach

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Received 16 August 2018
Revised 26 September 2018
Accepted 16 October 2018

Downloaded by 106.79.224.116 At 06:29 26 February 2019 (PT)

Abstract

Purpose – The purpose of this paper is to visualize the prioritization among essential factors of cellular manufacturing system (CMS) implementation using the analytic hierarchy process (AHP) and analytic network process (ANP) methods.

Design/methodology/approach – Based on literature review, 4 enabler dimensions and 17 CM factors were identified which were validated by experts from academia and industry. Then, AHP and ANP models are proposed in evaluating CMS implementation dimensions and factors. The results are validated using sensitivity analysis.

Findings – These models give firms a straightforward and simple to utilize way to deal with CMS efficiently. The two strategies were appeared to be powerful in choosing a strategy for CMS implementation. The two strategies brought about nearly similar outcomes. Both methods consider the particular necessities of the organization through its own accessible ability.

Practical implications – The techniques exhibited in this paper can be utilized by a wide range of organizations for adopting CMS that have a higher impact on performance and thus overall productivity. The two techniques are explained in a step-by-step approach for easier adoption by practitioners.

Originality/value – The strength of the present study is that it is one of the first few to be conducted in perspective for CM implementation factors analysis.

Keywords Analytical hierarchy process, Analytic network process, Cellular manufacturing system, Implementation

Paper type Research paper

1. Introduction

Cellular manufacturing (CM) is an approach for enhancing operations of job shop and batch shop production. CM is used to achieve the advantages of a product-oriented production system for medium volume, medium variety condition by preparing a group of parts on a group (cell) of machines. CM, which clusters machines, is dedicated to the part family of similar components (Dekkers, 2018). Although CM does not have the flexibility of job shops in making an extensive variety of items yet, it has a high production rate and efficient flow (Liu *et al.*, 2018). In the present batch production situation, demand for the product is considered by endless varieties concerning volumes, product mix and new product development. CM increases productivity, delivery performance by reducing work-in-progress inventory and lead times, hence helping manufacturing industries to be

Benchmarking: An International Journal
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1463-5771
DOI 10.1108/BIJ-08-2018-0253

06/12/2021
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International Journal of Advanced Science and Technology
Vol. 29, No. 6, (2020), pp. 1605-1613

An Efficient Neural Network Based Approach for the Detection of Breast Cancer

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Abstract

Women's of young age of the developing nations are suffering from breast cancer which is considered as the major cause of deaths and it is increasing with a rapid rate, to get control over this early detection and diagnosis of this disease is highly required. In order to implement this various machine learning techniques are becoming popular now a days especially the neural networks because of their capacity to handle the enormous data of various complex datasets and to perform various computation for providing better results with minimal rate of error. In this work we have used two types of neural networks MLP and RNN over Diagnostic dataset of Breast Cancer. Model of both the networks were tuned using various hyper parameters in order to get precise and accurate results.

Keywords: *Neural Networks, RNN, MLP, Breast Cancer.*

1. Introduction

As per statistics of American cancer society the total number of deaths due to breast cancer worldwide is around 627,000in the year 2018 and it is likely to be increased by 2.1 million in the coming years [1]. Breast cancer is mainly affecting the women's of younger age of any developing nations [2-3]. This cancer occurs in the cells of breast by creating an extra tissue generally called as tumors which can be further categorized as Benign (non-cancerous) and Malignant (cancerous) [4]. If the portfolio regarding the medical facilities of advanced level is considered then it is sliding down with a rapid rate especially for diagnosing the breast cancer at an early stage [5]. Various traditional approaches are considered for diagnosing the breast cancer named as Biopsy and mammography. In biopsy technique a testing is performed over the collected tissues of breast and then the results are generated, but the process of biopsy is painful & time consuming also the results produced after testing are not effective and accurate [6]. Mammography is a type of technique where an image of breast is captured and the image is diagnosed with 2-D projection technique. These two techniques are also known as invasive diagnosis techniques, but these techniques are quite tough to carryout and the results produced from these techniques are not effective and accurate for diagnosing breast cancer [7-8]. Keeping in mind the above mentioned disadvantages of the invasive diagnosis techniques there is a requirement of some technique which provide the better and accurate results in less time. In order to fulfill this, various non-invasive techniques need to be applied using some machine learning algorithm. As these techniques are widely reported in various literatures to perform classification between Benign and Malignant tumors using different classification algorithm.

In this paper an attempt is made to identify the importance of neural networks in the prediction of breast cancer in terms of accuracy & various parameters. Various hyper parameters were also used in this study and they were tuned in order to get good form of results.

This paper is structured in the below listed way:

(i) In Section 1, basic information about breast cancer and applicability of machine learning algorithms is discussed.

(ii) In Section 2 literature review we have gone through is provided.

06/12/2024
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International Journal of Advanced Science and Technology
Vol. 29, No. 7, (2020), pp. 14597 - 14606

Attribute and Role Based Deduplication

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Abstract

In the Field of Cloud Computing, Usage of proper cloud-storage space has been the leading area as it provides proper scalability and availability. The tremendous generation of data lead to storage space problem in the field of cloud computing. Different solutions have been proposed to solve the Storage space problem and improve cloud storage performance. The Data Deduplication is one of the propitious techniques to work out these storage issues. This paper covers the discussion on the background study of data deduplication technique which covers different types of deduplication and its performance metrics. Also we propose a method of role based and attribute based data deduplication. Proposed framework found storage saving and efficient as compare to existing methods.

Keywords: *Data-Deduplication, Data Storage, Chunking Method, Cloud Computing.*

1 Introduction

Data is the most important part of any organisation to fulfill their needs. Data is generating at very high rate and it needs to be stored and managed in the databases with uniqueness. The Cloud model has notably changed the direction of data in small, medium and big business model and personal data care due to increased scaling, network connection and on appeal self-service with minimal price. The CISCO Global Cloud Index (2020) [Cisco 2015-2020] showed that by 2020, data center storage will grow to 1.9 ZB, up from 392 EB in 2016, nearly a 5-fold growth. By 2020, the total global installed data storage capacity in cloud data centers will hold for 90 percent share of total DC storage capacity, up from 67.9 percent in 2015 [3].

With the unprecedented growth of cloud data, multiple copies of the same data exist within cloud storage as a massively increasing number of users independently store the same documents, media, or software packages. Today's demand of Cloud data storage backups lead to execution and storage space problems in cloud model. Various solutions have been suggested to improve the cloud storage performance and to improve the storage space problems. Data deduplication is one of the encouraging techniques to solve the issue of cloud data storage. Data deduplication is a means to remove redundant files or dossier. Deduplication identifies the data having more than one copy and eliminates the redundant ones. Deduplication finds the similar data, removes it and keeps only a single instance of it. By doing so, it drastically reduces the cloud storage space that can be used for another files or data to be used. Basically, it reduces storage space occupied by data or files. This will bring the following aid:

- Not needed the extra space to increase investment.
- Cost-saving and Time-saving.
- Limited power pressure.
- Save network bandwidth.

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International Journal of Mechanical and Production Engineering Research and Development (IJMPERD)
ISSN(P): 2249–6890; ISSN(E): 2249–8001
Vol. 9, Issue 5, Oct 2019, 1191–1202
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THERMAL PERFORMANCE ANALYSIS ON STAGGERED FINNED ABSORBER SOLAR AIR HEATER

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ABSTRACT

Analysis of thermal performance analysis on the staggered fin solar air heater has been carried out theoretically in this paper. Thermal efficiency indicates the part by which incident solar energy is converted to useful work output on the other hand thermohydrauic efficiency inform about the fraction of incident energy transformed to desired need. A analytical study has been carried out to investigate the number of effect of system and various operational parameters i.e. space between fins, vertical length of fin, mass flow rate of air and insolation 960 W/m2 on the thermal and thermohydraulic efficiency. The analytical approach provides adequate information of the performance of offset finned solar air heater and it helps in designing such types of solar air heater. The analytical methodology gives sufficient premonition of the execution of offset finned solar air heater and it very well may be useful in designing such kinds of solar air heater.

KEYWORDS: Solar Air Heater, Fin Spacing, Thermal Efficiency & Effective Efficiency

Received: Apr 10, 2019; **Accepted:** Apr 30, 2019; **Published:** Oct 04, 2019; **Paper Id.:** IJMPERDOCT2019105

Original Article

1. INTRODUCTION

With new progressions in scientific examinations, solar based energy could be more sparing in future with ease and high productivity. It is most essential amidst sustainable power source assets because of its quantifiable simplicity. The easy and the most effective approach to use sunlight based vitality are to change over it into warm vitality for warming applications. The flat plate solar air heater has an captivate radiative warmth exchanger, convert sun powered radiant energy into warmth, which is go on through convection from the absorber plate to the air. Solar air heater can be utilized satisfactorily for various applications, i.e. crops drying and restorative plants to quell the loss of therapeutic impact from direct radiation, moisture removal of food, warming of room and warm stockpiling. By prudence of lower thermo physical properties of air, extended surfaces, i.e. packed beds, rough surface absorber, and baffles are utilized to enhance the heat exchange rate without expanding the size of absorber plate (Duffie and Beckman, 1980; Krieder and Krieth, 1978). An experimental examination was finished by Youcef, A. S., (2005) to research the thermal execution of an offset rectangular plate fin fixed below the surface of absorber plate in staggered way and directed parallel to the flow of air. Results demonstrate that by high thermal exchange surface zone per unit volume are acquired high heat transfer with low pressure drop loss. Ming, Y., et al (2014) structured and enhanced a solar air heater with staggered strip fin by analytical modelling. The work was helpful for making energy efficient and financially effective solar air heaters. Another researcher, Youcef, A. S., Desmons, J. Y (2006) built up a numerical model to evaluate the thermal performance of the single pass solar air heater with staggered fin absorber plate.

06/12/2021

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International Journal for Research in Engineering Application & Management (IJREAM)
ISSN : 2454-9150 Special Issue - TMRI - 2019

Performance Characteristics of Diesel Engine on Sesame Oil- Diesel Blended Fuel

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Abstract- In this world where technology moves faster than anything else, demand of energy resources are increasing for cop up with our requirement. Our earth has vast sources of energy which could provide as much best as possible. But these resources does not gives us guarantee that it could support us in growth of our economy and at the same time provide better environment conditions. We have to choose those options which give us optimum results and help us to reaching our goal of energy security, economic growth and environment safety. In transportation sector, to meet our global requirement, demand of liquid fuel is very high. Although presently we are working on production of third generation biofuel, like algal biofuel, hydrogen fuel, but its implementation would require huge technological challenges to overcome. Until that we can use first and second generation biofuels to fulfil global oil demand and secure oil reserves for future purpose. This study provides utilization of vegetable oil (sesame oil) blend with diesel and its effect on performance parameters of diesel engine.

06/12/2021

Keywords —**blending, brake specific fuel consumption, brake thermal efficiency, diesel, sesame oil**

I. INTRODUCTION

Now a day, due to limited resources of fossil fuels, rising crude oil prices and the increasing concern for environment, there has been renewed focus on vegetable oil as a substitute to petroleum fuel. Fossil fuel is primarily dominating due to its high combustion efficiency, fuel adoptability and handling facility [1]. However the deep concern about fossil fuel is its toxic pollutant generation that links to the global warming, climate change and even some impasse diseases [2]. From the point of view of protecting the global environment and the concern for long term supplies of the conventional diesel fuel, it become necessary to develop alternative fuel comparable with conventional fuels. Diesel fuel drives the transport, farming; commercial, households and industrial sector for the generation of power and replacing a tiny fraction of total consumption by alternative fuels will have a significant impact on the economy and the environment [3]. Petroleum and diesel come in the category of non- renewable fuel and will be exhausted in few decades. These non-renewable also emit pollutants in the form of oxide of nitrogen, oxide of Sulphur, oxide of carbon, lead, hydrocarbon etc. Biodiesel an alternative fuel to commercial diesel which can be evaluated for emission results. However major disadvantage of vegetable oil is its viscosity, which is order of magnitude higher than of mineral diesel [4]. Literature study reveals that vegetable oil can replace for mineral oil if viscosity is reduced by mixing it with diesel or by esterification or by preheating of oil [5]. Biodiesel has low Sulphur contents and hence cause lass environment damage than diesel.

II. MATERIALS AND METHOD

Sesame is originated in Africa, Turkey, India, China, Sudan, Burma, Tunisia, Egypt, Thailand, Mexico, Guatemala, Afghanistan, Pakistan, Bangladesh and etc. The oil content is about 57-63% [9, 10]. Sesame is world's ancient oilseed. This warm- season annual crop is primarily found in well drained soils. India being the largest producer of sesame oil exports around 6,80,000 metric tonne annually. It is unusually high in oil thus decrease in protein content. On one side it is environmentally sustainable to use this fuel on the other hand it will also encourage farmers to plant this crop along with regular food crop. They can also make use of and waste lands for cultivation. Globally, more than 350 oil-bearing crops are identified as potential source of biodiesel which can be classified as edible and non-edible [13] due to diversity of oil bearing crop; it is a challenge to select the potential sources of biodiesel. Hence several of research is ongoing. A number of sources from edible oil are already dominating in several countries. For instance, canola and soybean are used in USA, Palm oil in Malaysia, rapeseed oil in Europe etc. [13, 14]. Sunflower, peanut, coconut and sesame are few other examples of edible oils. The KSRTC began trials of edible oil such as groundnut,

DOI : 10.18231/2454-9150.2019.0539
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International Journal for Research in Engineering Application & Management (IJREAM)
ISSN : 2454-9150 Special Issue - TMRI - 2019

Wind-Solar Hybrid Power System

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Abstract—The main purpose of energy production is to fulfill the power requirements of the society along with necessary safety and reliability. The prime objective of energy generation is to satisfy customer needs economically with emphasis on safety, reliability and quality. Many conventional methods energy generation depend upon renewable and exhaustive resources like coal, oil, nuclear fuels etc. With growing environmental awareness to preserve conventional resources for future generations, escalating fuel prices, safety as in case of nuclear plants; conventional power sector has felt a setback. Ever increasing requirement of energy has led to power generation techniques stressing on reduced emissions, efficient energy uses of exhaustive sources along with safety. In the same context, technology to harness power from newer renewable energy resources has paved the way for a greener tomorrow. Worldwide interest extracting energy from Renewable Sources increasing day by day mainly because Global population has concerns over vision air quality global warming cetera electrification of rural areas developing country like India is a factor favors because these sources have minimal impact on Environment ecology and human health. Most of the people in India reside in villages and many villages are so remotely located they are not connected to any electrical power grid. Lack of power affects quality of living of such population; for example, shortage of cold storage facilities for perishable items or medicines, lack of entertainment like TV, industrial and agricultural growth etc Now renewable resources are changing this scenario. At present renewal resources have more cost of production in terms of per unit of power generation but they possess added advantage having zero and desirable impact on our environment.

Keywords: Solar System, Aero-wind Generator.

I. INTRODUCTION

Renewable energy can meet the electrical power requirement in the difficult terrains like hills, islands, remote areas and unreachable places. Photovoltaic solar and wind system combination provides a good alternative which can take care of required power output throughout the year despite of seasonal variation of sun radiation and wind flow speed.

Solar energy: There are good places of solar energy resources on earth, average global solar radiation on the horizontal surface is about 4.5 kWh / sq.m / day and on the 300 inclined surfaces it was 5.1 kWh /sqm/day. There data indicate the bright prospects for solar thermal and photovoltaic application.

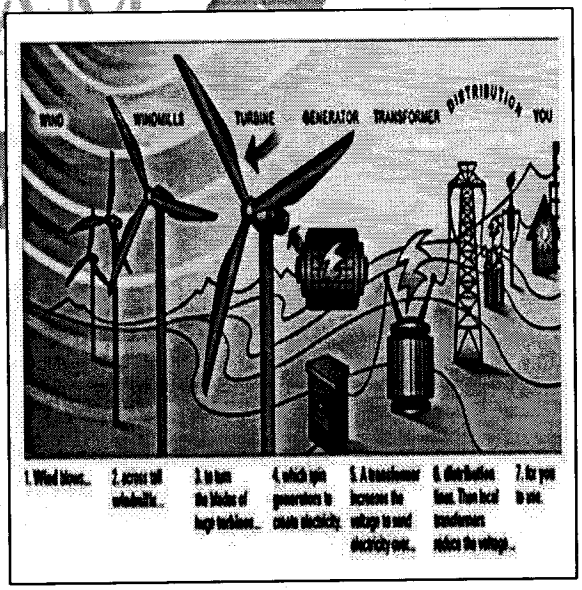

Figure 1 Wind Energy

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06/12/2019

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Modelling and Simulation of Photovoltaic Thermal Cooling System Using Different Types of Nanofluids

Sanjeev Jakhar, Mukul Kant Paliwal, and Atul Kumar

Abstract Solar technologies like flat plate solar collectors are being widely used for low-grade thermal energy for household purposes. These days, photovoltaic thermal (PV/T) collectors are also gaining momentum as source of combined heat and electric power. Commonly used base fluid in PV/T collector is water which have low thermal conductance, and thus, addition of nanoparticles in base fluid will lead to the enhancement in overall thermal conductance. Keeping this as main focus, a research has been carried out to evaluate the performance of PV/T system with different nanoparticles. For that, the simulation was carried out by performing grid test and then simulated on ANSYS to obtain results. For the same, nanofluids with 20 nm particle dimensions and 299 K inlet temperature were loaded with 0.5, 1 and 1.5% particle volume fraction with different Reynolds numbers varying from 250 to 1500. The simulated model was validated with the literature, and obtained results showed that the heat transfer coefficient (HTC) without any nanoparticles ranges from 245.5 to 519.8 W/m^2 K for Reynolds number of 250–1500, respectively. On other hand, with nanoparticles, the HTC increases and ranges between 250.6–529.20 W/m^2 K, 255.42–539.8 W/m^2 K and 261.1–550.8 W/m^2 K for 0.5%, 1.0% and 1.5% volume fraction, respectively, for Reynolds number of 250–1500. In the end, it is concluded that the simulation results are in good agreement with the literature.

Keywords Laminar flow · Photovoltaic thermal (PV/T) · Heat transfer coefficient (HTC) · Solar energy

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Nomenclature

C	Specific heat (J kg^{-1}K^{-1})
ρ	Density kg m^{-3}
μ	Dynamic viscosity (Pa s)

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M. Ramgopal et al. (eds.), *Advances in Air Conditioning and Refrigeration*, Lecture Notes in Mechanical Engineering, https://doi.org/10.1007/978-981-15-6360-7_1

Journal of Indian Acad. Math.
Vol. 42, No. 1 (2020) pp. 49-56

ISSN: 0970-5120

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REVIEW STUDY ON DIFFERENTIAL TRANSFORM FOR LAPLACE EQUATION

Abstract: In this article, the analytical solution for Laplace equation using differential transform method has been presented. To represent this we have obtained the corresponding exact solutions by considering four models with two well-known boundary conditions known as Dirichlet and Neumann. The achieved outcome shows the easiness of the method and substantial decrease in successive iterations in comparison to the other well-known iterative methods. We can say that very less number of iterations gives the desired output for the problem nearer to the expansions of series for the identified functions.

Keywords: Laplace equation, boundary Conditions of Dirichlet and Neumann, Finite Difference.

Mathematical Subject Classification: 35K20.

Introduction

It is very difficult to solve analytically the problems which are related to engineering and physics where the governing equations are in the form of standard boundary value problems such as Laplace, heat and wave equations in one and two dimensions. The exact solution of the governing differential equation corresponding to the problem can be obtained after difficult calculations. To reduce this difficulty, different approximations and direct methods, such as Adomian decomposition [1], Homotopy analysis [2], Variational iteration [3], New iterative [4, 5] and Differential transform [6] are invented.

06/12/2021

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International Journal of Advanced Science and Technology
Vol. 29, No. 5s, (2020), pp. 2083 - 2086

Review Study on Effect of Eccentricity on Conjugate Free Convection in Eccentric Annuli with Vertical Position

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Abstract

In different fields of engineering applications such as electrical, nuclear, solar and thermal and the drilling operations of oil and gas wells, the study of collective conduction-free convection heat transfer in eccentric annuli with vertical position is important. In the drilling process, through the drill the liquid muds are pumped from a surface mud tank and back to the mud tank through the annular gap between the well bore wall and the drill pipe. Free convection may occur during idle periods and it can contribute to passive cooling of the drill Pipe. In this article, to achieve thermal full development different heights of annulus are calculated corresponding to different eccentricities.

Key Words: Eccentricity, heat transfer, vertical eccentric annuli, natural convection, Newtonian fluid, laminar flow, viscous dissipation.

AMS Subject Classification: 76R10, 76N20

Introduction

For the conventional case of either forced or free convection in the developing region of eccentric annuli [1-4], some research articles are available for the conjugate case in vertical eccentric annuli. El-Shaarawi and Haider [5] represented the forced convection for a fluid with Prandtl number 0.7 ,annulus of radius ratio 0.5 and different eccentricities 0.1, 0.3, 0.5 and 0.7. Similarly El-Shaarawi et al. [6, 7] investigated the conjugate and geometry effects on steady laminar free convection in both side open eccentric Annuli in vertical position, respectively.

So far thermally developing conjugate free convection has not been investigated. The present paper presents a boundary layer model for the problem of developing steady laminar conjugate free convection heat transfer in eccentric annuli with vertical position. To solve this mathematical model finite-difference technique is used. Numerical out puts, which represents the parameters like heat flux, Nusselt number, mean bulk temperature, annulus walls temperature and heat absorbed in the developing region of the annulus, are presented for a Newtonian fluid with Prandtl numberPr=0.7, fluid-annulus radius ratioNR_2=0.5 and eccentricities, E=0.1, 0.3, 0.5, and 0.7.

Also by heating one wall isothermally and keep in other wall at inlet fluid temperature, the first kind [8] thermal boundary conditions of are obtained.

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06/12/2021
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Solid State Technology
Volume: 63 Issue: 5
Publication Year: 2020

On Convergence of Different Quadrature Rules of Numerical Integration and Error Estimations

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Abstract: In this present manuscript the error occurred in different standard quadrature rules of numerical integrations using set of numerical data of the function $y = f(x)$ corresponding to equidistant values of argument x have been studied. With the different form of functions $f(x)$ numerical outputs have been obtained for the definite integral in certain limits with different sub intervals of the range of integral to compare the error estimation, rate of convergence of particular rule of integration and accuracy of the outcomes. The standard rules of numerical integration known as Trapezoidal, Simpson's one third, Simpson's three eighth rules including Newton-Cotes formula has been discussed. It has been concluded that the Simpson's one-third rule of integration is more effective and accurate after graphical and numerical comparison.

Key Words: Definite Integration, Trapezoidal rule, Simpson's one third rule, Simpson's three eighth rule.

AMS Subject Classification: 65D30.

1. Introduction

The process of obtaining the numerical value of the definite integral of the form $I = \int_{x_0}^{x_0+nh} f(x)dx$using set of numerical data of the function $y = f(x)$ corresponding to equidistant values of argument x is known as numerical integration.

For the function $y = f(x)$of a single variable numerical integration represents the area bounded by the curve, the ordinates $x = x_0$, $x = x_0 + nh$ and the axis of x. Besides, there are no singularities of the integrand in the domain under the assumption and also numerical integration comprises a boarding family of algorithms for the sake of counting the numerical values of a definite integral.

2. Analysis

The present study is focused on comparison of the existing standard Newton-Cotes methods such as Trapezoidal rule, Simpson's 1/3 rule as well as Simpson's 3/8 rule to achieve the best results among them [1,4]. Pennestrietal. [5] gave and compared eight widespread engineering friction force models to well-known friction models. He also delivered a review and comparison based on numerical efficiency. A basic comparison between three different numerical solution strategies for breakage population balance models and their results achieved for the fixed pivot technique, moving pivot technique and the cell average technique (Bhonsale et al 2019) [1]. Using such approach researcher succeeds in estimating an integrable polynomial discarding Taylor Series (Sinha 2010)[6]. Unlike these works, i discussed and investigated the most general one, namely the Newton-Cotes methods

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International Journal for Research in Engineering Application & Management (IJREAM)
ISSN : 2454-9150 Special Issue - TMRI - 2019

Performance Characteristics of Diesel Engine on Sesame Oil- Diesel Blended Fuel

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Abstract- In this world where technology moves faster than anything else, demand of energy resources are increasing for cop up with our requirement. Our earth has vast sources of energy which could provide as much best as possible. But these resources does not gives us guarantee that it could support us in growth of our economy and at the same time provide better environment conditions. We have to choose those options which give us optimum results and help us to reaching our goal of energy security, economic growth and environment safety. In transportation sector, to meet our global requirement, demand of liquid fuel is very high. Although presently we are working on production of third generation biofuel, like algal biofuel, hydrogen fuel, but its implementation would require huge technological challenges to overcome. Until that we can use first and second generation biofuels to fulfil global oil demand and secure oil reserves for future purpose. This study provides utilization of vegetable oil (sesame oil) blend with diesel and its effect on performance parameters of diesel engine.

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Keywords **—blending, brake specific fuel consumption, brake thermal efficiency, diesel, sesame oil**

I. INTRODUCTION

Now a day, due to limited resources of fossil fuels, rising crude oil prices and the increasing concern for environment, there has been renewed focus on vegetable oil as a substitute to petroleum fuel. Fossil fuel is primarily dominating due to its high combustion efficiency, fuel adoptability and handling facility [1]. However the deep concern about fossil fuel is its toxic pollutant generation that links to the global warming, climate change and even some impasse diseases [2]. From the point of view of protecting the global environment and the concern for long term supplies of the conventional diesel fuel, it become necessary to develop alternative fuel comparable with conventional fuels. Diesel fuel drives the transport, farming; commercial, households and industrial sector for the generation of power and replacing a tiny fraction of total consumption by alternative fuels will have a significant impact on the economy and the environment [3]. Petroleum and diesel come in the category of non- renewable fuel and will be exhausted in few decades. These non-renewable also emit pollutants in the form of oxide of nitrogen, oxide of Sulphur, oxide of carbon, lead, hydrocarbon etc. Biodiesel an alternative fuel to commercial diesel which can be evaluated for emission results. However major disadvantage of vegetable oil is its viscosity, which is order of magnitude higher than of mineral diesel [4]. Literature study reveals that vegetable oil can replace for mineral oil if viscosity is reduced by mixing it with diesel or by esterification or by preheating of oil [5]. Biodiesel has low Sulphur contents and hence cause lass environment damage than diesel.

II. MATERIALS AND METHOD

Sesame is originated in Africa, Turkey, India, China, Sudan, Burma, Tunisia, Egypt, Thailand, Mexico, Guatemala, Afghanistan, Pakistan, Bangladesh and etc. The oil content is about 57-63% [9, 10]. Sesame is world's ancient oilseed. This warm- season annual crop is primarily found in well drained soils. India being the largest producer of sesame oil exports around 6,80,000 metric tonne annually. It is unusually high in oil thus decrease in protein content. On one side it is environmentally sustainable to use this fuel on the other hand it will also encourage farmers to plant this crop along with regular food crop. They can also make use of and waste lands for cultivation. Globally, more than 350 oil-bearing crops are identified as potential source of biodiesel which can be classified as edible and non-edible [13] due to diversity of oil bearing crop; it is a challenge to select the potential sources of biodiesel. Hence several of research is ongoing. A number of sources from edible oil are already dominating in several countries. For instance, canola and soybean are used in USA, Palm oil in Malaysia, rapeseed oil in Europe etc. [13, 14]. Sunflower, peanut, coconut and sesame are few other examples of edible oils. The KSRTC began trials of edible oil such as groundnut,

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Applied Thermal Engineering 171 (2020) 115069

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Experimental and theoretical analysis of hybrid concentrated photovoltaic/thermal system using parabolic trough collector

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HIGHLIGHTS

- A hybrid CPVT system was proposed and analyzed theoretically and experimentally.
- The flow rate was varied from 0.083 kg/s to 0.117 kg/s using different configurations.
- At optimum flow rate of 0.108 kg/s the mean overall efficiency goes up to 69.19%.
- Enviroeconomic study shows carbon mitigation of 40.2 tCO_2/year at optimum conditions.
- The proposed HCPVT system could be used for low grade thermal applications.

ARTICLE INFO

Keywords:
Solar energy
Parabolic trough collector
Concentrated photovoltaic/thermal
Hybrid system
Renewable energy

ABSTRACT

In the current work, a hybrid concentrated photovoltaic thermal system was designed and coupled with a parabolic trough collector and investigated theoretically and experimentally for combined heat and power output. In the design, a photovoltaic module was mounted on a flat surface of parabolic trough absorber tube having semi cylindrical shape. A provision was made to cool photovoltaic panel from both the surfaces by flowing water through the absorber tube as well as the annulus of between absorber tube and glass cover. The model was developed using first law of the thermodynamics and then validated using experimental data generated through the fabricated setup. During the experimentation, the annulus flow rate was varied from 0.008 kg/s, 0.017 kg/s and 0.025 kg/s and inner flow rate was varied from 0.075 kg/s, 0.083 kg/s and 0.091 kg/s. The field testing results showed the mean overall efficiency of system obtained as 61.42%, 64.61% and 66.36% for inner tube flow rate of 0.075 kg/s, 0.083 kg/s and 0.091 kg/s respectively for annulus flow rate of 0.008 kg/s. The theoretical results of hybrid system obtained from the simulation are in good agreement with the experimental data. In the end environmental cost analysis was also carried out for the proposed system.

1. Introduction

The photovoltaic (PV) technology works on the principle of direct conversion of sunlight into electricity using semiconductor materials. The PV technology is commercially proven technology with achievable cell efficiency between 15 and 20% [1]. Although widely acceptable, a major challenge with PV systems is high cell/panel temperature due to incessant solar radiation which reduces the efficiency of the cell and its lifespan [2]. To utilize maximum solar energy, the systems are designed to utilize the excess waste heat into a useful form. One of the technology, Photo-Voltaic Thermal (PVT) increases the PV efficiency along with recovery of excess heat as reported in various studies [3–5]. Under high radiation, concentrated photovoltaic/thermal (CPVT) system not only provides higher electrical output but substantial thermal energy due to their inbuilt cooling systems. While a variety of cooling approaches have been used to the maintain the PV panel temperature, most of them are based upon removal of heat from the back of the cell (opposite surface of the incident flux exposed surface) [6].

Although the PV installation has grown many folds to more than 400 GW across the world and many commercial plants are installed across various countries, the installed capacity of PVT or CPVT is too low to be reported [7]. The major work on CPVT is still in research phase with lab scale testing of prototypes. The literature discusses the work related to design, modelling, prototype testing and various

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https://doi.org/10.1016/j.applthermaleng.2020.115069
Received 17 July 2019; Received in revised form 10 January 2020; Accepted 10 February 2020
Available online 11 February 2020
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06/12/2021
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Experimental investigation of exergy performance of a water cooled hybrid photovoltaic thermal collector

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Abstract: In this paper, the performance of a water cooled hybrid photovoltaic thermal collector is evaluated by carrying out experimental exergy analysis by designing and fabricating a hybrid system to provide combined heat and power. The experimentation was carried out for mass flow rates, collectively ranging from 0.083 kg/s to 0.116 kg/s in different configurations. Along with losses and exergy destruction, the exergy efficiency was calculated using three different scenarios, i.e., by excluding exergy losses, by taking exergy losses and destruction and by considering exergy destruction only. On comparison, exergy efficiency for last scenario was observed on higher side and ranged between 48.55% to 61.36%, 41.44% to 55.85% and 35.09% to 48.16% for fixed inner tube flow rate of 0.091 kg/s and varying annulus mass flow rate of 0.008 kg/s, 0.017 kg/s and 0.025 kg/s, respectively. Such hybrid system may provide combined heat and power for semi-arid regions of Rajasthan, India.

Keywords: exergy; solar energy; CPV/T; hybrid system; water cooling.

Reference to this paper should be made as follows: Gakkhar, N., Soni, M.K. and Jakhar, S. (2020) 'Experimental investigation of exergy performance of a water cooled hybrid photovoltaic thermal collector', *Int. J. Exergy*, Vol. 31, No. 4, pp.330–351.

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Chapter 9 - An insight into Parkinson's disease: researches and its complexities

Angana Saikia [1], Masaraf Hussain [2], Amit Ranjan Barua [3], Sudip Paul [1]

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Abstract

The chapter emphasizes about the research done on Parkinson's disease and its advancements. The choice of Parkinson's disease (PD) for the study was determined by the problems that PD, and other neurodegenerative disorders, poses to society. PD is mainly caused due to loss of dopamine in the midbrain. It affects approximately 0.3% of the world's population and 1% of people over 60 years old. It is estimated around 6.3 million people suffer from PD worldwide. The World Health Organization gives an estimated crude prevalence of 160 per 100,000, and an estimated incidence of 16–19 per 100,000.

The aim in writing this chapter is to present a detailed insight towards the development of the different research done in the field of Parkinson's disease with context to Electroencephalogram (EEG) and Electromyogram (EMG). It is not confined to only this but also gives a brief view of some other parameters of PD like the worldwide statistics including the epidemiology in India, role of neurotransmitters in the disease progression and the impact of radiological data for disease diagnosis.

Previous Next

Keywords

Parkinson's disease (PD); Electroencephalogram (EEG) and electromyogram (EMG); Neurodegenerative disorder; Neurotransmitter; Epidemiology

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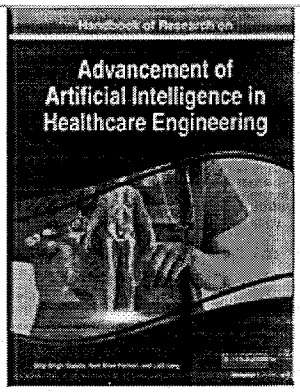

Application of Deep Learning for EEG

Angana Saikia (North-Eastern Hill University, India) and Sudip Paul (North-Eastern Hill University, India)

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Abstract

Deep learning is a relatively new branch of machine learning, which has been used in a variety of biomedical applications. It has been used to analyze different physiological signals and gain better understanding of human physiology for automated diagnosis of abnormal conditions. It is used in the classification of electroencephalography signals. Most of the present research has continued to use manual feature extraction methods followed by a traditional classifier, such as support vector machine or logistic regression. This is largely due to the low number of samples per experiment, high-dimensional nature of the data, and the difficulty in finding appropriate deep learning architectures for classification of EEG signals. One of the challenges in modeling cognitive events from EEG data is finding representations that are invariant to inter- and intra-subject differences as well as the inherent noise associated with EEG data collection. Herein, the authors explore the capabilities of the recent deep learning techniques for modeling cognitive events from EEG data.

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Introduction To Deep Learning:

Deep learning is part of machine learning methods based on learning data representations, as opposed to task-specific algorithms. It uses a cascade of multiple layers of nonlinear processing units for feature extraction and transformation. Each successive layer uses the output from the previous layer as input. It learns in supervised (e.g., classification) and/or unsupervised (e.g., pattern analysis) manners and also learns multiple levels of representations that correspond to different levels of abstraction (LeCun, Bengio, & Hinton, 2015).

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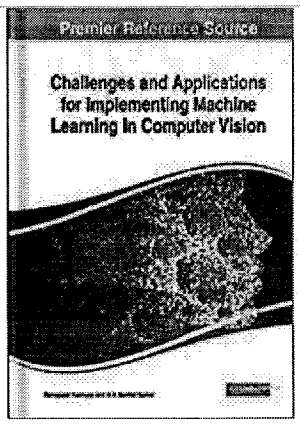

Deep Learning in Computational Neuroscience

Sanjay Saxena (Department of Computer Science and Engineering, IIIT Bhubaneswar, Bhubaneswar, India), Sudip Paul (North-Eastern Hill University, India), Adhesh Garg (Department of Computer Science and Engineering, IIIT Bhubaneswar, Bhubaneswar, India), Angana Saikia (North-Eastern Hill University, India) and Amitava Datta (The University of Western Australia, Australia)

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Abstract

Computational neuroscience is inspired by the mechanism of the human brain. Neural networks have reformed machine learning and artificial intelligence. Deep learning is a type of machine learning that teaches computers to do what comes naturally to individuals: acquire by example. It is inspired by biological brains and became the essential class of models in the field of machine learning. Deep learning involves several layers of computation. In the current scenario, researchers and scientists around the world are focusing on the implementation of different deep models and architectures. This chapter consists the information about major architectures of deep network. That will give the information about convolutional neural network, recurrent neural network, multilayer perceptron, and many more. Further, it discusses CNN (convolutional neural network) and its different pretrained models due to its major requirements in visual imaginary. This chapter also deliberates about the similarity of deep model and architectures with the human brain.

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Similarity Of Deep Neural Network And Brain

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Performance Analysis of Artificial Neural Network for Hand Movement Detection from EMG Signals

Angana Saikia, Sushmi Mazumdar, Nitin Sahai, Sudip Paul & Dinesh Bhatia

Published online: 09 Sep 2019

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Deep Learning and its Importance for Early Signature of Neuronal Disorders

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Abstract:
Deep learning is a nomenclature given to a recently developed domain of pattern recognition. It has potency to influence the development of artificial intelligence research. The concept of deep learning has been originated from the capability of making educated decisions/guesses regarding a topic/situation in spite of having no prior experience. From mathematical perspective, deep learning allows the extraction of features from a given set of data which allows much more capable and accurate training for a certain technique. With the advent of more powerful mathematical techniques deep learning is seen as an effective method to enhance the capabilities of presently developed algorithms without needlessly complicating their mode of operation. This paper presents importance of deep learning to detect neural disorder.

Published in: 2018 4th International Conference on Computing Communication and Automation (ICCCA)

Date of Conference: 14-15 Dec. 2018 **INSPEC Accession Number:** 18868575

Date Added to IEEE *Xplore*: 29 July 2019 **DOI:** 10.1109/CCAA.2018.8777527

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International Journal of Engineering and Advanced Technology (IJEAT)
ISSN: 2249 – 8958, Volume-8 Issue-6, August 2019

EEG-EMG Correlation for Parkinson's disease

Angana Saikia, Masaraf Hussain, Amit Ranjan Barua, Sudip Paul

Abstract: Parkinson's disease (PD) is a neurodegenerative disease in which disease symptoms progresses with time and mostly affected after 50 years of age. This disorder leads to loss of interconnectivity between brain and muscles. Human Biosignal like Electroencephalography (EEG) and Electromyography (EMG) acts as a tool for detecting various cognitive decline and muscle conditions in PD. Work reported here emphasized on a study of the EEG from the frontal and temporal brain in PD and healthy subjects as well as their muscle activities for the flexion and extension of the wrist. Signal acquisition was done using a dual channel Biosignal acquisition system from AD Instruments. Signals were acquired for 30 minutes each for all the subjects in the Out Patient Departments of various hospitals. Signal analysis was carried out in MATLAB platform. Various EEG and EMG features were extracted to determine brain and muscle conditions of patients. Classification was done using Artificial Neural Network for EEG and EMG features separately. A combination of EEG and EMG feature was also classified using ANN which gave a highest classification rate of 98.8% as compared to only EEG and EMG feature. This result proved that correlation and combination of various EEG and EMG features together provides more accuracy to the disease classifier. It gives an insight into the mechanism of muscle weakness and gait problems caused from the low production of dopamine in the brain of PD by giving a high classification rate as compared to others(Only EEG features and Only EMG features). Many studies have reviled the effect of EEG and EMG using various tools but here we focus mainly on correlation between them in the early stages. Detection of conditions of brain and muscle in early stage helps the clinician for proper medication to control disease progression. This work can also be further applicable for classifying the various stages of PD and also classifying them from the healthy subjects.

Index Terms: Neurodegenerative disease, Artificial Neural Network(ANN), Parkinson's disease (PD), Electroencephalography (EEG), Electromyography (EMG).

I. INTRODUCTION

Parkinson's disease (PD):

Parkinson's disease is neurodegenerative disease is due to loss of dopamine in the substania nigra of the brain. Symptoms increases with the progression of the disease. Dopamine inhibits a person movement by establishing a link between brain and muscles [1]. It is a type of neurotransmitter produced in human brain. A person suffering from PD losses its coordination between brain and muscles, and results in disturbed limb movements [2].

Visible symptoms of PD are as follows [3, 4]:

- Bradykinesia, tremor, rigidity, postural instability.
- Sleep disorder, autonomous dysfunction, neuropsychiatric.

Environmental factors such as exposure to certain toxins substances(MPTP) and direct contact with some of the metal manganese by the workers in the mine fields may also lead to PD [5]. Villagers working with insecticides and pesticides are mostly prone to PD. Researchers and clinicians has also proved various genetic causes attached with PD. This included the alpha synuclein gene[6].

Biosignal significance in PD:

Various brain functions are studied using EEG. It is a effective and important biomarker for diagnosis of various cognitive impairments in brain disorders like PD[7]. EEG carried out in resting state acts as an indicator of various spontaneous neuronal activities. It also detects specific cognitive tasks to establish brain behavior relationships [8].

EMG is used for the finding out the muscle strengths of any kind of diseases. PD also leads to weakening muscle due to loss of dopamine. Hence, EMG examines the various motor symptoms(tremor, bradykinesia) in PD [9]. Although these dysfunctions can be assessed by electromyography, it is still used rarely in the clinical evaluation of PD. The visible changes in the EMG signal of a PD patient is increased tonic background activities as well as bursts patterns are mostly alternating in nature [10,11].

Various Motor-cortical activities in PD can be identified using electroencephalography–electromyography correlation [12]. Synchronized activities of our neurons produce oscillatory activities whose frequencies reflect membrane properties of single neurons and interconnectivities of biological neural networks [13].

Hellwig et .al in the year 2001, worked on EEG-EMG recordings, that detected cortico-muscular coherences at the tremor frequency. The outcome suggested that the sensory-motor cortex plays a vital role in the initiation of essential tremors, which is similar in Parkinsonian resting tremor [14].

The relationship between EMG and EEG gives the physiological information about how activities sensory-motor cortex, are related to the movement of limbs, [15]. In case of voluntary movement, EMG-EEG correlation is mainly studied to investigate cortical mechanisms which leads to central motor control and its associated disorders. On the other hand, the use of EEG-EMG correlation for the study of involuntary movements serves as a diagnostic supplement as well as a method for clarifying the physiological mechanism underlying the generation of each involuntary movement [16].

Revised Manuscript Received on August20, 2019.
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International Journal of Innovative Technology and Exploring Engineering (IJITEE)
ISSN: 2278-3075, Volume-9 Issue-1, November 2019

Performance Analysis of various Neural Network functions for Parkinson's disease Classification using EEG and EMG

Angana Saikia, Masaraf Hussain, Amit Ranjan Barua, Sudip Paul

Abstract: Artificial neural network (ANN) is a significant tool for classification of various types of disease using either Biosignals/images or may be any kind of physical parameters. Establishment of appropriate combination of learning, transfer function and training function is a very tedious task. Here, we compared the performance of different training parameters in feed forward neural network for differentiating of Parkinson's disease using human brain (Electroencephalogram) and muscle signals (Electromyogram) features as the input vector. 3 different types of training algorithm with six training functions is used. They are Gradient Descent algorithms (traingd, traingdm), Conjugate Gradient algorithms (trainscg, traincgp) and Quasi-Newton algorithms (trainbfg, trainlm). Proposed work compared the mentioned algorithm in terms of mean square error, classification rate (%),R-value and the elapsed time.

Study showed that trainlm (Levenberg-Marquardt) best fits for larger data set. It showed the highest accuracy rate of 100% with 0 mismatch classification with a best validation mean square error of 0.0040254 in 3 epochs with a elapsed time of 1.12 seconds. The R-value found was 0.9998 which is in nearly equals to 1. Hence, Levenberg-Marquardt can be used as a training function for the classification of any brain disorder

Keywords : Artificial neural network (ANN), Electroencephalogram (EEG), Electromyogram (EMG), Parkinson's disease (PD), Neural Network Classification.

I. INTRODUCTION

Parkinson's disease is a brain impairment which is affected due to insufficient and low formation of dopamine in the human brain. It initially starts with tremor of the hands and slowly increases to the other limbs (1) (2). One suffering from PD losses its control of limb movements. They suffer from muscle rigidity and does not have a proper standing, walking or sitting prosture (3). They also come across Sleep disturbances, and many other neuropsychiatric problems (3). PD also results due to continuous contact with toxic drugs like MPTP which is mostly affected in people working in mines. Also the fields workers working in farming sector get exposed to different types chemicals have risk of PD. Many types gene studies are been carried out by researchers to find the genetic causes of PD (4).

Diagnosis of PD brain and muscle signal is a very much essential parameter to find the functional neuronal changes of PD (5). During Parkinson's disease a person muscle and brain coordination gets disturbed. Hence, study of EEG and EMG patterns is a effective tool (6).

Artificial neural network classification is technique to classify various types of system. Most of the disease diagnostic systems are nowadays modeled and designed using neural network classification. ANN is same as that of the biological neurons of our body which consists of inputs, transfer and training functions and the desired output. ANN can be of single-layer or multiple layer neurons. Most of the disease detection system, which is complex dataset, multilayer perceptron (MLP) is used. In MLP network, back propagation (BP) learning algorithm is used (7).

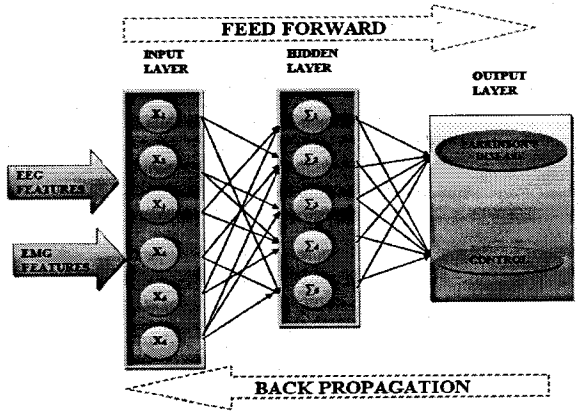

Fig I: ANN Architecture

Some work done in this field is:

Loconsole et al (8) designed a model to classify the PD from healthy subjects on the basis of handwriting on computer vision and sEMG processing. The classification was done using ANN and SVM tools and found that various features on handwriting patterns and classification tools with the sEMG signals acts as effective technique for neurodegenerative disease classification.Berus et. al (9) worked on the classification of PD, using multiple feed-forward ANNs. Features were extracted from 26 voice recordings from each individual. Kendall's correlation coefficient based feature selection technique outperformed among all others which recognized the most effective and accurate voice.

Revised Manuscript Received on July 22, 2019.

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06/12/2021

Retrieval Number: A4424119119/2019©BEIESP
DOI: 10.35940/ijitee.A4424.119119

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Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

International Journal on Emerging Technologies 10(3): 166-173(2019)

ISSN No. (Print) : 0975-8364
ISSN No. (Online) : 2249-3255

A Systematic review on Application based Parkinson's disease Detection Systems

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(Received 19 June 2019, Revised 29 August 2019 Accepted 23 September 2019)
(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Detection of any neurological disorder is very much necessary. Various tools and techniques are nowadays available worldwide. These techniques are mainly based on mobile and web based application as these are cost-effective and easily accessible. These techniques are also user friendly as it can also be used by the disease caregivers by sitting at home and can monitor the disease progression. These applications are also used by clinicians to monitor the disease progressions and can also be used by researchers who wish to extend and work on any kind of neurological disorders like Parkinson's disease (PD), Alzheimer's disease (AZ), Huntington disease (HD) etc. It is also very much less time consuming. In a fraction of second once the data is fed to the application it will detect stage of disease the person is suffering from. The various parameters like Electroencephalography (EEG), Electromyography (EMG), Tremor, Grip Strength, SpO_2 etc can be used as the disease detecting parameters in PD. This type of detection system can diagnosis Parkinson's disease in its early stage as well as diagnose disease progression in later stages. This paper emphasizes on a systematic review of various types of applications used worldwide for the detection and diagnosis of Parkinson's disease and also proposed a detection system based on mobile and web application for Parkinson's disease. The module will not only detect the stage of the PD but also will give the patients various brain and muscle complicacies of the patients. It is a portable one solution system for patients suffering from PD to detect as well as monitor disease progression.

Keywords: Neurological Disorder, Parkinson's disease (PD), Web application, Mobile application, Disease detection system.

I. INTRODUCTION

Parkinson's Disease (PD): PD is a neurodegenerative defect due to less production of a neurotransmitter called dopamine in the substantia nigra of the human brain. Hence, the person loss its coordination between brain and muscle which leads to disturbed limb movements. Loss of dopamine results in the motor symptoms like tremor, rigidity, and bradykinesia. The graphs below shows the prevalence of PD in India [1] (Fig.1) and in worldwide [2] (Fig. 2).

Causes:

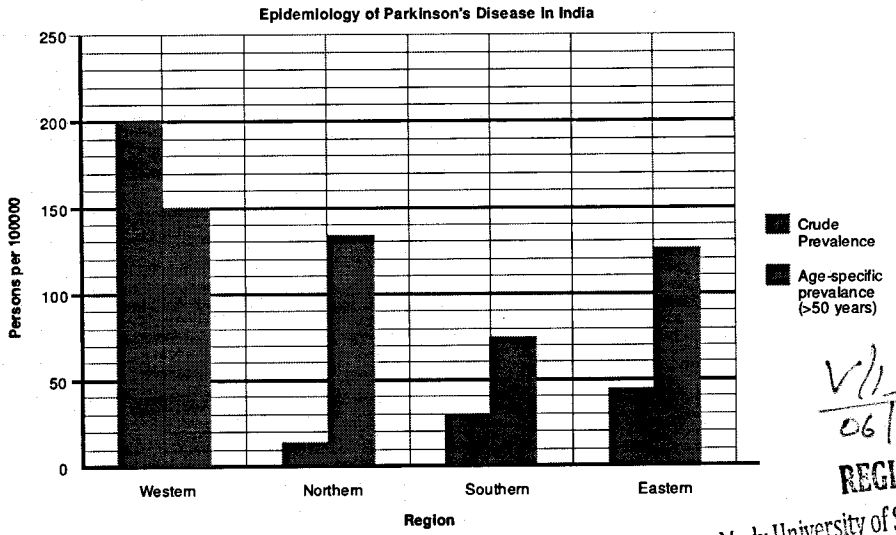

Fig. 1. PD Epidemiology in India.

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RESEARCH ARTICLE

A Novel Pentagonal Shaped Planar Inverted-F Antenna for Defense Applications

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ARTICLE HISTORY

Received: August 27, 2019
Revised: October 15, 2018
Accepted: October 25, 2018

DOI:
10.2174/2213275912666181102151149

Abstract: *Background*: The planar inverted-F antenna (PIFA) is most widely used for wireless communication applications due to its unique properties as low Specific Absorption Rate, low profile geometry and easy fabrication. In literature a number of multiband PIFA designs are available that support various wireless applications in mobile communication, satellite communication and radio frequency field.

Method: In this paper, a miniature sized planar inverted-F antenna has been proposed for dual-band operation. The antenna consists of an asymmetrical pentagonal shaped patch over an FR4 substrate. The overall antenna dimension is 10 × 10 × 3 mm^3 and resonates at 5.7 GHz frequency. A modification is done in the patch structure by introducing an asymmetrical pentagon slot.

Results: The proposed pentagonal antenna resonates at 5.7 GHz frequency. Further, modified antenna resonates at two bands. The lower band resonates at 5 GHz and having a bandwidth of 1.5 GHz. This band corresponds to C-band, which is suitable for satellite communication. The upper band is at 7.9 GHz with a bandwidth of 500 MHz. Performance parameters such as return loss, VSWR, input impedance and radiation pattern are obtained and analysed using ANSYS High-Frequency Structure Simulator. The radiation patterns obtained are directional, which are suitable for mobile communication.

Conclusion: The antenna is compact in size and suitable for radar, satellite and vehicular communication.

Keywords: Defense application, PIFA, pentagonal slot, SAR, satellite, radiation.

1. INTRODUCTION

In 1980, planar inverted-F antenna (PIFA) was developed and now it has become the most suitable choice for mobile phones [1]. The Planar Inverted–F Antenna is most widely used for wireless communication applications due to its unique properties as low Specific Absorption Rate (SAR), low profile geometry and easy fabrication [2]. PIFA is the most common type of antenna used in cellular mobile phones. This type of planar structure consists of a top patch which is connected to the ground plane with the help of a short pin or plate. This shorting scheme makes the antenna to resonate at quarter wavelength and a reduction of 50% in size can be achieved in comparison to the MPA. The side view of this antenna resembles an inverted F letter. It is also called a quarter wavelength antennas as it resonates at a quarter – wavelength due to the shorting pin or plate at the end. PIFA resonates at multiple bands and supports various wireless applications [3]. In literature a number of multiband PIFA designs are available that support various wireless applications in mobile communication; satellite communication and RF field [4-9]. A frequency reconfigurable PIFA using RF-MEMS switches for radio frequency communication is reported in [4]. The design consists of a spiral slot on a radiating patch. Nashaat *et al.* presented a compact PIFA design, producing quad bands [5]. The overall dimensions of the antenna are 60 × 100 mm^2 and it is made-up on a foam substrate. To reduce the size of the PIFA a capacitive plate is placed between the U-shaped slotted patch and the ground plane. This antenna is suitable for Bluetooth, WLAN, and mobile communication.

Cheung *et al.* designed a compact PIFA to support the Internet of Things application [6]. This design consists of a meandered shaped short pin and meandered feed line to attain good efficiency and wide bandwidth. The overall area of this antenna is very small 15 × 6 mm^2. This design resonates at 2.4 GHz with −1.98 dBi average gain. Kwak *et al.* presented a PIFA for wearable devices as smart watch [7]. To reduce the health hazards by absorption of radiation AMC (artificial magnetic conductor) construction is used. AMC is a type of metamaterial which is used to regulate the radiation characteristics of the antenna. This designed antenna resonates in WCDMA band and safe to be used by a human. AlJa'afreh *et al.* have done a comparative analysis on the impact of various feeds such as parallel feed, orthogonal feed and coplanar feed on the performance of PIFA [8]. It was found that by using coplanar feed, the mutual coupling can be reduced and pattern, as well as polarization diversity, can

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2213-2759/19 $58.00+.00

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06/12/2024
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Research Article Impact Factor: 4.226 ISSN: 2319-507X
Maandvi Raje Singh, IJPRET, 2018; Volume 6 (8): 186-191 IJPRET

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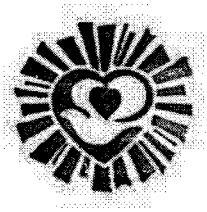

SPECIAL ISSUE FOR
NATIONAL LEVEL CONFERENCE
"Technology Enabling Modernization of Rural India (TMRI- 2018)"

BARRIERS IN FLOURISHING OF SUSTAINABLE ENERGY RESOURCES IN INDIA

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Accepted Date: 19/03/2018; Published Date: 01/04/2018

Abstract: India has set out on the path of harnessing renewable energy (RE) sources than never before. The reasons are many and are not hard to find within the chronic shortage of power, matters of energy security and environmental concerns. However, RE capacity addition and development of the sector suffers on account of a number of constraints, overlaps and gaps prevalent in the current policy and regulatory environment. There is therefore a need to review the existing environment for development of RE and propose a new approach to the development of this sector. With this objective, this paper examines the current status of RE development in India and the existing environment for such development.

RE technologies (RETs) in India can be divided into two categories: (i) near commercial and commercial technologies such as wind, small hydro power (SHP), solar PV, biomass and co-generation (COGEN) that have matured and are being deployed or are close to deployment, and (ii) emerging technologies such as solar thermal and biofuels that will need time to mature. The latter will also have to undergo pilots before commercial deployment. This paper focuses on the RETs that fall in the first category. The paper also restricts itself to grid-connected RE.

Keywords: Barriers, Solar Power, Wind Power, Hydro Power, Bio Mass Power.

PAPER-QR CODE

Corresponding Author: MAANDVI RAJE SINGH

Access Online On:

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How to Cite This Article:

Maandvi Raje Singh, IJPRET, 2018; Volume 6 (8): 186-191

06/12/2021
REGISTRAR
Mody University of Science and Technology
Lakshmangarh (Distt Sikar) 332311

Review Article Impact Factor: 4.226 ISSN: 2319-507X
Priya Gupta, IJPRET, 2018; Volume 6 (8): 203-208 IJPRET

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SPECIAL ISSUE FOR
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"Technology Enabling Modernization of Rural India (TMRI- 2018)"

REVIEW ON LATEST AUTOMOTIVE TECHNOLOGIES

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Accepted Date: 19/03/2018; Published Date: 01/04/2018

Abstract: This paper focuses the technical features and the working of the advanced technologies used in the present or in the future automobiles. The technologies that are examined in this paper are Valvetronic Engines, Downsizing, variable valve timing and Turbocharging, Weight Reduction Materials, Advanced Combustion Modes, Hybrid / Electric Vehicles, Fuel Cells, Alternative Fuels, Batteries and Energy Storage, 42 volt system, Drive by wire Technology, Camless engine, Exhaust gas recirculation, Sterling engine opposed piston engine, Split cycle engine, Free piston engine and Wankel rotary engine. A crucial analysis with their advantages and disadvantages of these technologies are made in this paper. A final inference is drawn that once these technologies are brought in the market they will not only help in providing better modes of transport but will also help in reducing our reliance on conventional fuels.

Keywords: Engine, Fuel cell, batteries, camless Engine, hybrid vehicles

Corresponding Author: PRIYA GUPTA

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How to Cite This Article:

Priya Gupta, IJPRET, 2018; Volume 6 (8): 203-208

PAPER-QR CODE

06/12/2018

REGISTRAR
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Accuracy Enhancement of the Base Classifier Using Clustering and Ensemble Method for Breast Cancer Detection

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Abstract— Breast cancer is type of chronic disease due to which a huge number of female patients are losing their life's every year and this is increasing with an rapid rate, so to control this type of disease at an early stage and appropriate diagnosis is required in order to reduce the number of deaths and provide a new life to the patients. Here machine learning plays a vital role where various methods like classification, clustering and ensemble methods are quite useful for the detection of such type of chronic disease. This paper is written with an aim to enhance the prediction accuracy where a novel approach is proposed in which the classifiers like Naïve Bayes, J48 and Logistic Regression are combined with K-Means Clustering algorithm and Bagging and the experimental results shows a significant increase in the prediction accuracy and reduced error rate. This study is conducted on the Wisconsin Breast Cancer Diagnostic Dataset (WDBC).

Keywords— Breast Cancer, Ensemble Methods, K-Means Clustering.

I. Introduction

Health care industry is now a days is increasing rapidly in terms of patients records, numerous types of treatments and due the generation of enormous data it is quite typical and tedious task to manage and diagnose the disease properly[1,2,3,4,5].Here data mining and machine learning has created a new hope for this industry, as various methods like clustering , classification etc. can be used for disease prediction, timely detection, cost efficient treatment and to assist the medical Practitioners to take appropriate actions[6,7,8,9]. As the chronic diseases like cancer, heart disease, kidney failures are the major cause of deaths worldwide. Especially if we talk about females than breast cancer is the most dangerous type of disease by which lots of women's are e are the major cause of deaths worldwide. This cancer holds second position just after the lung cancer [10,11,12,13].

To get exact cause of breast cancer is very difficult as it depends on various factors like age, history, late pregnancy, depression [14]. For the assessment of the developing cancer two types of treatments are generally used i.e. Systematic and local. Surgery and radiation therapy are under local treatments whereas chemo and hormonal therapy are under systematic treatment [15].

This paper is written with an aim to improve the classification accuracy of the different classifiers in order to do prediction for the breast cancer effectiveness using clustering and ensemble method like bagging on the base classifiers like Naïve Bayes, J48, and logistic regression. The reason to go with this method is that in the recent past various ensemble methods has been proposed which turns to be quite beneficial for various machine learning tasks like prediction, detection, pattern recognition[16, 17,18,19,20].

This paper is outlined in the following manner:

(i) General introduction and overview about the paper is presented in this section.

(ii) Section 2 contains the related works which provides the details about the works which has been previously done.

(iii) Section 3 demonstrates the methodology which also provides the details about the clustering methods, ensemble methods, classifiers used and the dataset description.

(iv) Section 4 provides the experimental results.

(v) Section 5 gives the conclusion about the study.

06/12/2021
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ISSN 1943-023X
Received: 23 May 2019/Accepted: 14 June 2019

DOI Number: 10.5958/0976-5506.2019.00690.9

Recommendation System for Breast Cancer Treatment Using K-Means Clustering Algorithm

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Abstract

Data Mining is one of the technology that is generally used healthcare industries now a days. As it helps in number of ways to the end users like doctors and patients. Doctors can prescribe medicine on the basis of mined data whereas patients can be categorized on the basis of severity type of disease and get treatment accordingly. In this paper we have designed a health recommendation system based on k-means clustering, using this approach it is easier for the doctors to segregate the breast cancer patients on the basis of their stages. Once the patients are categorized treatment is given to them accordingly.

Keywords: *Recommendation system, K-Means, Healthcare.*

Introduction

When we talk about the knowledge discovery from the data then data mining plays an important role by applying some intelligent patterns to generate the results. There are several benefits of using data mining techniques like early detection, medical solution availability, possible treatment methods and it also helps in creating new health care policies[4]. Different tools and techniques of data mining helps in discovering and understanding the hidden pattern in a dataset. Generally, there are two types of learning available in the data mining i.e. supervised and unsupervised. Clustering is considered as the unsupervised method. Here the set of data is partitioned into different groups in order to achieve higher similarity[4] ratio between the objects of the same group. It has a wide application area which includes image processing, pattern recognition, analysis of purchase pattern of the customer. This paper aims to provide a recommendation system for the breast cancer patients with the help of cloud-based clustering using WEKA Tool.

Data Mining in Health Care

In the medical field a small error can be more harmful and costlier too, due to different types of medical errors many people's losses their lives each year. In order to reduce the ratio of death due to various chronic diseases a smart recommendation is needed which provides the opportunities to reduce the medical errors and enhance the safety of the patients. Data mining techniques are very useful in developing such types of recommendation systems because of their capability of extracting the hidden pattern and relationship between the data [4]. For storage of data we use cloud computing as cloud provides a very cost-effective solution. As Prediction of the outcome of a disease[10] is very typical now days due to enormous amount of data and there complex structure so by using data mining tools and techniques it can be quite convenient to predict the outcomes on the basis of different variables[12,19]of a large dataset. Data mining applications are also helpful for various stakeholders associated with healthcare like hospitals[11], clinics, doctors and patients by identifying the best possible treatments and suggestions. Data mining combines the various approaches to group the data which can be useful for the knowledge discovery process, like statistical techniques, machine learning[13], visualization etc. are some of techniques which uses data mining as there base. If we talk about the models of data mining then they are broadly classified into two categories: Descriptive modeling and Predictive modeling[12,14,20]. Healthcare industries needs a system that handles large and continuous increasing volume of patients using IT infrastructure. Using cloud we can form an interconnection between different computers and source of providing information specifically in healthcare industries[21].

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IJCSE International Journal of Computer Sciences and Engineering Open Access
Research Paper Vol.-7, Special Issue-10, May 2019 E-ISSN: 2347-2693

A Prototype Of Role Based And Attribute Based De-duplication

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DOI: https://doi.org/10.26438/ijcse/v7si10.912 | Available online at: www.ijcseonline.org

Abstract— Cloud storage services enable individuals and organizations to outsource data storage to remote servers. Cloud storage providers generally adopt data de-duplication, a technique for eliminating redundant data by keeping only a single copy of a file, thus saving a considerable amount of storage and bandwidth. However, an attacker can abuse de-duplication protocols to steal information. At present, there is a considerable increase in the amount of data stored in storage services, along with dramatic evolution of networking techniques. In storage services with huge data, the storage servers may want to reduce the volume of stored data, and the clients may want to monitor the integrity of their data with a low cost, since the cost of the functions related to data storage increase in proportion to the size of the data. To achieve these goals, secure de-duplication and integrity auditing delegation techniques have been studied, which can reduce the volume of data stored in storage by eliminating duplicated copies and permit clients to efficiently verify the integrity of stored files by delegating costly operations to a trusted party, respectively. This paper present study and development of a prototype for role and attribute based de-duplication.

Keywords— Data de-duplication, data reduction, de-duplication approaches, role based, attribute based de-duplication

I. INTRODUCTION

Cloud storage provides customers with highly available, scalable and low cost data storage with elastic provisioning and usage-based pricing [1]. It achieves economy of scale from multi-tenancy in which multiple customers are served from a shared pool of resources; each customer, which could be an enterprise or government, is referred to as a tenant [2]. Indeed, many enterprises are moving to cloud storage services such as Google Drive [3], Dropbox [4] or Mozy [5] rather than using their on-premise storage server. Individual users, usually the employees of a company, are thereby provided with ubiquitous file-sharing and backup services by the outsourcing of data to the cloud storage. The fast growth of data volumes from users raises a challenging issue to minimize costs of storing outsourced data in the cloud storage. Data de-duplication techniques [6] can achieve this goal by allowing a cloud storage service provider (CSP) to eliminate redundant data on the storage. Since this technique saves more than 90% of resources, most CSPs take advantage of it [7][8].

Data de-duplication (henceforth de-duplication), is the process of eliminating copies of repeating data, thus reducing both the intra-file- and inter-file data redundancies [9]. *"By identifying common chunks of data both within and between files and storing them only once, de-duplication can yield cost savings by increasing the utility of a given amount of storage[10]."*

The effectiveness of de-duplication varies widely across the different de-duplication algorithms and different data sets. The governing cooperation of large naval, fishing, oil, etc. Fleets requires information to flow from their management system(s) to their fleet in a robust manner, likewise the fleets have information required by the governing entity. The information necessitates the need to differentiate between different recipients; the captain requires some documents, while crewmembers have differing needs. The research work proposes a framework for role and attribute based de-duplication for cloud content. In this work we will perform de-duplication on the basis of roles assigned to users along with attributes of contents. It will support for heterogeneous type of contents like text, images, etc. Proposed prototype of the system will apply own encryption scheme on the basis of various parameters like roles, attributes and type of data.
Rest of the paper is organized as follows, Section II contains the related work, Section III contain proposed prototype of the research and, section IV concludes research work.

II. RELATED WORK

There exists a myriad of de-duplication methodologies, which involves invoking several processes to both chunk and restore the files. Irrespective of framework, application or

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International Journal of Mechanical Engineering and Technology (IJMET)
Volume 9, Issue 8, August 2018, pp. 77–83, Article ID: IJMET_09_08_008
Available online at http://www.iaeme.com/ijmet/issues.asp?JType=IJMET&VType=9&IType=8
ISSN Print: 0976-6340 and ISSN Online: 0976-6359

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COMPUTER AIDED CLOSED DIE DESIGN AND MANUFACTURING FOR OPEN END WRENCH

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ABSTRACT

Tool and Die design and its manufacturing were developing at a very rapid pace. Delivering quality tools at right time is a challenging task for manufacturing organizations. A typical case study of computer aided closed die design and manufacturing for open end wrench and corresponding trimming fixture design steps are explained. The purpose of this paper is to formulate a standard procedure computer aided closed die design and manufacturing for open end wrench.

Hot work die steels are commonly used for hot forging dies subjected to temperatures ranging from 1100 to 1200 °C. These materials contain chromium base steels contain chromium and tungsten. Alloying elements which have hardening characteristics and resistance to abrasion and softening, such as H11 or H13, H14 are used for the critical die works. Moreover, the trimming die or bottom die can be used from D2 tool steel that has a high strength alloy hard face applied to the cutting edge. Forging die design procedures were sequentially used to produce computer aided closed die design and manufacturing tools. This includes the creation of final forged product model, Blocker model, Bender and Flattener model before extracting the die profile. Trimming fixture will trim and give finished part. Basically all this procedure can be standardized and utilized for various product varieties. The results of the research are shown as 3D model views and 2D drawings. The 3D model creative are finisher model, blocker model, wrench assembly layout, top and bottom die and trim fixture are the result of this work.

06/12/2021

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International Journal of Mechanical Engineering and Technology (IJMET)
Volume 9, Issue 6, June 2018, pp. 1189–1198, Article ID: IJMET_09_06_131
Available online at http://www.iaeme.com/ijmet/issues.asp?JType=IJMET&VType=9&IType=6
ISSN Print: 0976-6340 and ISSN Online: 0976-6359

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OPTIMAL SINGLE CYLINDER ENGINE CRANKSHAFT SUBJECTED TO DYNAMIC LOADING

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ABSTRACT

Single cylinder crankshaft is basic for other internal combustion engine crankshaft since it has one crankpin, two crank web and journals at both ends. The large size crankshaft needs more energy than that of small size. So, optimization takes place by varying geometry of selected parameters. The main objective of this study was to investigate possibility of weight and cost reductions of a typical crankshaft without scarifying the desired performances under dynamic loading condition. For a successful completion of this research, the dynamic load analysis of a crankshaft rotating in internal combustion engine was evaluated. Using this loads as input for finite element method (FEM) determine the stress distribution by ANSYS software and compare with analytical result. On the other hand the percentage weight of crankshaft reduced in this research work is 4.16%.

Key words: Crankshaft, Finite Element Analysis (FEA), Optimization.

Cite this Article: Shimelis Mekuria Edo, Mukesh Kumar, Ajeet Kumar and Atul Kumar, Optimal Single Cylinder Engine Crankshaft Subjected To Dynamic Loading, International Journal of Mechanical Engineering and Technology, 9(6), 2018, pp. 1189–1198.
http://www.iaeme.com/ijmet/issues.asp?JType=IJMET&VType=9&IType=6

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International Journal of Engineering and Advanced Technology (IJEAT)
ISSN: 2249 – 8958, Volume-8 Issue-4, April 2019

Cloud Access with Load Balancing and Certificateless Signature Authentication

Manmohan Sharma, V.K. Jain

Abstract: Cloud computing is one of the most emerging technology in the market which caters the demand of large people in an economic fashion. Nowadays most of the organizations are using cloud services directly or indirectly and they pay for these services on the basis of their usage. Another important property of cloud computing is on-demand services. Most of the organizations and individuals are using cloud services for storage of their data and retrieval of the data. In both the case there might be the chances of data loss and data hacking. So to ensure the security and integrity of the data we need to apply certain encryption techniques. We focus on security aspects in cloud ensuring load balancing and authentication using Certificateless public key cryptography technique.

Index Terms: Cloud computing, data security, an encryption technique, load balancing.

I. INTRODUCTION

Cloud computing is an exceptionally current theme and the term has picked up a great deal of consideration as of late. It can be characterized as pay as per your usage of data, program, and platforms as and when required using any gadgets from anywhere. Human reliance on the cloud is clear from the way that today's most well-known social organizing, email, archive sharing, and web-based gaming destinations are facilitated on the cloud [1]. Google, Microsoft, IBM, Amazon, Yahoo and Apple among others are exceptionally dynamic in this field.

One of the most important services offered by the cloud is the data storage. Users now days utilize cloud storage and can be completely released from the troublesome local data storage and maintenance. However, the data stored in others database possess risk related to confidentiality of the data. Specifically, the cloud servers maintained by cloud vendors are not fully trusted by users because the data might be sensitive and any leak results in complete failure of business plans. For data privacy preservation, the best solution is to encrypt the data file and then store the encrypted files on the cloud [2]. There is the number of challenges related to designing of secure and efficient data sharing schemes for groups of people in a cloud. Some of the challenges issues are:-

The first issue is related to the privacy of the data. This is one of the major obstacles in the large-scale deployment of cloud computing. Users have a concern that their identity might be reviled to the attackers and cloud providers [4]. So they are looking for the guaranteed privacy of their identity.

Revised Manuscript Received on April 10 ,2019

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The second issue is related to providing full control of storing, reading and editing of data to multiple users. This system is also known as multi-owner system. On the other side in a single owner system, only the group manager can store and modify data in the cloud. Multi-owner system is more advantageous and flexible as compared to single owner system but is more prone to security threats. If every user has a right to edit and upload files in the cloud then might be some employees who left the company will store and edit some useful files in the cloud [5,6]. There might be the possibility that they share their credentials to hackers who intended to do some malicious actions.

Last but not least, employees or user groups are dynamic in practice that means new staffs joining and current staff discontinues in a company. Membership changes create some issues related to secure data sharing in the cloud. There are numerous system challenges for new granted users for learning the contents of data files before storing. At the same time, these users also struggle with anonymous data owners for corresponding decryption keys of stored data files. On another side, membership revocation mechanism without updating the secret keys of the remaining users is also required to minimize key complexity management.

Numbers of security schemes for data sharing on untrusted servers are proposed by many researchers. In those schemes, the data owner will store the encrypted data and share the decryption key with the authorized user. In this fashion, the unauthorized user and data servers cannot retrieve the content of the data files because they do not have decryption keys.
To deal with the issues of accommodating huge volume of continuously increasing data we need the services of cloud with security and privacy. In this paper, we proposed a load balanced secure data sharing scheme. This scheme will overcome the issues related to load balancing, security, and confidentiality of the data. It also impacts the data retrieval efficiency while preserving the privacy. The paper is organized in the following sections:-Section 2 presented load balancing in cloud whereas section 3 focuses on security issues related to cloud access. Section 4 focuses on the literature review related to cloud load balancing and security. The proposed scheme is presented in Section 5 with an advantage of CL signature in Section 6 followed by the conclusion in section 7.

II. LOAD BALANCING

It disseminates the aggregate load to the individual machines of the framework in such a way that each and every hub successfully uses the assets and limits the reaction time. It tackles situations where a portion of the hubs is over

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Graphical Comparison for Convergence of Gauss-Seidel and Jacobi Iterative Methods

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Abstract: In this paper, the graphical comparison between Gauss-Seidel and Jacobi iteration method has been shown. It is observed that neither of the iterative methods always converges. Although, it is possible to obtain a divergent sequence of approximations by applying Gauss-Jacobi or Gauss-Seidel iterative method to a system of simultaneous linear equations. It is observed that convergence of the sequence of approximations, strict diagonal dominance of the coefficient matrix is necessary condition before applying any iterative methods.

Keywords: Iterative methods, convergence and divergence, diagonal dominance matrix.

AMS Subject Classification: 65F10, 65-01

Introduction

A square matrix A is diagonally dominant if$|a_{ii}| \geq \sum_{j=1}^{i}$ i.e. in which every element of leading diagonal should be greater or equal to the absolute values of all other elements in corresponding row.If the inequality is strict then the matrix is strictly diagonally dominantand if the inequality is greater than or equal to, then the matrix is weakly diagonal dominant. The convergence rate of various iterative methods, tells about how fast the error$|a^n - a|$ tends to zero, as the number of iterations (n) increases. The necessary condition for convergence is represented as$a^{n+1} = Sa^n + d$ to converge is$\gamma(S) = \max_{1<i<k} |\delta(S)| <$ 1,where$\gamma(S)$is spectral radius of (S).

Jacobi –Iterative method

Jacobi-iterative method is a type of indirect method used for solving an equation of matrix on a matrix, which do not has zeroes along the main diagonal of it.Each diagonal element is solved.In this method before any new updation is used in calculations,all the values of unknown variables are used. That means starting with initial approximations as$x_1^0, x_2^0, x_3^0, x_4^0, x_5^0, \ldots x_n^0$. We have to calculate next approximation as:

$$x_1^1 = \frac{c_1-(a_{12}x_2^0+\cdots+a_{1k}x_k^0)}{a_{11}}, x_2^1 = \frac{c_2-(a_{21}x_1^0+\cdots+a_{2k}x_k^0)}{a_{22}}, \ldots\ldots\ldots, x_k^1 = \frac{c_k-(a_{k1}x_1^0+\cdots+a_{k,k-1}x_{k-1}^0)}{a_{kk}}$$

Continuing this processafter niteration

$$x_1^{n+1} = \frac{c_1-(a_{12}x_2^n+\cdots+a_{1k}x_k^n)}{a_{11}}, x_2^{n+1} = \frac{c_2-(a_{21}x_1^n+\cdots+a_{2k}x_k^n)}{a_{22}}, \ldots\ldots\ldots,$$

$$x_k^{n+1} = \frac{c_k-(a_{k1}x_1^n+\cdots+a_{k,k-1}x_{k-1}^n)}{a_{kk}}$$

In generally,$x_i^{n+1} = \frac{c_i-\sum_{j\neq i} a_{ij}x_j^n}{a_{ii}}$.

This method is also called simultaneous displacement method.

Gauss-Seidel Method

It is modification of Jacobi method. This modification more convenient than Jacobi method and often requires minimum number of iterations to provide the same degree of accuracy. With the Jacobi method, the values of obtained in the nth approximation remain unchanged until the entirenth approximation has been calculated. With the Gauss- Seidel method, on the other hand, we make use of the latestvalues of each as soon as they are known, which simply means, once we have determined from the first equation, that obtained value is employed in the next equation to calculate the new values.

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IJRECE VOL. 7 ISSUE 2 APR.-JUNE 2019 ISSN: 2393-9028 (PRINT) | ISSN: 2348-2281 (ONLINE)

Graphical Comparison of Convergence of Iterative Methods for Solution of Algebraic and Transcendental Equations

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Abstract: In this paper, the graphical comparison between iterative methods has been shown. Motive for this project is to discern the best method of solving algebraic and transcendental equations by comparing different methods graphically. Cost of solving algebraic and transcendental equations is controlled by both, per iteration cost and required number of iterations. Derivations of all three methods were acquired. An example is demonstrated using MATLAB R2016a to show the results of all three methods and the results were cumulated, organized in tabular form and analyzed regarding their rate of convergence and errors in the solution. The results were also examined from graphical comparison of all three methods. It is concluded that the higher the rate of convergence, faster will be the evaluation of approximate solution of equation. Therefore, it was suggested that the Newton-Raphson method is the best method for solving algebraic and transcendental equations, in terms of a single variable, due to having higher rate of convergence among all three.

Keywords: Iterative methods, convergence and divergence.

AMS Subject Classification: 65F10, 65-01

1. Introduction

Various useful solutions of the problems involving algebraic and transcendental equations are provided by Numerical methods. Algebraic equations may have infinite number of solutions and transcendental equations may have finite or infinite number of solutions or may not have a solution at all.

This research work will make emphasis on solving algebraic and transcendental equations in one dimension by including a single unknown. $F: R \to R$ which contains a scalar x as its solution, such that $f(x) = 0$.

It is necessary to make attempts to discuss about the branch of mathematics through which this work arises which is numerical analysis.

Numerical analysis is that subdivision or branch of mathematics which tackles with the development and use of numerical methods for solving problems. It is an area of mathematics and computer science that design, analyses and carry out algorithm for acquiring numerical solutions to problems involving continuous variables. Numerical algorithms are as ancient as the Egyptian Rhind Papyrus(1650 BC) which outlines a method of finding root for solving equations like algebraic and transcendental equations or in general, a problem in which calculating the values of unknowns $x_1, x_2 \dots x_n$ is required for which $f_k(x_1, x_2 \dots x_n) = 0, k = 1,2 \dots n$.

Algebraic and transcendental equations are those equations which never shows a straight line when we find their graphical solution.

Algebraic and transcendental equations are solved by using iterative methods. A random solution is assumed and is substituted into the equation and the error is calculated and then this error is used in a systematic manner to find an improved solution of the equation. Various methods are used to find the root of the equation.

Equations that can be transformed in the form of polynomial are referred as algebraic equations and the equations containing complex transcendental functions like trigonometric, hyperbolic, exponential or logarithmic functions are referred as transcendental equations. It is well known that when we find the convergence of several methods, the convergence of Newton method is guaranteed by quadratic rate.

If $f(x)$ is a polynomial of degree two or three or four, then formulae are available to find the root of polynomial. But, if $f(x)$ is a transcendental function like $a + be^x + \sin x + d \log x$ etc. the solution is not exact. Various numerical approximate methods can be used to solve such algebraic and transcendental equations. These types of equations are difficult to be solved so the best method to solve these equations is iterative methods. One of the best

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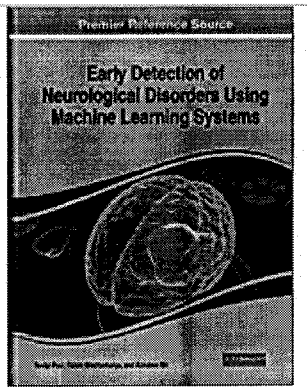

Tremor Identification Using Machine Learning in Parkinson's Disease

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Source Title: Early Detection of Neurological Disorders Using Machine Learning Systems (/book/early-detection-neurological-disorders-using/218302)

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Pages: 24

DOI: 10.4018/978-1-5225-8567-1.ch008

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Abstract

Tremor is an involuntary quivering movement or shake. Characteristically occurring at rest, the classic slow, rhythmic tremor of Parkinson's disease (PD) typically starts in one hand, foot, or leg and can eventually affect both sides of the body. The resting tremor of PD can also occur in the jaw, chin, mouth, or tongue. Loss of dopamine leads to the symptoms of Parkinson's disease and may include a tremor. For some people, a tremor might be the first symptom of PD. Various studies have proposed measurable technologies and the analysis of the characteristics of Parkinsonian tremors using different techniques. Various machine-learning algorithms such as a support vector machine (SVM) with three kernels, a discriminant analysis, a random forest, and a kNN algorithm are also used to classify and identify various kinds of tremors. This chapter focuses on an in-depth review on identification and classification of various Parkinsonian tremors using machine learning algorithms.

Chapter Preview

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Introduction

Tremor and Its Classifications

An involuntary action which is rhythmic is known as tremor which is caused by either alternating or synchronous contractions of antagonistic muscles. It is movement of muscle contraction and relaxation involving twitching movements of one or more body parts. It affects the hands, arms, eyes, face, head, vocal folds, trunk, and legs. Tremor is the most common of all movement

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Combination of EMG Features and Stability Index for Finger Movements Recognition

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Abstract

Even though extensive research have been done on electromyogram (EMG) based prosthetic hand control, relatively lesser attention have been received for control of individual prosthetic hand fingers. An EMG based recognition of individual finger movements will enable a more dexterous control of prosthetic hands. This paper reports the recognition of index finger movements: flexion-extension and abduction-adduction based on two channel EMG. The focus was on deriving an EMG feature vector through combination of features for higher recognition rate based on a stability index. Feature vector derived through linear discriminant analysis of the average combination of three time and frequency domain features with the highest stability index resulted into a recognition of 98%. The recognition was using Levenberg-Marquardt (L-M) algorithm based back propagation neural network. The experimental result shows that the stability index holds promise in deriving a feature vector for higher recognition rate of finger movements.

Previous Next

Keywords

Electromyogram; Finger movement recognition; Stability Index

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Significance of Lyapunov Exponent in Parkinson's Disease Using Electroencephalography

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Abstract:
A neurodegenerative disorder which is caused due to loss of a neurotransmitter called dopamine in the substania nigra of the mid brain is known as Parkinson's disease (PD). It is mostly affected to the people after the age of 50 years. The disease results in the loss of coordination between brain and muscle; hence the person is disturbed. Electroencephalography (EEG) is one of the primitive methods for studying the human brain function. It is used for the detection of cognitive decline in neurodegenerative disorders including PD. In this paper, we reported a study of the frontal and temporal EEG of Parkinson's disease patients using MATLAB platform. Lyapunov exponent and inverse Lyapunov exponent for both PD and healthy subjects were calculated within a given time frame. It was found that for PD subjects, the Lyapunov exponent for the temporal part of the brain is less than that of the frontal while the inverse Lyapunov exponent is reverse order of the brain. This result signifies that the correlations between neurons are stronger in frontal region for healthy subjects than PD.

Published in: 2019 6th International Conference on Signal Processing and Integrated Networks (SPIN)

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International Journal of Innovative Technology and Exploring Engineering (IJITEE)
ISSN: 2278-3075, Volume-8 Issue-6C, April 2019

Load Balancing in Cloud using Hybrid Approach

Manmohan Sharma, V.K. Jain

Abstract: *Cloud computing is up and coming era of registering what's more, a creating processing worldview in the present-day industry, either might be government associations or people in general associations. In basic terms we will outline Cloud computing is assortment of assorted servers that take into consideration want of numerous customers in lightweight of their demands. Clouds have very capable knowledge centers to handle expansive variety of client's demands. Cloud is defined as a shared reservoir of dynamic resources and virtualization. Load Balancing is needed to cater the needs of customer in an efficient manner. In LB the workload is distributed between numerous virtual machines (VM's) on a Server over the system, to accomplish ideal resource utilization, diminish data processing time, diminish in normal response time, and stay away from over-burden. The target of this paper is to propose effective and productive furthermore, upgraded composite scheduling algorithm that can be used to keep up the load and gives proficient resource distribution procedures. This paper outlines the advantages of combining Equally Spread Current Execution (ESCE) and Priority algorithms. The entire simulation is performed on Cloudsim 3.0 toolbox which is JAVA based simulation.*

Index Terms: *Cloud Computing, Load balancing (LB), Virtual Machine (VM), CloudSim, and Priority*

I. INTRODUCTION

private cloud. Numerous merchants offer cloud services, for example, Amazon, AT and T, Eucalyptus System, Google, Microsoft and some more [1][2] Cloud. The primary goal of cloud computing are to share hardware resources, software resources, data resources through web to decreased general cost of the framework, to give better execution as far as normal response time and normal processing time, keep up the framework consistency and to give future adjustment in the system [3].Basically there are diverse difficulties that should be dealt with like rapid demand changes, throughput, fault tolerance, but the main issue is LB.LB is the procedure of conveying the load among different nodes of a conveyed framework with a specific end goal to limit the correspondence delay and to limit the resource usage and furthermore avoiding a circumstance when a some servers are overloaded, some are under loaded while remaining are sitting idle.

II. LOAD BALANCING

LB is the method of dissemination of workload among nodes in an appropriate way with the end goal that it guarantees no node in the framework is over-burden or sits idle. Cloud LB diminishes costs and augments resource

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IJCSE International Journal of Computer Sciences and Engineering Open Access
Research Paper Vol.-6, Issue-11, Nov 2018 E-ISSN: 2347-2693

Load balancing in cloud using prioritization based on Quality of Services (QoS) demand

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Available online at: www.ijcseonline.org

Accepted: 25/Nov/2018, Published: 30/Nov/2018

Abstract— Cloud computing is the emerging technology that delivers the services on demand using the underline internet based software's. It is used to store a large amount of data and provide the accessibility to that data with minimum response time. Minimum bandwidth is required to assess the stored data from anywhere. In cloud there is a shared repository of resources that the cloud service providers try to utilize efficiently. Cloud vendors lease these services to the cloud customers as per their needs or demands. Customers also pay to the vendors as per their usage of cloud services. It is beneficial for both the service provider and customer as service provider earn money leasing their resources and customers also earn using the resources which otherwise they need to purchase. Cloud computing generally uses the concepts of virtual machines (VM) and their scheduling to feed maximum customers. This paper briefs about how to improve the quality of the services provided to the customer. Here we assign priorities to the customers on the basis of certain factors like number of VMs required, request type based on pricing and association with company etc. On the basis of these factors we assign priorities to the customers and the customers are feed on the basis of this priority. Here we also included the concepts of feeding the users request from the same geographical areas with minimum distance. This will improve the overall performance and throughput of the cloud with maximum customer satisfaction.

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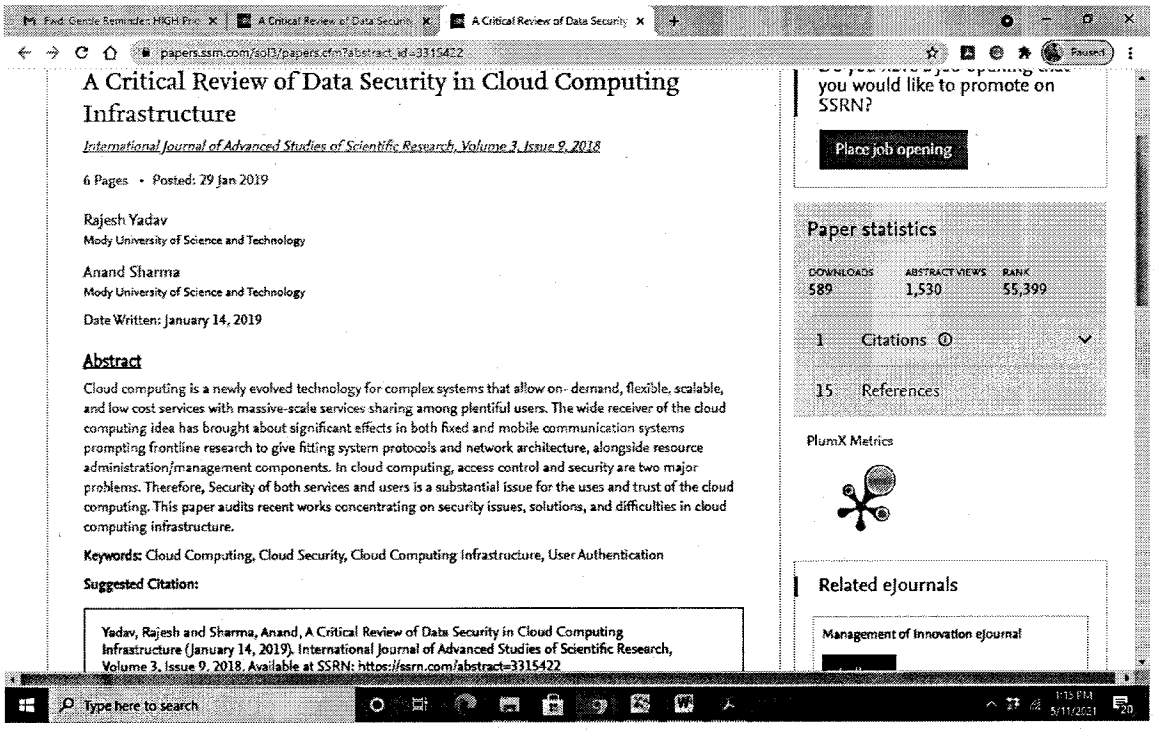

A Critical Review of Data Security in Cloud Computing Infrastructure

International Journal of Advanced Studies of Scientific Research, Volume 3, Issue 9, 2018

6 Pages • Posted: 29 Jan 2019

Rajesh Yadav
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Anand Sharma
Mody University of Science and Technology

Date Written: January 14, 2019

Abstract

Cloud computing is a newly evolved technology for complex systems that allow on- demand, flexible, scalable, and low cost services with massive-scale services sharing among plentiful users. The wide receiver of the cloud computing idea has brought about significant effects in both fixed and mobile communication systems prompting frontline research to give fitting system protocols and network architecture, alongside resource administration/management components. In cloud computing, access control and security are two major problems. Therefore, Security of both services and users is a substantial issue for the uses and trust of the cloud computing. This paper audits recent works concentrating on security issues, solutions, and difficulties in cloud computing infrastructure.

Keywords: Cloud Computing, Cloud Security, Cloud Computing Infrastructure, User Authentication

Suggested Citation:

Yadav, Rajesh and Sharma, Anand, A Critical Review of Data Security in Cloud Computing Infrastructure (January 14, 2019). International Journal of Advanced Studies of Scientific Research, Volume 3, Issue 9, 2018. Available at SSRN: https://ssrn.com/abstract=3315422

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International Journal of Latest Trends in Engineering and Technology
Special Issue IC3NS 2018, pp. 014-018
e-ISSN:2278-621X

CLOUD COMPUTING : DATA SECURITY ASPECT

Rajesh Yadav[1], Anand Sharma[2]

Abstract- Cloud computing has been intended as the next generation architecture of Information technology era. Cloud registering will be the visualized dream for registering similarly as a value, the place clients could remotely store their information under those cloud what's more entry the on-demand prominent provisions and administrations starting with an imparted pool of configurable registering assets. There are Different favorable circumstances for cloud registering like: on-demand self-service, area autonomous asset pooling, widespread system access, and usage-based estimating Furthermore fast asset versatility. However, those seeing clients no more need physical ownership of the information makes the information integument safety done cloud registering What's more it is a testing also possibly troublesome task, particularly for clients with compelled registering competencies and assets. Security affectability In addition anxieties develop concerning outline a little while later Likewise you stop advertising on that one begins will use majority of the data alternately run procurements secret word the designated firewall Also move closer towards kin as a rule Web-domain. Those key drive of the paper might be for portray the security perspective from claiming perspective from asserting cloud registering for the individuals protest highlight the individuals security worries that ought further bolstering an opportunity to make bag had a tendency to Besides assumed crazy how ought further bolstering figure it out the individuals full likelihood about cloud registering. Keywords : Cloud computing; Security; Private Cloud; Public cloud; Hybrid Cloud.

1. INTRODUCTION

Cloud computing, those long-held dream about registering Likewise An utility, need the possibility on change an expansive and only those it industry, making programming Significantly a greater amount engaging Concerning illustration an administration What's more molding the path it equipment will be intended Furthermore bought. As for every the definition cloud registering alludes on both the provisions conveyed Similarly as administrations through those web and the fittings What's more frameworks programming in the information focuses that give the individuals benefits. Here, in this segment we need aid specifying A percentage trademark which An cloud registering framework must possess.

1.1 On-demand self-service

A consumer have separately need registering abilities, for example, such that server chance Furthermore organize information storage, as required obviously without requiring human interaction for every administration supplier.

1.2 Resource pooling

-tenant model. This model works according to consumer demand with different physical and virtual resources dynamically assigned and reassigned. It is essentially area independent, in that the client by need no control alternately learning again the correct area of the Gave assets Anyhow might have the ability to define area at a larger amount about reflection (e. G. , country, state, alternately datacenter).

1.3 Broad network access

Information what's more distinctive abilities would accessible through the organize Furthermore accessed through standard devices that Push utilization by heterogeneous platforms.

1.4 Rapid elasticity

Information and separate competencies camwood make elastically provisioned What's more released, for a few situations automatically, on scale quickly outward Furthermore internal similar with request. Of the consumer, those abilities accessible to provisioning frequently all the show up should a chance to be boundless Also camwood be appropriated Previously, At whatever amount toward whatever duration of the time.

1.5 Measured service

Cloud frameworks naturally control Also streamline asset utilize by leveraging an metering capability1 during some level for reflection proper of the kind of administration (e. g. , storage, processing, bandwidth, and animated client accounts). Asset use could a chance to be monitored, controlled, What's more reported, giving work to transparency to both those supplier Also purchaser of the used administration.

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BARRIERS IN FLOURISHING OF SUSTAINABLE ENERGY RESOURCES IN INDIA

MAANDVI RAJE SINGH[1], VIKRANT SHARMA[2], MUKUL PALIWAL[3], ATUL KUMAR[4]

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Accepted Date: 19/03/2018; Published Date: 01/04/2018

Abstract: India has set out on the path of harnessing renewable energy (RE) sources than never before. The reasons are many and are not hard to find within the chronic shortage of power, matters of energy security and environmental concerns. However, RE capacity addition and development of the sector suffers on account of a number of constraints, overlaps and gaps prevalent in the current policy and regulatory environment. There is therefore a need to review the existing environment for development of RE and propose a new approach to the development of this sector. With this objective, this paper examines the current status of RE development in India and the existing environment for such development.

RE technologies (RETs) in India can be divided into two categories: (i) near commercial and commercial technologies such as wind, small hydro power (SHP), solar PV, biomass and co-generation (COGEN) that have matured and are being deployed or are close to deployment, and (ii) emerging technologies such as solar thermal and biofuels that will need time to mature. The latter will also have to undergo pilots before commercial deployment. This paper focuses on the RETs that fall in the first category. The paper also restricts itself to grid-connected RE.

Keywords: Barriers, Solar Power, Wind Power, Hydro Power, Bio Mass Power.

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Access Online On:

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How to Cite This Article:

Maandvi Raje Singh, IJPRET, 2018; Volume 6 (8): 186-191

PAPER-QR CODE

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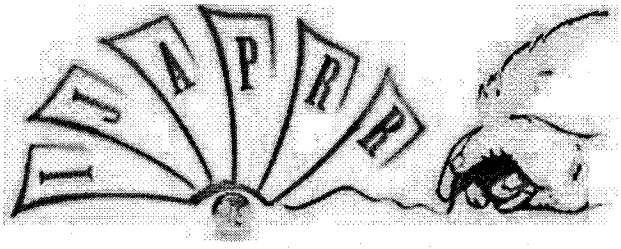
UGC JOURNAL NUMBER 44557



International Journal of Allied Practice, Research and Review

Website: www.ijaprr.com (ISSN 2350-1294)

A Study of Human Intelligence Vs Artificial Intelligence

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Abstract - The paper explored numerous examinations over human knowledge and artificial intelligence, their similarities and differences. Paper includes a brief study about introduction of human intelligence and artificial intelligence. The principle objective of the paper is to discuss about HI (Human Intelligence) and AI (Artificial Intelligence) and finish up to find the better out of them.

Keywords - Human *Intelligence, Artificial Intelligence, Brain Computer Interference*

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I. Introduction

1.1 Human Intelligence

Human intelligence is something natural, nothing is artificial in it. Intelligence is something differently perceived and contrastingly obtained. Human intelligence is something related to the adaption of various other cognitive processes in order to have specific environment. Because of which subjective registering has developed as a hot region of research nowadays. In human knowledge, "insight "assumes a fundamental part since insight is with them all it's have to think and make a well ordered arrangement for playing out specific assignments. It's a characteristic gift that is with people since their introduction to the world and nobody can supplant it aside from GOD [1]

1.2 Artificial Intelligence

Computerized reasoning is intended to include human like characteristics in machines, e.g. robots are its most widely recognized case. Counterfeit consciousness real capacity is to influence the robots to copy to or act like individuals. To put it plainly, we can state that it's

Scientific Journal of Impact Factor (SJIF): 4.72

e-ISSN (O): 2348-4470
p-ISSN (P): 2348-6406

International Journal of Advance Engineering and Research Development

Volume 4, Issue 7, July -2017

Multi-Objective Optimization in CNC End Millingusing Taguchi Optimization Technique

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Abstract: *The present work makes an attempt to analyzevarious parameters of end milling in order to minimize the surface roughness and to maximize the material removal rate (MRR) of Al 2024-SiC composite. Al2024-SiC is generally used in manufacturing high strength parts of aircrafts and machinery, fuselage structural wing tension members, wing skins, engine parts subjected to high temperaturesincluding gears and bolts and for security vans where strength is critical. The quality of the machined surface, i.e., surface finish and texture affects the function, appearance and reliability of a product. On the other hand higher production rate is possible when MRR is maximum. But higher MRR leads to lower surface finish, so a tradeoff between Surface finish and MRR is needed. In this work, the optimal selection of process parameters have been done in order to obtain optimized response output parameters namely surface roughness and MRR by using Taguchi's technique. And ANOVA analysis. In machining operations, achieving desired surface quality is a bit difficult as these quality structures are influenced by the effect of process parameters and their interactions. However, the amounts of influence of the process parameters vary for different processes. Therefore, optimization of surface roughness and MRR is a multi-factor and multi-objective optimization which is carried out successfully by the help of Taguchi optimization technique.*

Keywords- *Surface Roughness, Material Removal Rate, Orthogonal Array, Taguchi Technique*

1. INTRODUCTION

Surface roughness is an important measure of the quality of a production and also influences the machining cost. The mechanism for achieving lower surface roughness is dynamic and process dependent.

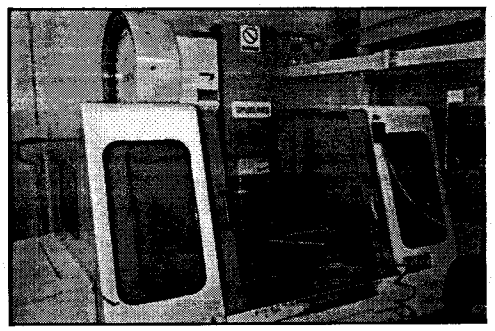

Figure 1 Takumi CNC VMC

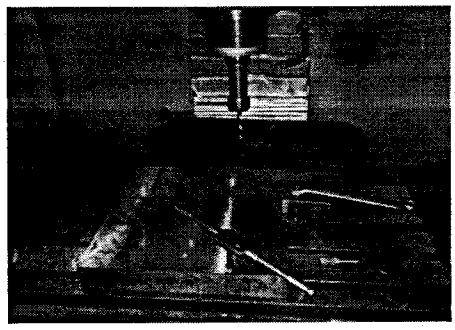

Figure 2 End Milling Operation on Al2024-SiC composite cast plate

So, generally machine operators use hit and trial method to achieve desired surface roughness but with lesser success rate. The Taguchi technique has been used to find a particular combination of machining parameters in end milling operation of Al2024-SiC composite under finishing condition considering input parameters namely speed, feed, depth of cut and number of flutes for assessingoutput responses namely surface roughness and material removal rate in order to obtain optimal parameter setting for the process. Confirmation tests were done to check the results obtained with Taguchi

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International Journal of Mechanical Engineering and Technology (IJMET)
Volume 9, Issue 12, December 2018, pp. 525–531, Article ID: IJMET_09_12_055
Available online at http://www.iaeme.com/ijmet/issues.asp?JType=IJMET&VType=9&IType=12
ISSN Print: 0976-6340 and ISSN Online: 0976-6359

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THERMAL AND PRESSURE DROP ANALYSIS OF SOLAR AIR HEATER WITH AND WITHOUT WAVY FIN

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ABSTRACT

A theoretical study has been carried out to get the effect of collector length on the heat transfer rate and pressure drop characteristics of a wavy finned solar air heater. The flow channel was formed by two transversely positioned wavy fins attached below the absorber plate and the top surface is subjected to uniform heat flux. The effect of mass flow rate and collector length of wavy finned solar air heater was investigated. By investigation it has been known that increasing the length of collector total loss, useful energy gain and drop in pressure increases. However, the thermal efficiency of solar air heater decreases. Moreover, outlet air temperature at lower mass flow rate increases and reduce pressure drop. At mass flow rate of 0.0139 kg/s the pressure drop for the wavy fin solar air heater increases from 4.02% to 23.5%. Meanwhile the outlet air temperature due to wavy fin increases at the cost of pressure drop and overall efficiency increases. It has been also noticed that outlet temperature of air increase with collector length but it is ineffective beyond rate of 0.05kg/s for the wavy air heater.

Keywords: Wavy fin, Collector length, Pressure drop, Solar air heater.

Cite this Article: Ajeet Kumar, Atul Kumar, GangindlaBheemanna and Gautam Prasad, Thermal and Pressure Drop Analysis of Solar Air Heater with and Without Wavy Fin, International Journal of Mechanical Engineering and Technology, 9(12), 2018, pp. 525–531.
http://www.iaeme.com/ijmet/issues.asp?JType=IJMET&VType=9&IType=12

International Journal of Applied Engineering Research ISSN 0973-4562 Volume 12, Number 18 (2017) pp. 7630-7637
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Analysis Of Energy Conservation For A Building Model Of Research Institute, (Using Design Builder Simulation Software)

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Abstract

In this paper a Research Institute Building model is chosen for energy simulation. In order to achieve this aim, building energy simulation Design Builder (DB) software is used to carry out a series of sensitivity analysis on set of design parameters, with an aim to achieve a comfortable and energy efficient building. To evaluate the energy consumption compared base case building model and ECBC building model and it is found that yearly energy consumption can be reduced by approximately 27.3% by designing ECBC buildings.

Keywords: Design Builder, ECBC code

INTRODUCTION

The Indian energy requirements are likely to grow at a much higher rate than the world growth rate of 2%. More than one third of energy is consumed in building, therefore existing building offer one of the greatest potentials in contributing to energy conservation. India has limited energy reserves and therefore it will need to increase its energy efficiency, in addition to reevaluating its existing building stock.

Energy efficient building is critical for India because of the following reason:

Rapid Urbanization: More than 215 million people are expected to migrate from rural areas into crowded cities. This influx and overall rise in living standards, building construction and energy demand. Efficient buildings are essential to assure sustainable urban environments.

Energy Security: India's energy demand is projected to double or triple by 2030. India already imports 68 percent of oil, 25 percent of natural gas, and 13 percent of coal of its requirement, according to the Energy Information Administration. Building efficiency will enable India to meet its increasing consumption with the same, or even lower, amount of energy than its current usage, easing India's reliance on foreign supplies of expensive fuels.

Reducing Power Cuts and Addressing Climate Change: India already faces a national electrical shortage of 9.9 percent and a peak demand shortage of 16.6 percent, according to the Central Electricity Authority. This gap results in frequent power outages with buildings especially hard-hit, and over 20 percent peak demand shortages in some states. The Government of India estimates that economy-wide efficiency measures will prevent an increase in demand that is equivalent to 19,598 megawatts, or some 30 mid-sized power plants.

From the energy saving point of view a research institute is chosen in which, energy consumption and energy saving is analysis by building energy simulation. Research institute are constantly faced with optimizing limited budgets to ensure maximum payback for facilities. By the energy simulation program we can save anywhere between 5- 20% on energy bills.

Scope of Energy Efficient Building in India:

India is committed to improving building efficiency. In 2009, the Central Government approved the National Mission for Enhanced Energy Efficiency. Among other goals, the Ministry of Power and the Bureau of Energy Efficiency (BEE) has adopted the Energy Conservation Building Code (ECBC), a minimum building standard developed in 2007. Although the ECBC is currently voluntary, the Ministry of Urban Development and BEE will work with state and local governments to make the code mandatory within the next two years. The Ministry of Environment and Forests also already requires largenew building projects to comply with the code as part of the environmental impact assessment.

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International Journal of Applied Engineering Research ISSN 0973-4562 Volume 12, Number 21 (2017) pp. 10816-10823
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Comparative study of Parametric Optimization of the End Milling of Al2024-SiC MMC on Surface Roughness using Taguchi Technique with Applied Statistical Plots

Atul Kumar[1], Dr. Neeraj Kumar[2], Dr. Sudhir Kumar[3] and Dr. Rohit Garg[4]

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Abstract

In today's competitive world, the industries should have production systems which are capable of versatility, high production rate, precision and ability to produce highly finished goods. Due to this the value of input machining parameters responsible for the desired surface finish & material removal rate becomes critical. Present paper presents a study on parametric optimization of the End Milling machining of Al2024-SiC metal matrix composite on quality characteristics namely surface roughness and material removal rate using Taguchi Technique. The end milling parameters selected is speed, feed, depth of cut and number of flutes. How these parameters influence the response outputs like MRR and surface roughness is analysed with the help of Taguchi Technique and ANOVA. At the same time various statistical plots are generated with the help of MiniTab software like residual plots, contour plots and surface plots. Twenty seven experimental runs based on design of experiments and L27 orthogonal array of Taguchi method are performed and data so obtained is used to subsequently applied to determine an optimal end milling parameter combination. Finally, confirmation tests carried out at optimum cutting conditions to make a comparison between the experimental results and developed model. The predicted results are found to be closer to experimental results by confirmation test. After this the results of Taguchi optimization are compared with the statistical plots found to be in close conformity with each other.

Keywords: End Milling, Taguchi Optimization, ANOVA, Surface Roughness

INTRODUCTION

The increase in demand for highly finished products has driven the manufacturing industry to continuously improve the control of the machining processes. The quality of the surface finish plays important role in various areas like tribology, wear resistant parts, fatigue life, bearing surfaces etc. End Milling is widely used machining operation in manufacturing as it is very versatile and can produce complex contours. Various end milling parameters affect response outputs like the surface texture, dimensional accuracy and MRR (material removal rate) to a greater extent.

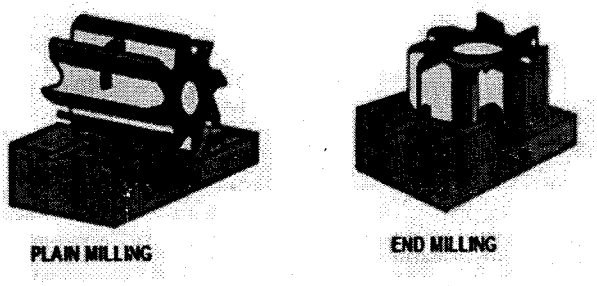

Figure 1: Difference between Plain and End Milling

Surface roughness and MRR greatly influences quality of a product and manufacturing cost. End Milling is generally applied in aerospace industry, tool and die shops and automobile sector. Slots, pockets, peripheries, and faces of machine components can be produced with this process. The machining of aluminium metal matrix composites using CNC machines is finds diverse applications in the aeronautics industry as this industry needs high quality, better surface finish and high output rate. The operation is usually performed on vertical milling machine. Quality and productivity is optimized with the help of optimization technique in such a manner that these multi-objectives could be fulfilled simultaneously up to the desired level.

LITERATURE REVIEW

Sundara Murthy et al (2010) studied provides the optimum cutting conditions for end milling of Aluminum 6063 under minimum quantity lubrication machining. The highest cutting speed, medium feed rate and medium depth of cut

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International Journal of Latest Trends in Engineering and Technology
Special Issue IC3NS 2018, pp. 051-053
e-ISSN:2278-621X

CRITIC REVIEW OF E-GOVERNANCE IN INDIA

Shivi Gupta[1], Ranu Shekhar[2], Nisha Lodha[3], Puneet Kumar[4]

Abstract. With the tremendous growth of knowledge communication technology in India, the government has introduced many data technology based mostly reforms in processes and now and then in policies. These reforms are driven principally with the read to permit the governmental services to be wide accomplished during a inhabited country like India. The aim of this paper is to debate the categorization of medical care of governmental services in India to elucidate one service from every class and supply a critical appraisal of identical. The paper consistently studies the expansion of ICT and e-governance initiatives in India afterward. It explains one good example initiative from every class and offers a primary critique on identical. The paper reports that although the vision of e-governance initiatives offered by the Indian government is considerable however the implementation has many challenges, identical are explicit within the critique.
Keywords: ICT, NeGP, Applications and challenges of e-Governance

1. INTRODUCTION

India is a diversified country where sixty nine percent of population belongs to rural and rest belongs to urban. So, it's unacceptable for the rural folks to access most of the most recent technologies. It's quite not possible for the government to achieve every subject of the country and vice-versa. Over the past years, an outsized range of initiatives are undertaken by numerous state governments associate degreed central ministry to commence a period of e-government. Various policies are created at multiple levels to improve the delivery of public services and change the method to access them. [1]

E-governance has developed gradually from mechanization of state departments to initiatives that contain the ultimate aim of governance, like service orientation, and transparency. In a developing country like India, the success of the government plans lies with the peoples participation, transparency, speedy dissemination of knowledge and apt and simply public administration. Moreover, transparency with people's participation in governance allows leaders and bureaucrats to perform with efficiency that is incredibly essential for any healthy and comprehensive democracy. Therefore, technological involvement is important and needed in these spheres. The infusion of e-governance has helped in bridging the gap between public and government. And it's opened new avenues for growth and development for developing countries by generating positive socio-economic setting.

This can be doable only if there's comprehensive democracy. And democracy can't be comprehensive unless each individual have access to economic, political and social justice and have their aspirations to be enclosed publicly policies. to realize this objective, the thought of excellent governance has emerged because the larger issue these days than the other problems. [2]

2. GOVERNMENT POLICIES

2.1 Information and communication technology (ICT):

In the direction of e-Governance, ICT has competed a serious role to profit the voters and conjointly to enhance potency in administration. The operating of public services, processes of administration and data on policymaking our the vital areas of governance that were unbroken beneath secrecy within the ancient model of governance, whereas the emergence of e-governance has created it additional clear and open by facilitating voters participation through several suggests that. E-governance has the potential to enhance the speed, convenience, quality and transparency of public body services. It's increased the flexibility of individual voters to precise and exercises their democratic rights. Transparency in governance through e-mode has created the leaders and bureaucrats additional responsible and accountable that is incredibly essential for any healthy and comprehensive democracy. [2]

3. NATIONAL E-GOVERNANCE PLAN (NEGP):

The National e-Governance Plan (NeGP) takes a overall review of e-governance scheme throughout the country. In context of this government plan, a vast broad infrastructure reaching right down to the remote areas that is growing in huge scale conversion of records is happening to modify simple, reliable access over the internet. The government approved the national e-governance plans (NeGP) comprising of twenty seven mission mode comes and eight parts on could eighteen, 2006. Within the year 2011, four projects-health, education, PDS and posts were introduced to form the list of twenty seven MMPs to thirty one Mission Mode comes (MMPs). The government has accorded approval to the vision, approach, strategy, key parts,

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A Review on Application and Challenges of Blue Brain Project

Dr. Puneet Kumar[1], Mili Sharma[2], Tulika Tewari [3]
[1,2,3] Dept of CSE
[1,2,3] Mody University of Science and Technology

Abstract- Man is said to be the most wonderful creation of the God. But, has anyone wondered what makes him different from all the other species. It is the human brain. This brain makes the man capable of doing all the activities which no other species is capable of. It would come as a surprise that researchers today are working to preserve the human brain even after its death. IBM is working on a project named Blue Brain which is said to be a human brain in a supercomputer.

The main approach is to have an actual brain inside a virtual brain which could work, respond, contemplate and take decisions just like any other normal brain is capable of doing. Idea is to create electrochemical interactions that occur inside a normal brain thereby eliminating any chances of brain disorders like autism, etc. Also, the main aim is to preserve the human brain after death so that the data, intelligence, personalities, feelings and memories of that person should not be lost [1].

Keywords- neurons, nanobots, computational modeling, supercomputers

I. INTRODUCTION

Today we are able to witness the development in the society because of the intelligence. But what if we want to use the intelligence of a man even after his death? Answer to that problem is having a virtual brain. Blue Brain project is an attempt to create a virtual brain through reverse engineering. By this we will be able to scan the natural brain and use the knowledge for further development of the society. The project involves studying slices of living brain tissue using microscopes and patch clamp electrodes. Data is collected about all the many different neuron types. This data is used to build biologically realistic models of neurons and networks of neurons in the cerebral cortex. The simulations are carried out on a Blue Gene supercomputer built by IBM [2].

1.1 History

The Blue Brain was launched on July 1, 2005 by the name "Blue Brain Project 1" by IBM and the Brain and Mind Institute in Ecole Polytechnique Federale de Lausanne, Switzerland. The director of this institute, Henry Markram is heading this project along with the co- directors Sean Hill and Felix Schurmann. The fundamental motive behind this ambitious initiative is the simulation of mammalian brain with biologically high level of accuracy, and eventually, study the steps involved in inception of biological level of intelligence with the aid of computing power of Blue Gene/L supercomputer which is a prototype of IBM [3].

1.2 Working

The functioning of blue brain basically involves the process of human brain uploading. The uploading is done with the use of small robots called Nanobots. These nanobots are so small that they can travel throughout our circulatory system. Thus, these robots can monitor the central nervous system by moving through the spine and brain and while still residing in the biological form, they act as an interface with the computer. In this way, nanobots will provide a complete readout of the connection by scanning the entire structure of brain. This information regarding the connection obtained, when input in the computer, could then continue to function like a human being. Hence, the data stored in the human brain will be uploaded in the computer.

The virtual brain is built using three main steps:

1. Data acquisition
2. Simulation
3. Visualization

Data acquisition- In this step, the 3D Neurological Morphologies are reconstructed by taking slices of the human brain. The data acquisition step is done on Windows workstation running Neurolucida software package. In order to study the electrophysiological behavior of neurons, a 12-patch clamp was invented for this project.

Simulation- In this step, a software called NEURON is used which is uses various algorithms to study the cells. This software is written in C, C++ and FORTRAN. Different algorithms are defined for simulation of different age and breed of the human beings. Blue Brain Project Software

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Abstract:
Electromyography (EMG) employs widespread usage of rehabilitation robotics. EMG informs about the maximum capabilities of muscles and allows comparisons between different tasks performed. This presents a comparitive study % MVC (Maximum Voluntary Contraction) hand muscles among 30 to 60 years of age group. The movement considered are flexion and extension of elbow and wrist, pronation and supination of forearm and opening and closing of hand. The study concludes that the muscles bicep brachii, tricep brachii, pronator quadrates, supinator, flexor carpi radialis, extensor carpi radialis, flexor digitorum superficialis, extensor pollicis brevis, extensor pollocis longus, extensor digitorum and extensor digiti minimi are significant for the particular hand movements considered during the study. The activity of these muscles was higher for particular movements when compared with the other muscles. Hence, this study is helpful in designing of orthotic and prosthetic devices for the disabled.

Published in: 2017 4th International Conference on Signal Processing and Integrated Networks (SPIN)

Date of Conference: 2-3 Feb. 2017 **INSPEC Accession Number:** 17213451

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International Journal of Applied Engineering Research ISSN 0973-4562 Volume 12, Number 20 (2017) pp. 10197-10204
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Comparative Performance Investigation of Battery and Ultracapacitor for Electric Vehicle Applications

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Abstract

Improving performance of Electric Vehicles (EV) has been trends of automobile market in recent time. The key to this improvement is the design of efficient energy management scheme for Hybrid Energy Storage System (HESS). The HESS may be form by taking Battery and Ultracapacitor (UC) together or Fuel Cell and Ultracapacitor together or all the three together. This paper investigates the performance of different types of rechargeable batteries such as Lithium Ion, Lead Acid, Nickel Cadmium and Nickel Metal Hydride types to be connected with Ultracapacitor to form our HESS. These different combinations are connected and applied in MATLAB/SIMULINK to check the performance of each combination to find out the optimal efficiency of battery and efficient energy management scheme when battery is connected with Ultracapacitor for electric vehicle applications. The selection of best battery and scheme is based on the performance analysis of the parameters like operating temperature, reliability, current and voltage of the battery, state of charge of battery and rate of charge/discharge. This investigation will lead to easy selection of type of battery in HESS which will also improve the life of the battery when connected with Ultracapacitor otherwise battery life is short when peak loads are handled.

Keywords: Ultracapacitor; Supercapacitor; Battery, Electric Vehicle.

INTRODUCTION

A. Battery:

The recent necessity of green world has led to green energy to check the Pollution problems and their environmental effects as long term goal. At present the automobile market is dominant with vehicles running on conventional fuel which pollutes the environment. Nowadays, research is more focused on minimization of the exhaust of carbon dioxide [1-2]. Hybrid Electric vehicle usage is a promising solution considering the environmental and its economic benefits. The batteries used by electric vehicles are easily damaged by extra high peak power and rapid charging/discharging cycles that are very much influenced by the repetitive actions of the acceleration and deceleration of the electric vehicles. This problem of peak current of battery can be solved if battery and Ultracapacitor combination is used as power supply where Ultracapacitor will act as buffer to fill the large magnitude of power and fluctuation demanded by load variation [3]. While designing an energy storage system for electric vehicle, its design, weight and volume must be considered for the vehicle to reach maximum acceleration and high performance to deliver enough power (kWh) for EV. This is dependent on the type of driveline the vehicle is equipping [4].

Rechargeable battery or storage battery or secondary cell or accumulator is kind of electric battery that can be charged and discharged through a load. It is recharged many times as unlike disposable battery and discarded after use. It is an electrochemical cell and also termed as accumulator as it accumulates and stores energy through a redox reaction. Rechargeable batteries are available in many forms of sizes and shapes (button cells to megawatt systems). The several types of electrode materials and electrolytes are combined in different ways to form different types of rechargeable batteries such Lead–Acid (Pb-Ac), Nickel–Cadmium (Ni-Cd), Nickel–Metal Hydride (Ni-MH), Lithium-Ion (Li-Ion) etc. These batteries initially are costlier than disposable batteries, but have the total cost of ownership and environmental impact is lower, as it easily recharges many times before they replaced. Disposable batteries may also be available in the same rating as the rechargeable batteries and can be used interchangeably sometimes. The positive active material is oxidized during charging which produces electrons while negative material is reduced by consuming electrons. The electron which moves constitutes the current flow in external circuit. The electrolyte will serve as a buffer for the ions to flow between the electrodes internally, as like in nickel-cadmium and lithium-ion cells whereas an active participant in the electrochemical reaction as in lead–acid cells.

A charger is used to supply energy to rechargeable battery through AC main electric supply which is to be maintained at higher potential so that current is forced to flow from charger towards the battery limiting to maximum current otherwise the battery will explode because of excessive input current

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International Journal of Mechanical Engineering and Technology (IJMET)
Volume 9, Issue 1, January 2018, pp. 216–228, Article ID: IJMET_09_01_026
Available online at http://www.iaeme.com/IJMET/issues.asp?JType=IJMET&VType=9&IType=1
ISSN Print: 0976-6340 and ISSN Online: 0976-6359

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NOVEL BUCK-BOOST CONTROLLED HESS TO DELIVER CONSTANT HIGH VOLTAGE FOR ELECTRIC VEHICULAR POWER SOURCE

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ABSTRACT

Electric Vehicle which derives power from battery suffers from supply of continuous high voltage energy supply during transient and high load. So this paper details better efficient energy management between Lithium-Ion battery and Ultracapacitor (UC) for Electric Vehicle (EV) applications. This is achieve by using an novel buck-boost controlled method to supply required high voltage by the EV along with the efficient energy management scheme to deliver power from UC whenever high transient is demanded by the EV. Through simulations using MATLAB/SIMULINK, the delivery of high power and efficient energy management is implemented.

Keywords: Ultracapacitor, Hybrid Energy Storage System, Electric Vehicle

Cite this Article: Thoudam Paraskumar Singh and Sudhir Y Kumar, Novel Buck-Boost Controlled HESS to Deliver Constant High Voltage for Electric Vehicular Power Source, International Journal of Mechanical Engineering and Technology 9(1), 2018, pp. 216–228.
http://www.iaeme.com/IJMET/issues.asp?JType=IJMET&VType=9&IType=1

1. INTRODUCTION

The present vehicles produces generates lots of CO_2 which pollutes the environment have given rise to the necessity of the car manufacturers to go for electric vehicles or hybrid electric vehicles. It is also seen that critics are of the opinion that social life is affecting because of the use of fossil based vehicles which runs on fuels like petrol, diesel and other forms of gasoline. The ICE engines used for the present commonly used commercial car produces pollution so the governments of states or nations have now emphasized on the need of EVs is the present trends. The problems of generation caused by CO_2 emissions to the environment by fuel based cars can be far reduces by choosing EV and HEV which runs on green energy sources. The other alternative of energy sources are batteries, electric double-layer capacitors and flywheel energy storage are forms of rechargeable on-board electrical storage. By avoiding an intermediate mechanical step, the energy conversion efficiency can

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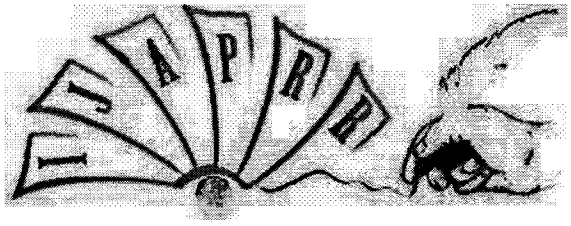

International Journal of Allied Practice, Research and Review

Website: www.ijaprr.com (ISSN 2350-1294)

Performance Analysis of Solar Photovoltaic System for Electric Vehicles

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Abstract - *To take care of the energy demand of the utility, solar based photovoltaic has just developed as persuading sustainable power source innovation. Solar based Photovoltaic (PV) modules are a standout amongst the best, practical, and eco-accommodating frameworks in late world. Automobiles which are energized by the conventional fuels emits harmful gases to the environment at the same time these energy resources are depleting at alarming level which is speculated to end soon. As alternative energy source, solar is considered the best option for the future Electric Vehicles (EV) while maintaining clean environment. This work outlines the variety of productivity and factors of photovoltaic array module under genuine working condition for integration with battery and Ultracapacitor to form hybrid energy storage system. MATLAB SIMULINK is utilized to examine PV attributes to assess the MPP (Maximum Power Point) for solar based photovoltaic cells array thinking about the impact of different irradiation and different temperature levels.*

Keywords - *Renewable Energy, Electric Vehicle, Solar irradiation, Solar cell, PV array, Ultra-capacitor*

1. Introduction

Presently energy requirement of a day is overall an issue of concern. So as to beat the difficulty of energy emergency, the resources of sustainable power source have turned into a noteworthy issue in the current years lately [1]. Sustainable power source is utilized to create electric power by solar based energy utilizing the idea of Photovoltaic (PV). This has come into see for its awesome points of interest and lesser upkeep [2]. Although, amongst solar powered innovation, the photovoltaic cells array (PV) have been making an optimistic consideration because of its ability of energy transformation without intermediate heating process [3-5]. On the off chance that the solar based energy is utilized as a part of right track, it can address the issue of having adequate energy of the world [6-8]. Photovoltaic (PV) solar oriented cell frameworks dependably demonstrate non-linear voltage-current relationship which changes with various sorts of natural and electrical parameters [1]. Most generally utilized materials for Photovoltaic (PV) change are mono-crystalline, poly-crystalline silicon, shapeless silicon and thin Film innovations. Silicon crystalline have distinctive kinds of structure's, for example, single crystalline type silicon, silicon type with multi-crystalline and type of ribbon casted

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ISSN:2320-0790

COMPUSOFT
An International Journal of Advanced Computer Technology

IMPACT OF NODE DENSITY ON ARCHIMEDES' SPIRAL BASED MOBILE NETWORK DESIGN IN 3D

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Abstract: Wireless Sensor Technology has entered into a new phase with all the research going on based on its efficient data delivery. Its favourable advantages and applications are the reason behind growing interest in this field. In this paper, this work is related to the impact of node density on a particular 3D terrain to determine its optimum performance. The use of Archimedes' Spiral was introduced to compare with static and random mobility conditions in both 2Dand 3D network designs to prove that communication can be improved when mobility is introduced. The simulation and 3D network design to prove that communication can be improved when mobility is introduced. The simulation results were impressive which when researched on higher levels and done field tests, may prove to be a better practical application of wireless sensor network in the field of agriculture.

Keywords: sensor nodes, Archimedes' spiral, wireless, 3D, network design.

I. INTRODUCTION

In a wireless sensor network, the sensor nodes are designed such as to monitor certain events and help solve the problems that may arise in a particular scenario. It has wide application area [1-4] but the focus in this work is mainly in the agricultural sector where sensor network may be designed for terrestrial deployment [5-8]. Sensor networks have been currently emerging as a great way to improve agriculture quality, productivity and resource optimization. Now a day's researchers are willing to do analysis and work further using WSN. Lot of new technologies in WSN is becoming available for improving agricultural quality. Precision agriculture is one of them, which is a field that provides suitable scenarios for the deployment of wireless sensor networks (WSNs). The wireless sensor network is built of few to several hundred or even thousands of sensor nodes. Each sensor node comprises of several parts such as a radio transceiver, microcontroller, an electric circuit for interfacing with the sensors and an energy source. The topology can change from a straightforward star network to a progressed Multi-hop interlock network. The communication technique between the jumps of the network can be either routing or flooding. Also, many routing protocols have been designed for WSNs which mainly differs depending on its wide range of application and network topology [9-11].

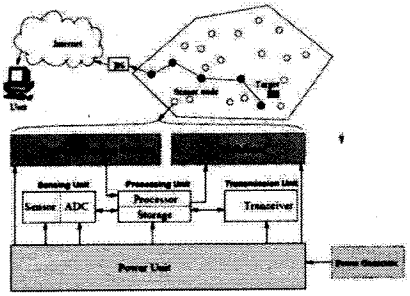

Fig 1: Overview of Wireless Sensor Network

However, the varying of node density in a particular area can have an impact on the efficiency of network design as shown in the work of this paper. Figure 1 shows a basic overview of Wireless Sensor Network and the internal units of a sensor node.

II. RELATED WORK

Based on node density variation in a wireless sensor network design, some research work has been conducted by

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Performance Comparison and Analysis of On-Demand, Table-driven and Hybrid Routing Protocols in 3D

Mody University International Journal of Computing and Engineering Research
Volume 2 Issue 1

Published: 2018
Author(s) Name: Raunak Monir, Ranjana Thalore, Partha Pratim Bhattacharya | **Author(s) Affiliation:** M.Tech Scholar, Dept of ECE, Mody Univ. of Science and Tech., Lakshmangarh, Sikar, Rajasthan.

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Abstract

The interaction between randomly distributed sensor nodes in an underground environment can lead to establishment of a network system with efficient data delivery. There has been an increasing interest in building mobile sensor networks due to its favorable advantages and applications. This paper focuses on the analysis of factors like data received, end-to-end delay, throughput, jitter and energy consumed by sink node when different routing protocols viz. On-Demand, Table-Driven and Hybrid are applied in the same 3D network design and the sink node is kept static. It is shown here how the performance of data communication is affected when using IEEE 802.15.4 standard. The analysis is done to show the applicability of various routing protocols for agricultural monitoring. Extensive simulations are done using QualNet 6.1 network simulator to validate the results

Keywords: sensor nodes, mobility, routing protocols, Qualnet 6.1

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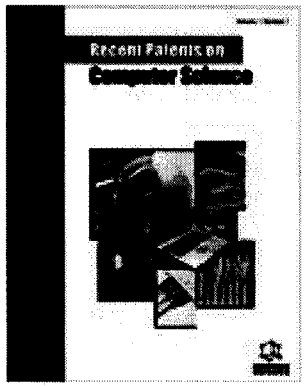

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Research Article

A Layered Relay-Medium Access Control (LR-MAC) Protocol for Wireless Sensor Networks

Author(s): Ranjana Thalore*, Manish K. Jha, Partha P. Bhattacharya

Journal Name: Recent Patents on Computer Science

Continued as Recent Advances in Computer Science and Communications (https://www.eurekaselect.com/node/174415/)

Volume 10 , Issue 3 , 2017

DOI : 10.2174/2213275910666171116151630 (https://doi.org/10.2174/2213275910666171116151630)

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International Journal of Sensors, Wireless Communications and Control, 2017, *7,* 000-000

RESEARCH ARTICLE

Multi-Layer MAC (ML-MAC) Protocol for WSN in Irregular Terrains

Ranjana Thalore*, M.K. Jha and P.P. Bhattacharya

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ARTICLE HISTORY

Received: June 23, 2017
Revised: August 25, 2017
Accepted: September 06, 2017

10.2174/2210327907666171006100742

Abstract: ***Background:*** Most existing works on Wireless Sensor Networks (WSNs) assume node deployment in regular terrain. Most of the works have considered the fact that in most real-life applications, nodes are actually in irregular terrain but are analyzed in two-dimensional plane. This paper attempts to analyze a sensor network in three-dimensional plane. The energy conservation and network lifetime prolongation problem along with secondary constraints of the sensor network are rigorously examined.

Method: Through the investigation of existing works, it is found that a more practical way to analyze monitoring of real-life applications of WSNs is deployment of sensor network in irregular terrains e.g. mountainous regions. This paper designs a random node deployment scheme with the use of two ray radio propagation model for transmitting information through the channel. The communication coverage of the sensor nodes is defined by a probabilistic sensing model as deterministic sensing models are more effective with regular terrains than the irregular terrains.

Results: Aimed at making progress on the constraints like energy conservation and lifetime prolongation, ML-MAC scheme is used for the analysis of a randomly deployed network. Results indicate an improvement of 21.98% in network lifetime and 1.25% in received throughput in irregular terrains when compared with regular terrains.

Conclusion: This paper compares two scenarios with same parameters but different architecture i.e. regular and irregular. The impact of various performance parameters like network lifetime, number of packets dropped, average jitter and average throughput on performance of regular and irregular terrain networks is evaluated. Although a sensor network is considered as a regular terrain network ideally, but a lot of real life scenarios actually are irregular terrains. The use of ML-MAC protocol improved the performance of both regular and irregular networks.

Keywords: Wireless Sensor Networks (WSNs), ML-MAC, Regular Terrain, Irregular Terrain, QualNet 6.1 Simulator.

1. INTRODUCTION

A WSN comprises sensor nodes that are capable of sensing the environment, processing and storing the information sensed and transmitting it through a wireless channel. WSNs are widely studied for a range of real-life applications [1-6] which essentially include automatic event detection. A WSN can be deployed either with static sensors or with mobile sensors. Limited battery capacity is a major bottleneck in design and development of WSN. For many environments or objects that need to be monitored and are normally difficult to reach, it is costly and impossible to redeploy the nodes. Hence network lifetime enhancement problem is a key issue in the design of sensor networks.

In WSNs, the coverage is also an important problem that has received considerable research

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2210-3279/17 $ 58.00 +.00 © 2017 Bentham Science Publishers

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Design of a Slotted Triple Band Triangular Patch Antenna for 3G and WLAN Applications

Purnima Sharma, S. K. Jha, P. P. Bhattacharya

Abstract - **In this work, a triangular patch slotted antenna is proposed. The proposed antenna is composed of a triangular patch with three triangular slots. Multiple radiation beams are obtained by operating the patch antenna at higher order TM_{02} mode. The presented antenna resonates at 2 GHz, 4.2 GHz and 5.7 GHz which corresponds to 3G, C-band and WLAN application. Characteristics parameters (return loss, VSWR and radiation pattern) are obtained and analysed using HFSS 13.0.**

Keywords - **Third generation (3G), Microstrip Patch Antenna (MPA), Triangular slot, WLAN**

I. Introduction

Recently, planar antennas are used widely in the area of wireless communication for its various characteristics [1]. The applications of planar antennas are in various fields such as in mobile communication, RFID applications, satellite and in the area of military such as rockets, aircrafts and missiles etc [2]. Microstrip patch antenna generally operates at their fundamental TM_{01} mode which produces a single beam. Microstrip patch antenna operating at higher order [TM_{02}] mode has dual symmetric radiation beams [3]. A wide-band and dual-beam U-slot microstrip patch antenna is presented in [3]. There, two radiation beams were obtained by operating patch antenna at higher order TM_{02} mode instead of conventional TM_{01} mode and this antenna is suitable for indoor wireless systems. Slots in printed antennas are widely used for multiband operation. Some antennas for multiband applications, such as U-slot [4], V-slot [5] and bow-tie slot [6] have been reported. A variety of techniques have been used to achieve multiband operation for planar antennas. A printed triple-band and wideband dual-polarized meander-line monopole antenna is presented in [7]. In this design, a metamaterial loading concept is used which improves the impedance matching and causes the proposed antenna to radiate at multiple frequency bands with extended bandwidth. A novel low cost triple-band circularly polarized antenna is presented in [8], which operates at 2.4 GHz, 3.5 GHz and 5.7 GHz bands. This antenna achieves frequency ratio which is suitable for multiband wireless communication systems.

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A linearly polarized compact multiband MIMO antenna system for small mobile unit is presented in [9]. This antenna generates five resonating modes covering various wireless applications and is suitable for Wi-MAX, Wi-Fi, and GPS. A triangular shaped microstrip patch antenna, designed using achip capacitor and T-shaped slit, was presented for multi-band applications in [10]. This antenna is. In [11], a comprehensive analysis of equilateral triangular patch antenna based on the cavity model with a coaxial fed source is studied. It was suggested that the equi-triangular patch can be designed to function as a triple frequency antenna. It was shown that in triangular patch antenna, the broadside modes are TM_{10}, TM_{20} and TM_{21}, but a conical radiation pattern is obtained when it is operated at TM_{11} mode. By using partial ground plane the bandwidth increases by certain amount [12]. It was also observed that resonating frequency increases with partial ground plane [12].

II. Design of Proposed Antenna

The present design consists of a slotted triangular patch on a FR4 substrate with a partial ground plane, as shown in Fig. 1. The design aspects are discussed below in the following sub-section.

A. Principle of Design

To design a microstrip patch antenna operating at TM_{02} mode, the patch length L should be λ_d, instead of $\lambda_d/2$ for the fundamental mode, where λ_d is the wavelength in the dielectric substrate [3]. In this design, triangular patch antenna configuration is chosen because it has the advantage of occupying less metalized area on substrate than other existing shapes and also fabrication is easier.

B. Design Considerations for Proposed Antenna

While designing, several important parameters were considered as listed below:

- Solution frequency (f_0): The frequency chosen for the simulation is 6 GHz.
- Substrate's dielectric constant (ε_r): The dielectric material used for this design is FR4 with dielectric constant of 4.4.
- Substrate's height (h): To make the antenna compact substrate height is taken to be 1.5 mm.

Figure 1 shows the geometry of proposed triangular patch slotted antenna with microstrip feed.

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A New CPW-fed Patch Antenna for UWB Applications

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Abstract—In this paper, the design and analysis of a compact size coplanar waveguide (CPW)-fed antenna for ultra-wideband (UWB) applications is presented. The antenna has a compact size of 20 × 20 × 1.5 mm and provides a good impedance matching over the entire bandwidth of 3.2–14.3 GHz. The characteristics parameters, i.e. return loss, VSWR and radiation pattern, are analyzed using HFSS 11.0 software.

Keywords—planar antenna, ultra wideband, wireless communication.

1. Introduction

Ultra-Wide Band (UWB) technology is best suitable candidate for future communication systems, i.e. vehicular radar system (20–29 GHz), due to its advantages like low power consumption, low cost for short range communication and highly secure communication [2]. UWB antennas have wide application in wireless communication, medical equipment, remote sensing, etc. A challenge while designing UWB antenna is to achieve compact size, good impedance over wide bandwidth and stable radiation pattern [2]. Multiband antenna is proposed for similar applications in [3].

2. Related Work

In literature a variety of UWB antennas have been reported, i.e. CPW-fed compact, which gives wide 2.6–13.04 GHz bandwidth [4]. In [5], an UWB antenna with slotted radiating patch has been demonstrated. In [6] an optimization algorithm based ultra wideband antenna is presented. A triangular shaped ground plane based antenna suitable for UWB communication has been reported in [7]. Si *et al.* have used circular disc and split ring resonator to design UWB aerial with 182% wider bandwidth [8]. The concept of coupling between rectangular slot and tuning stub has been utilized to achieve UWB performance in [9]. In [10], a radiating patch with arc-shaped ground plane has been demonstrated, which is suitable for ultra-wideband applications.

The hexagonal-shaped microstrip fractal antenna powered through CPW-fed structure for UWB applications has been reported in [11]. A rectangular-shaped compact CPW-fed antenna has been demonstrated which is suitable for UWB and WLAN applications [12]. Another slotted rectangular patch antenna for WLAN application is presented in [13]. This has a simple structure and bandwidth of 2.06 GHz. For portable mobile communication, a tapered patch and ground plane with slots is presented, which gives 164% wider bandwidth [14].

3. Design of Proposed Antenna

The proposed slotted CPW-fed patch made on a FR4 glass-epoxy laminate is presented in Fig. 1.

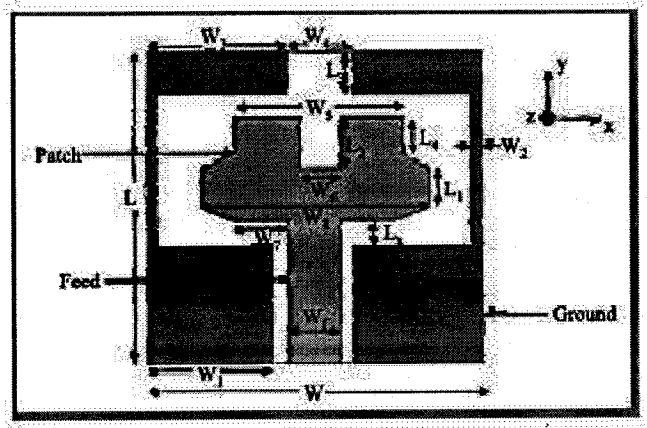

Fig. 1. Geometry of proposed CPW-fed patch antenna.

In design a 20 × 20 mm, substrate size was considered as requirement. The single side height is typical 1.5 mm, with dielectric constant 4.4 and loss tangent 0.02. Slotted rectangular patch is chosen to achieve wide impedance bandwidth in planar antennas. The patch size is of 6×15 mm wider. Two equal finite ground planes are placed on each side of the CPW-fed, extended upward to utilize the area (Fig. 1). The CPW-fed is used as it provides less radiation loss together with low dispersion and good impedance matching. The coplanar waveguide fed is in the x-z plane. The width of the CPW-fed line is fixed at 3 mm to achieve 50 Ω characteristic impedance. The feed line length is 9 mm. The whole dimensions are listed in Table 1.

4. Simulation and Results

To evaluate antenna performance, a simulation study is carried out using finite element method based HFSS 11.0 software. The parameters like return loss, VSWR, current dis-

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Effect of Analysis and Design Phase Factors on Testing of Object Oriented Software

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Abstract- The paper presents the results of analysis of different factors which affect testing techniques in Object Oriented (OO) system. The paper uses statistical methods to analyze these factors and identifies important factors of analysis and design phase in selecting the testing technique. Seven potential factors of analysis and design phase have been identified. In survey respondents are testers, programmers and managers.

Keywords –ANOVA, Factors of Object Oriented Software, Relative Weight Method, Testing.

I. INTRODUCTION

The software development consists of many phases [10]. According to Beizer [3], in all the phases of software development testing is the most costly process, and it should be done in all the phases of development [4].

In Object Oriented systems the majority of development is concerned with analysis, design, and coding phases. Each phase of development has its own importance in testing. Testing is a continuous process involved in each phase of software development, but development in testing could not speedup itself with advancement in object oriented paradigm.

There are several factors in each phase which affect the software testing. In this paper we have considered only analysis and design phase and factors related to them. Object oriented concepts are an intention where people deliberate in terms of objects rather than operations or methods. Object oriented analysis and design is quicker way to develop software.

Although tester faces a problem every time he tests a system that "what are the factors which affect the testing". Form number of testing techniques some is rarely used but some of them are used frequently without considering their temperaments. There are mainly two reasons of not make good choices:

i) The information about these techniques are scattered in secondary source of literature (books, journals etc.). So developers and testers do not have an idea about available testing techniques.

ii) They have not having the prerequisite knowledge of using different testing techniques.

The paper address the problem of identify relevant factors and their rankings in analysis and design phase which affect the testing techniques in Object oriented software and to find the opinion of programmer and tester on significance of selected factors for Object oriented software testing. The objective of considering this problem is to help people to find factors which affect the testing in project for analysis and design phase and select the suitable testing technique.

II. RELATED WORK

Very less work has been done for the problem of identifying and analyzing the factors which affect the testing in analysis and design phase, there is little literature available which only compares testing techniques. Therefore, there are not solutions for the problem with which we are concerned here, although the knowledge they input can be used in analyzing the problem that we propose.

The key problem with testing of object oriented systems is that conventional methodologies could not be used for them. In [16], the authors opined that present IEEE testing definitions and guidelines cannot be applied unseeingly to OO testing. In [8], the authors presented a technique that takes advantage of the hierarchical nature of classes, utilizing information from the super classes to test related groups of classes. In [12] the authors discussed a high-level view of testing OO systems within the entire software development cycle. In [13], the authors opined on techniques for testing OO systems that is based entirely on generating test cases from the class implementation. Research on software process innovation found that factors, such as organization size, technological diversity, professionalism, and IS slack are related to the adoption process [7]. Characteristics of a software organization, such as IT infrastructure, staff, managers, and control systems, have an effect on identifying; adopting, testing and implementing an innovation [19].These attributes and organizational characteristics comprise the basis for our research model and hypotheses.

In software analysis and design process, factors like Requirements, Amount of Design Documents, Design Method, Relationship between Design and Requirement, Frequency of Specification Change, Management Activities

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978-9-3805-4421-2/16/$31.00 ©2016 IEEE

Optimization of Material Removal Rate in End Milling of Al2024-SiC_p Metal Matrix Composite using Taguchi Technique

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Abstract: Since the inception of aerospace industry. Aluminum has been the most suitable material for fabrication due to its light weight. But its strength is low and this disadvantage has been overcome by alloying and by making aluminium composite. In the present study the Taguchi methodology has been used for modelling and optimization of material removal rate (MRR) in end milling of Aluminum Silicon Carbide composite plates (Al 2024-SiC_p) using carbide end mills. Four cutting parameters, the spindle speed (rev. /min.), the feed rate (mm/sec), the depth of cut (mm) and number of flutes were used in the experiment. The experiment was designed and carried out on the basis of standard L27 Taguchi orthogonal array. The data set of the experimental values was used for conducting the optimization using Taguchi design methodology. The results of calculations were in good agreement with the experimental data. A minor discrepancy between the experimental results and calculations could be inferred due to the presence of random errors and uncontrollable errors of the machining process, as well as environmental effects. Using Taguchi method for design of experiment (DOE), other significant effects such as the interaction among milling parameters are also investigated. Spindle Speed is most significant factor for higher content of SiC i.e., for Al 2024-15% SiC while feed is more significant for lower content of silicon carbide (for Al 2024-10% SiC). Depth of cut is the third significant factor after speed and feed.As the content of Silicon carbide increases in the aluminium alloy end mill with more flutes provides better material removal.

Keywords: Stir Casting, End milling, Material Removal Rate (MRR), Taguchi optimization methodology, ANOVA.

I Introduction

The advancement in automation and accuracy of machine tool has made it possible to produce high quality industrial products. Aluminium alloy 2024 possesses good machining characteristics, higher strength and fatigue resistance than both aluminium alloys 2014 and 2017. It is widely used in aircraft wing and fuselage structures because of its good tensile strength. Due to its high heat resistance properties it is also used in high temperature applications such as automobile engines, pistons, drive shafts, brake rotors and in structural parts which requiring high strength but possess less weight [23]. One of the drawbacks of this material system is that they exhibit poor wear resistance. Hence in order to develop a material with light weight, higher tensile strength and higher wear resistance (better tribological properties) metal matrix composites of aluminium alloys took place [24, 25].Silicon carbide (SiC) was originally produced by a reaction of sand and carbon at a high temperature. It is having a chemical resistance from any acids or alkalis or molten salts up to 800°C. In the presence of atmospheric oxygen, SiC forms a protective silicon oxide layer at 1200°C and is able withstand temperatures up to 1600°C. The high thermal conductivity along with low thermal expansion and high strength makes this material thermally shock resistant. Due to these properties wafer tray supports and paddles in semiconductor furnaces are made from this material. It possesses excellent abrasiveness and has been used for making grinding wheels and other abrasive products for many years. It is used in abrasives, refractories, ceramics and numerous high-performance applications .These materials are selected as they are most widely used in automobile and aerospace industry.

An end milling process is a multipoint & intermittent (unlike drilling where tool is in continuous contact with the job) cutting operation in which the contact between cutting point and the work piece is not continuous and the uncut chip thickness varies with spindle rotation. End mills have teeth on their circumferential surface on one of the end with a shank which may be straight or tapered. The teeth of the End mill tool may be helical or parallel to the axis of the rotation. The End mill cutters generate two workpiece surfaces at the same time; cutting edges are located on both the end face and the periphery of the cutter body. End milling produces profiles, slots, grooves, shoulders, slabs, plunging & pockets in the machined jobs. They are produced in High

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Review

Recent advancements in prosthetic hand technology

Angana Saikia, Sushmi Mazumdar, **Nitin Sahai** ✉, Sudip Paul, Dinesh Bhatia, Suresh Verma & ...show all

Pages 255-264 | Received 02 Jul 2015, Accepted 15 Mar 2016, Published online: 21 Apr 2016

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Abstract:
For the upper limb amputees and disabled persons, the human hand is a marvel of strength, sensitivity and discrimination due to innumerable tasks it can perform and more importantly the human brain controls to perform these tasks. Presently the researchers are focusing on developing bio-signals based natural gesture, which is one of the most active thrust areas in the field of rehabilitation robotics. The field of rehabilitation robotics is actively being employed to develop a human computer interface for the person with disabilities. The work reported in this paper presents the statistical comparison of muscle activation patterns (EMG) of significant hand muscles among gender between the age group of 18 to 60 years. The statistical analyses employed are: mean; standard deviation; median and variance. Time domain and frequency domain features were extracted which are employed through classification of the EMG signals. The different hand movements studied were flexion and extension of the elbow and the wrist, pronation and supination of forearm and opening and closing of the hand. From this study, we concluded that the male subjects have higher values for all the four parameters than females and also the age group between 18 years to 40 years show higher values for the statistical parameters measured when compared with aged

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Journal Homepage: - www.journalijar.com
INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)
Article DOI: 10.21474/IJAR01/4441
DOI URL: http://dx.doi.org/10.21474/IJAR01/4441
ISSN NO. 2320-5407

RESEARCH ARTICLE

MODELING AND SIMULATION OF ELECTROCHEMICAL SUPERCAPACITOR FOR HIGH POWER DELIVERY.

Thoudam Paraskumar Singh and Sudhir Y Kumar.
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Manuscript Info

Manuscript History

Received: 10 April 2017
Final Accepted: 12 May 2017
Published: June 2017

Key words:-
Electrochemical Capacitors; Supercapacitor; Ultracapacitor; Energy Storage

Abstract

An Electrochemical Supercapacitor is an energy storage device that can store high energy and also release high power from the same time. Almost all the applications in the field of power transmission, electric or hybrid vehicles, industrial electronics to name some; where battery was used as power source can be replaced by Supercapacitor. This paper first discusses different types of models commonly used and chosen the model which includes the non-linear behavior. OrCAD Lite demo version was used to simulate and obtain the behavior of Supercapacitor by varying the Equivalent Series Resistance. This analysis has the advantage that identify performance of high power release is dependent on the value of Equivalent Series Resistance. With proper selection of electrolyte in fabrication also the power release can be very high which can supply high peak load.

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Introduction:-

The energy in this world can neither be created nor destroyed but it is converted from one form to another. All the energy generated from different types of power plants using renewable and non-renewable resources are utilized as generated. They can be temporarily stored in certain energy storage which is limited in storage capacity. The complete generated energy from power plants can never be stored in one place or no single storage device or any number of combined storage devises together can do the storing. It is only about some fractions in percentage of the total generated. There is growing demand for developing efficient storage system in the field of electric and hybrid vehicles, consumer electronics, renewable energy systems like solar and wind, generating plants and electric energy distribution grid with varying performance characteristics.

The energy storage devices available as of today are not ideal to meet all the economic and technical requirement of the growing demand. Some of the storage devices which see competition amongst the devices are electrochemical batteries; pump hydro, flywheels, Superconducting Magnetic Energy Storage, compressed air energy storage, Fuel Cells etc. The interest in developing and refining more efficient energy storage devices has led to the introduction of Supercacitor and has matures over the decade and emerged with major potential to facilitate advances in storing of energy. The Ragone plot for different energy storage devices is represented to compare the specific power and specific energy in figure 1[3].

Working Principle to Store Energy:-

The most promising energy storage device which can replace battery in many application of present time is the Supercapacitor (SC), also known by other names as Ultracapacitor (UC) or Electrochemical Capacitor or Electric Double Layer Capacitor (EDLC). Supercapacitor offers high capacitance which means more energy storage and release high power that utilizes high surface area electrode materials and very thin electrolytic dielectrics that allows

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International Journal of Emerging Technology and Advanced Engineering
Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 7, Issue 6, June 2017)

Analysis of Ultracapacitor for High Power Applications

Thoudam Paraskumar Singh[1], Sudhir Y Kumar[2]
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Abstract— **Different types of material available to be used for fabrication and which provides the best solution for the Ultracapacitor is the requirement of the time to store high energy density and have high power density at the same time. Electrolyte selection plays another role in decreasing the performance of energy storage. The performance of high power release is dependent on the value of Equivalent Series Resistance. This paper discusses the types of models used commonly and choses the model that includes the non-linear behaviour. Matlab/Simulink software was used for simulation and analyses the behaviour of Ultracapacitor by varying the internal resistance (equivalent series resistance). This analysis helps in identifying the advantage performance of high power release that it is dependent on the value of equivalent series resistance.**

Keywords— **Electrochemical Supercapacitor, Energy Storage, Equivalent Series Resistance, Supercapacitor, Ultracapacitor.**

I. Introduction

The energy in this world generated from different types of power plants using renewable and non-renewable resources are utilized as generated. The energy generated using fossil fuels have been considered as unsafe for some time. The researchers in the search of clean energy generation have started research and subsequently started generation with non-conventional methods using renewable and clean resources. This also leads to the research of storage system which can store clean energy generated to be used at later time. They can be temporarily stored in certain energy storage that has limited storage capacity. All the energy generated from a power plant can never be possible to store in one place or no single storage system or may be many combined storage devises together can do the storing. It is always only about some fractions in percentage of the overall generated energy. There is growing demand for developing efficient storage system in the field of electric and hybrid vehicles, consumer electronics, renewable energy systems like solar and wind, generating plants and electric energy distribution grid with varying performance characteristics.

The storage systems that are available today are not ideal to meet all the technical and economic constraints of the increased demand.

Some of the storage systems which see competition amongst the devices are pump hydro, flywheels, electrochemical batteries, Superconducting Magnetic Energy Storage, Fuel Cells, compressed air energy storage etc. The need in developing a clean and higher energy storage system has led to the introduction of Ultracapacitor and it has matured over the decade which also has higher power density. The information depiction of different energy storage systems is shown in figure 1[3] which compare the specific energy density with specific power density. In almost all the application that requires constant energy, battery is used to supply energy but when repeated high or peak load is supplied, the battery easily damages which decreases life span. While using Ultracapacitor, the repeated high or peak load demand is easily supplied at burst.

II. Working Of Ultracapacitor

The energy storage device that can substitute battery in many applications is the Ultracapacitor (UC), also known by other names as Supercapacitor (SC) or Electric Double Layer Capacitor or Electrochemical Capacitor (EDLC). This storage device offers high power density and high capacitance utilizing high surface area electrode materials and very thin electrolytic dielectrics to achieve capacitances several orders of magnitude much larger than conventional capacitors [1-5].

Ultracapacitor works on the same principle of conventional capacitor where electrostatic charge is accumulated on the conductors while in UC; charges are accumulated at interface between the surface of a conductor and an electrolytic solution. Schematic diagram of Ultracapacitor is presented in figure 2. This storage of energy or conversion of energy process does not involve chemical reaction oxidation. Thus the internal resistance of the UC which controls the charging and discharging of UC is low. This internal resistance effect of all the connection circuitry is called equivalent series resistance (ESR), a property to deliver high power burst. Ultracapacitor stores energy in the similar manner as capacitor but has very high capacitance as defined by the following relations.

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Paper

Performance Comparison of Homogeneous and Heterogeneous 3D Wireless Sensor Networks

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Abstract—Recent developments in wireless sensor networks include their applications in safety, medical monitoring, environment monitoring and many more. Limited battery energy and efficient data delivery are most considered constraints for sensor nodes. Depletion of node battery ceases functioning of the node. The network lifetime can be enhanced with the help of Multi-Layer protocol (ML-MAC). This paper presents a practical approach including 3-dimensional deployment of sensor nodes and analyzes two different types of networks – homogeneous and heterogeneous WSNs. To analyze various QoS parameters, two types of nodes are considered in a heterogeneous network. The performance of both the networks is compared through simulations. The results show that ML-MAC performs better for a 3D heterogeneous WSNs.

Keywords—heterogeneous WSN, homogeneous WSN, ML-MAC, QualNet 6.1 Network Simulator, Wireless Sensor Networks.

1. Introduction

Wireless sensor networks (WSNs) consist of small sensor nodes. Typical sensor node consists of various parameter sensors, a microcontroller, a radio transceiver, and is mainly battery powered, which results in limited network lifetime. The WSNs are used in many fields such as habitat monitoring [1], [2] of wildlife [3] without intrusion, tracking of objects [4], ad hoc deployments for disaster management and precision agriculture [5]. WSNs are required to operate in an unattended environment for a long time in an autonomous way. Most of the WSNs existing run on battery supply and battery replacement or recharge is impossible. Scarcity of energy resource for sensor nodes may result in a short lifetime, so that energy management schemes are required to minimize energy consumption. It is important that the network nodes are low cost [6] to make sensor networks a technology that can be used in a large number of application areas.

In homogeneous WSNs, all sensor devices have the same characteristics such as energy consumption, processing capacity, and radio equipment. On the other side, if the devices that coexist in WSNs have different characteristics, the sensor network is referred as a heterogeneous WSN. In addition, sensors may sense different physical phenomena such as temperature, pressure, and humidity, thereby various reading rates are introduced at the sensors. All these characteristics can be considered as sources of heterogeneity of WSNs. The design of heterogeneous WSNs requires adaptive mechanisms that are able to react to different characteristics. For WSNs to be simple and energy conserving, limited processing resources and strong energy consumption constraints require Medium Access Control (MAC) methods.

In this paper, the performance of homogeneous and heterogeneous WSNs is compared by simulating a 3D sensor network in QualNet 6.1 network simulator. Further, the reduction in energy consumption is achieved by the use of ML-MAC protocol [7], which allows selective nodes to communicate and lets others to be inactive.

The remainder of this research paper is structured as follows. Related research works are described in Section 2. Simulation topology is elaborated in Section 3. Parameters for simulation evaluation are described in Section 4 and performance evaluation is presented in Section 5. Summary of this research paper is provided in Section 6.

2. Related Work

Energy conservation is an important research area for designing energy efficient wireless sensor networks. Jha *et al.* [7] proposed a multi-layer MAC (ML-MAC) protocol, which is a distributed content-based MAC protocol. In ML-MAC, time is divided into frames and each frame is divided into listen and sleep periods. The active period is sub-divided into L non-overlapping layers. A node wakes up only at its assigned layer timings. The simulation was done with 100 nodes in 200 s using ns2 simulator and Matlab and results show a significant reduction in node power consumption as compared to Sensor-MAC (S-MAC) protocol.

Thalore *et al.* [8] proposed an energy-efficient multi-layer technique (ML-MAC) for Wireless Personal Area Networks (WPANs) with 1000 nodes randomly deployed in a network to increase the network lifetime. The simulation was done using QualNet 5.2 software that supports sensor networks with large number of nodes and has sensor networks library for IEEE 802.15.4. The results show an improvement over 47% in network lifetime and improved throughput as compared to IEEE 802.15.4. This technique is further used to optimize the network parameters by varying node density and number of layers in a network [9].

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Performance Improvement of 3D WSNs using Mobile Super Nodes

Mody University International Journal of Computing and Engineering Research
Volume 1 Issue 1

Published: 2017
Author(s) Name: Ranjana Thalore, P. P. Bhattacharya | **Author(s) Affiliation:** College of Engineering and Technology, Mody Univer. of Scie. & Tech., Rajasthan, India.

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Abstract

Mobility is an important research area in Wireless Sensor Networks (MWSNs).The feasibility of mobile nodes is further facilitated by low cost and high energy efficiency. Energy consumption by nodes is an important performance parameter to increase the lifetime of any network. Many protocols for MAC layer have been designed to make efficient energy use by assigning sleep mode in the nodes. WSN deployments were never visualized to be static. Mobility was initially regarded to have many challenges that were needed to overcome including connectivity, coverage, and energy consumption, etc. In this paper, an energy-efficient multi-layer Medium Access Control (ML-MAC) protocol is analyzed with the use of mobile super nodes for 3-Dimensional wireless sensor networks. The results are validated through extensive simulations. Simulation results prove that use of mobile super nodes in ML-MAC outperforms original ML-MAC protocol in terms of throughput, network lifetime, packets dropped, and end to end delay.

Keywords: 3D Wireless sensor networks (WSNs), mobile super nodes , ML-MAC, QualNet 6.1, energy efficiency

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International Journal of Advanced Engineering Research and Science (IJAERS) *[Vol-4, Issue-4, Apr- 2017]*
https://dx.doi.org/10.22161/ijaers.4.4.34 *ISSN: 2349-6495(P) | 2456-1908(O)*

A Review of Various Routing Protocols in VANET

Rajashree Dutta, Ranjana Thalore

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Abstract—*Vehicular Ad Hoc Networks (VANET) is a subclass of Mobile ad hoc networks which provides a distinguished approach for Intelligent Transport System (ITS). VANET's provide communication between vehicles moving on the roads.Many protocols have been adopted to serve different topology and scenarios. We introduce and reviewPosition based Routing Protocols, Broadcast based routing protocols, Multicast/Geocast routing protocols, Cluster based routing protocols. The survey of routing protocols in VANET is very essential and necessary for smart ITS. This paper also discusses the advantages / disadvantages and the applications of the above mentioned routing protocols for vehicular ad hoc networks. The challenges and perspectives of routing protocols for VANET's are finally discussed.*

Keywords– Delay-bounded routing, MANET, Routing protocols, VANET.

I. INTRODUCTION

MANET (mobile ad hoc network) is a network that has no infrastructure and it has the ability to configure itself to connect mobile devices using wireless channels. It is used to supply each device to ceaselessly maintain the information required to correctly route traffic [1]. Apart from the safety applications, VANET's broadcast valuable, real-time information to the users such as transit systems, weather information, mobile e-commerce, internet access and other multimedia applications. [5][6]Routing in Vehicular Ad hoc Networks is a challenging task due to the unique characteristics of the network such as high mobility of nodes, dynamically changing topology and highly partitioned network.[2] The performance of routing protocols depends on various internal factors such as mobility of nodes and external factors such as road topology and obstacles that block the signal. [3] This demands a highly adaptive approach to deal with the dynamic scenarios by selecting the best routing and forwarding strategies and by using appropriate mobility and propagation models.

II. ROUTING PROTOCOLS IN VANET

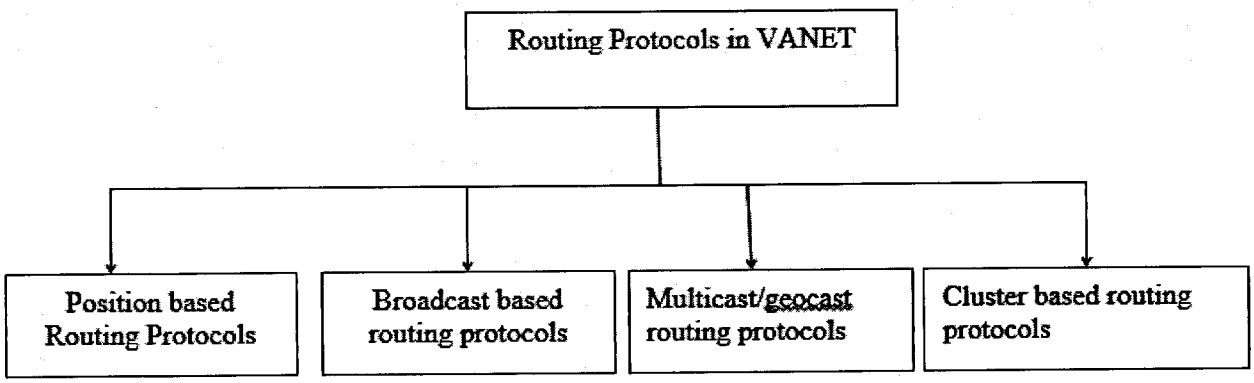

Fig. 1: Routing Protocols in VANET

Vehicle to Vehicle data transfer is one of the main challenges within the design of VANET because it needs to design a dynamic routing protocol. [4] Routing in traditional MANET is different to the VANET routing because of extremely dynamical topologies. Routing in VANET can be classified into following major categories:

1. Position based Routing Protocols

In position based protocols, the routing decisions are based on geographic position of the vehicles. [7][9] This does not require establishment or maintenance of routes, but requires location services to determine the position of the destination. Some of the commonly used location services include Global Position System (GPS), DREAM

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INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 4.295
(Volume3, Issue3)
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Performance Comparison of AODV and DYMO Routing Protocols for Boundary Detection in 3-D Wireless Sensor Networks

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Abstract*: In order to track and detect continuous nature objects in wireless sensor networks, a large number of sensor nodes are involved. These continuous objects like biochemical diffusions, forest fires, oil spills usually spread over larger area. The nodes that sense the phenomena need to communicate with each other for exchanging the information and also send sensing information to sink, possibly by passing through many intermediate nodes. For many geometry based algorithms triangulation serves as the basis for wireless sensor networks. In this paper, we propose a distributed algorithm that produces a Delaunay triangulation for an arbitrary sensor network, for communication between the sensor nodes. The information of occurrence of an event is then passed to a control node. The communication is done both with and without using relay nodes and a comparison is made between the two methods in terms of battery, total unicast messages received, throughput and delay. The two protocols in which we have worked are AODV and DYMO.

Keywords: AODV, Boundary Detection, Delaunay Triangulation, DYMO, Event Boundary, Relays.

I. INTRODUCTION

In WSNs (wireless sensor networks), nodes on or near boundaries (termed *boundary nodes*) normally play a more important role than the other nodes. On the one hand, boundary nodes not only directly interact with the outside environment (such as events entering or leaving the region monitored by the WSN, any communication with the outside environment and so on), but also help to extract further information about the WSN structure (which is useful for routing, guiding and management purposes) [1]. On the other hand, due to the correspondence between the boundaries of a WSN and its physical environment, such as a building floor plan, a map of a transportation network, terrain variations, and obstacles (buildings, lakes, etc), boundary nodes are important for keeping track of the WSN shape which indicates significant features of the underlying environment. In contrast to the outer boundary of a WSN, boundaries of inner holes (termed *inner boundaries*) are critical indicators of the general health of a WSN, such as insufficient coverage and connectivity. Therefore, boundary detection is of great importance for various WSN applications.

A wireless sensor network can be represented by a graph, where a node corresponds to a sensor and an edge indicates the communication link between two sensors [2]. A network graph under practical experiment settings or theoretical communication models usually exhibits undesired randomness and intractability, calling for effective techniques that yield a well-structured network subgraph to support target applications.

For example, triangulation [3] serves as the basis for many geometry-based routing, [4]-[6], localization [7], coverage [8], segmentation and data storage and processing [9] algorithms in wireless sensor networks.

Rest of the paper is organized as follows:

Section II consists of the related work done on boundary detection. In section III, we have discussed the protocols in which the performance comparison is done. Section IV elaborates our proposed work, where we have set-up the network with the use of Delaunay triangulation.

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International Journal of Advanced Engineering Research and Science (IJAERS) *[Vol-4, Issue-4, Apr- 2017]*
https://dx.doi.org/10.22161/ijaers.4.4.33 *ISSN: 2349-6495(P) | 2456-1908(O)*

Boundary Detection in 2-D and 3-D Wireless Sensor Networks

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Abstract—*In order to track and detect continuous natured objects in wireless sensor networks, large number of sensor nodes are involved. These continuous objects like bio-chemical diffusions, forest fires, oil spills usually spread over larger area. The nodes that sense the phenomena need to communicate with each other for exchanging the information and also send sensing information to sink, possibly by passing through many intermediate nodes. In this paper, we have reviewed boundary detection in 2-D wireless sensor networks as well as in 3-D wireless sensor networks. A comparative study between the both has also been shown. The various challenges encountered in 3-D wireless sensor networks have also been discussed.*

Keywords— ***Boundary detection, Delaunay Triangulation, Event Boundary, Network Boundary.***

I. INTRODUCTION

Boundary detection plays a crucial role in information fusion and dissemination in 2D and 3D Wireless Sensor Network (WSN) applications such as target tracking, plume tracking, forest fires, animal migration, underwater WSNs and surveillance applications. It is also often important for self-organization of networks. A network has a specific embedding and can have three different types of boundaries which the scheme presented in this paper aims at detecting.

First is network's outer boundary which consists of a unique subset of nodes. Second is an inner boundary. The last type of boundary is an event boundary. For example events such as mobile targets or forest fires have highly dynamic event boundaries while an underground chemical plume may have boundaries that change gradually over time.

Currently available boundary detection schemes that have been targeted exclusively at 2D networks can be broadly categorized as physical information-based and topological/connectivity information-based [2][5] schemes. The former uses physical position of nodes to identify the boundary while the latter uses topological/connectivity information of the network. Physical domain schemes rely on node location or physical position information obtained using localization algorithms or GPS. Providing nodes with GPS is expensive and infeasible for many applications. Localization based on parameters such as RSSI/time delay is error-prone even for 2D networks of modest size, is susceptible to interference, multipath and fading, which makes it impractical in many environments. Future sensor networks may have thousands or even millions of sensors, and hence distributed strategies that do not accumulate errors, and scalable in cost and complexity are of significant interest.

An alternative approach is connectivity based boundary detection [19-20]. A connectivity domain description of a network can have more than one valid embedding (configurations) [20] in physical domain, even though only one of them corresponds to the physical network. The actual embedding is one out of the many, but identifying the correct embedding solely based on the connectivity information is challenging. Hence, connectivity information based boundary identification captures a union of boundary nodes in every embedding. As a result the actual set of boundary nodes is a subset of it which leads to identifying a band of nodes as boundary nodes [20]. Due to such difficulties there is no connectivity based approach available to identify boundaries on 3D surfaces to the best of our knowledge.

Boundary detection in connectivity domain requires two steps:

(1) Identifying the correct embedding, and

(2) Detecting boundary.

A novel two step connectivity based approach for boundary detection is proposed. It produces highly accurate results by overcoming the ambiguity of network boundary due to multiple embedding in connectivity domain. It uses a Virtual Coordinate System (VCS) to generate a Topology Preserving Map (TPM) that identifies the correct physical embedding. In VCS, a subset of nodes is selected as anchors. Then all the nodes in the network including anchors estimate their shortest path hop distance to the anchors and use those values as virtual coordinates. Number of anchors is the cardinality of the coordinates. TPM is simply a map of the original network, in the original physical dimensionality, in which the neighbourhood is preserved. 2D topology preserving map (TPM) generation based on virtual coordinate system

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Volume 12, Issue 1, 2021

ArchiTextile: A Review on Application of Textiles in Architecture

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ABSTRACT

The use of next generation advanced textiles materials are now accepted and preferred over conventional building materials by the architects due to unique characteristic features of textile materials contributing towards improving overall function, aesthetics and expressiveness of the built structures. In modern architecture, the high performance textile materials are appreciated and adopted for a wider application gamut such as self-cleaning maintenance free structures, fabric canopies, energy efficient structures, high performing façade, energy harvesting curtains, flexible mega-structures, responsive phase changing materials, air-supported fabric structures, thermal balancing, green roofs, smart living spaces, acoustic applications, advanced building materials, textile membranes and constructing living spaces in extreme weather conditions. The textile based architecture is fast and easy to erect, needs less maintenance, cost effective and can replace metal and other conventionally used construction materials. The study focuses on exploring the contribution of advanced textile materials application areas in modern sustainable architecture. The study also aims to highlight the key characteristic features of these uniquely engineered advanced textiles which make them suitable over conventionally used building materials.

Keywords: Architextile, advanced textiles, sustainable architecture

1. Introduction

The use of textile materials and technologies in Architectural applications confronts lack of interest by the architects due to many unsuccessful attempts to incorporate textile based materials by the architects between 1956 and 1970 [1]. There exist different reasons explained by the expert architects on minimal use of textiles in architectural applications. Many architects justify this through citing the reasons behind that includes objection on durability & strength of textiles, lack of fineness, prone to attract more dust & dirt, less life, poor response to serve climatic conditions, resist the flow of air, and hinder light [2-3].

The inception of technical textile products in diverse fields of functional application, replaces gradually the traditionally used materials over time with the advanced textile

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Development of a Collection of Garments Inspired by the Hawa Mahal Historical Monument

Razvoj kolekcije oblačil, navdihnjene z zgodovinskim spomenikom Hawa Mahal

Short scientific article/*Kratki znanstveni prispevek*
Received/*Prispelo* 5-2020 • Accepted/*Sprejeto* 6-2020

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Abstract

Sources of inspiration play a vital role during the initial stages of the fashion design process by providing a specific direction to the entire fashion design process. Fashion designers interpret their imagination to improve the creative use of design inspirations during the development of clothing collections. Such exploration for design inspiration is crucial in the fashion design process for absorbing visual ideas and translating them into original creative clothing. The uniqueness of such creatively and systematically designed original clothing will also improve significantly. The current study focuses on the systematic development of a collection of casual women's wear inspired by the Hawa Mahal (The Palace of Winds) historical monument in Jaipur, Rajasthan. The fabric patterns were developed by extracting motifs from the Hawa Mahal architectural marvel using computer-aided designing solutions and digital printing with hand embroidery. In order to check the market potential of developed garments, a mini-survey was also conducted to analyse the extent of the appropriateness of garment silhouettes, fitting and drape, and overall aesthetic features among targeted consumers.
Keywords: fabric pattern design, historical motif, clothing collection

Izvleček

Viri navdiha igrajo ključno vlogo v začetnih fazah modnega oblikovanja, tako da določijo smer celotnemu procesu modnega oblikovanja. Modni oblikovalci interpretirajo svojo domišljijo z namenom, da bi izboljšali kreativno uporabo oblikovalskega navdiha za razvoj kolekcije oblačil. Takšno raziskovanje oblikovalskega navdiha je ključnega pomena pri modnem oblikovanju, in sicer za dojemanje vizualnih idej in njihovo prevajanje v izvirna kreativna oblačila. Tako se edinstvenost takšnih ustvarjalno in sistematično zasnovanih izvirnih oblačil tudi bistveno izboljša. Ta študija se osredinja na sistematičen razvoj kolekcije sproščenih ženskih oblačil, ki jih je navdihnil zgodovinski spomenik Hawa Mahal Palača vetrov iz Džaipurja v Radžastanu. Vzorci tkanin so bili razviti na podlagi motivov iz arhitekturnega čudesa Hawa Mahal z uporabo računalniško podprtih oblikovalskih rešitev in uporabo digitalnega tiska z ročnim vezenjem. Za preverjanje tržnega potenciala razvitih oblačil je bila izvedena manjša anketa med ciljnimi potrošniki, da bi ugotovili ustreznost silhuet oblačil, prileganja in drapiranja ter splošnih estetskih lastnosti.
Ključne besede: oblikovanje vzorcev tkanin, zgodovinski motiv, kolekcija oblačil

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Study of denim jeans fabric on finishing process and characteristic performances

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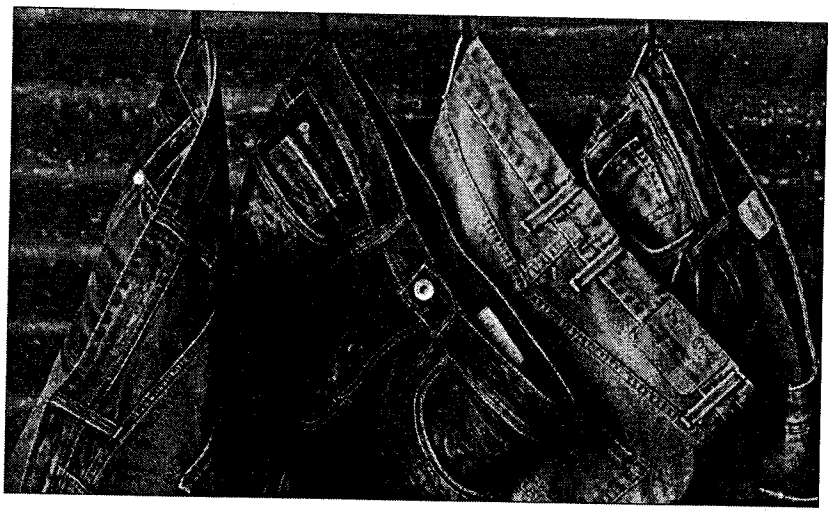

The traditional denim is hard-wearing, heavy fabric made from 100% cotton and woven from coarse indigo dyed warp and grey undyed weft yarn. Traditional denim fabric is high density fabric with a high mass per unit area and a 3/1 or 2/1 -twill weaves construction[1]. Denim has always been used for very durable outdoor work clothing because of its weight, rigidity, and thickness, denim is chosen for casual jackets, skirts, and jeans. Now that so many garment-finishing techniques are applied to denim, its use has broadened into different lifestyles. Nowadays lycra yarn is added to denim to make it elastic[2,3]. The performance and comfort factors of garments during usage are very important. Generally, the comfortable stretching of fabrics according to body movements as well as recovery after stretching, are good desirable properties[4,5]. Denim jeans finishing is one of the most extensively used finishing treatments that have enormous practice, because of its effects on appearance and comfort[6]. There are almost countless variations of dry and wet processing techniques used by designers and textile chemists to achieve fashionable looks that are distinctive and desirable[7-11]. With the increasing awareness about and concern for environmental issues, such as large amounts of effluents produced and high consumption of water and energy, wet processes related to denim washing are considered as not environmentally friendly. To address the environmental concerns, some finishing techniques (Laser, Ozone and Water Jet) have been introduced as an alternative to the conventional wet processing[12].

In this paper, washing process for better characteristic performance of denim fabric such as physical, mechanical properties, durability, and comfort of product are given.

Characteristics and parameters of denim

- Warp yarns are colored usually with vat or sulphur dyes
- Weft yarns are always white in color
- Structure: warp dominating right hand or left-hand twill i.e. Z/S-twill of 2/1 or 3/1 construction
- Usually made of cotton yarns of coarser count (7S, 10S, 14S, 16S, etc.)
- Rotor yarns are usually used
- Coarser cloth (weight lies between 6 - 14 oz/sq.yds.) and used for pant and warm jacket.

Weave design of denim

We all know that the denim fabric is constructed with twill design. Now, let us take a brief look about twill construction :

- A distinct design for the twill weave is it forms a diagonal line.
- In the right-hand twill, the diagonals run towards the right.
- In the left-hand twill, the lines run

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A case study on fair compensation to hand embroidery workers in India

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Received 15 July 2019
Revised 3 October 2019
4 December 2019
20 January 2020
Accepted 13 February 2020

Abstract

Purpose – The study aims to focus on developing a methodology of technical calculation for fixation of piece rate for embroidery homeworkers of fashion industry to ensure an ethical livelihood standard. The standardised methodology for wage fixation will ensure better payments for homeworkers with clarity down the supply chain and sustainability of pay scales that will in turn improve the homeworkers' impecunious living standards. The brands giving living wage will be benefitted in terms of savings on training costs, more stable work force, reliable services and enhancements to the reputation.

Design/methodology/approach – Interviews of subcontractors and agents down the supply chain in a target region were conducted to know current practice of wage fixation. The influential parameters were work content, basic living expenses and necessary benefits under government policies. Based on the aforementioned parameters, a formula has been generated. The present study is an attempt to develop a standard methodology to be used for piece rate calculation to ensure fair compensation for homeworkers. Impact of increased earnings of home workers on garment free on board cost has also been analysed.

Findings – As there is no uniformity in methodology used for piece rate calculation, and work content is not considered in calculating piece rate, the wage earned per month by homeworkers, minimum wage and living wage are INR 2,860, 6,998 and 8,007, respectively. Homeworkers receive 54-58 per cent of total embroidery labour cost incurred by suppliers. It can be increased up to 75 per cent, which would result in increasing the wage earned per month by homeworkers to INR 4,000.

Originality/value – The impact of implementing the outcome of the study will increase the earnings of embroidery homeworkers and reduce wage inequality in women's favour, as there are more women than men in embroidery homeworking.

Keywords Fair compensation, Wage fixation, Homeworkers, Fashion industry, Piece rate, Living wage

Paper type Research paper

Introduction

India: the land of heritage, ethnicity and vivid culture

In the world of fashion, India is famous for its offering of intrinsic hand-embroideries of a wide variety, which were adopted from different dynasties through the pages/cycles of history. Different areas of India are known for their expertise in different genres of embroidery and many of them are declared as geographical indicators.

It is said that the earthen lamp "diya" enlightens the whole room but leaves the darkest underneath. Likewise, behind the glamour of sophisticated thread-work and gorgeous embellishments, there lies the diary of poverty of embroidery homeworkers—technically an invisible/neglected yet most important node in the supply chain.

Research Journal of Textile and Apparel
Vol. 24 No. 2, 2020
pp. 97-110
© Emerald Publishing Limited
1560-6074
DOI 10.1108/RJTA-07-2019-0030

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Topological and system-level protein interaction network (PIN) analyses to deduce molecular mechanism of curcumin

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Curcumin is an important bioactive component of turmeric and also one of the important natural products, which has been investigated extensively. The precise mode of action of curcumin and its impact on system level protein networks are still not well studied. To identify the curcumin governed regulatory action on protein interaction network (PIN), an interectome was created based on 788 key proteins, extracted from PubMed literatures, and constructed by using STRING and Cytoscape programs. The PIN rewired by curcumin was a scale-free, extremely linked biological system. MCODE plug-in was used for sub-modulization analysis, wherein we identified 25 modules; ClueGo plug-in was used for the pathway's enrichment analysis, wherein 37 enriched signalling pathways were obtained. Most of them were associated with human diseases groups, particularly carcinogenesis, inflammation, and infectious diseases. Finally, the analysis of topological characteristic like bottleneck, degree, GO term/pathways analysis, bio-kinetics simulation, molecular docking, and dynamics studies were performed for the selection of key regulatory proteins of curcumin-rewired PIN. The current findings deduce a precise molecular mechanism that curcumin might exert in the system. This comprehensive in-silico study will help to understand how curcumin induces its anti-cancerous, anti-inflammatory, and anti-microbial effects in the human body.

Naturally derived compounds possess enormous potential for medicinal and therapeutic actions for the management of diseases and curcumin is one of the most suitable examples among them. Curcumin is a yellowish-orange polyphenolic compound of turmeric/haldi (*Curcuma longa*), a herb often found in curry powder. The reason for the selection of curcumin for this study is, it is one of the important and thoroughly investigated naturally occurring bioactive compound, but its precise mode of action is still unclear. The global curcumin market was valued at $58.4 million in 2019 and is projected to reach $104.19 million by 2025. (https://www.alliedmarketresearch.com/press-release/curcumin-market.html & https://www.grandviewresearch.com/industry-analysis/turmeric-extract-curcumin-market). Earlier studies clearly exhibit the highly pleiotropic actions of curcumin as anti-cancerous[1,2], anti-inflammatory[2,3], anti-microbial[4], anti-oxidant[5], cardio-protective[6], radio-protective[7] and many more that makes it an ideal ingredient in different medical and food applications. Curcumin's market is expected to witness a huge development due to growth in consumer awareness regarding its therapeutic properties, and that's why an intense scientific study are urgently needed to explore the precise mechanistic action of curcumin. Many research studies have been published in the past dealing with the mode of action of curcumin yet inconclusive, and still the puzzle remains unsolved. This pleiotropic potential of curcumin can be endorsed to its capability to interact with a huge interactome of biomolecular targets of cellular system that participate

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Proc. Natl. Acad. Sci., India, Sect. B Biol. Sci.
https://doi.org/10.1007/s40011-021-01249-8

RESEARCH ARTICLE

Micro-array Analysis of Cold Tolerant Tomato Expressing *Nicotiana tabacum Osmotin*

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Received: 15 June 2019 / Revised: 3 February 2021 / Accepted: 19 February 2021
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Abstract Our earlier studies have established improved cold tolerance in the transgenic tomato (*Solanum lycopersicum* cv. Pusa Ruby) developed through constitutive over expression of *Nicotiana tabacum* Osmotin gene. To understand the molecular responses, micro-array analysis was performed in the transgenic and the wild type on cold (4.0 °C) treatment for 2 and 24 h using Affymetrix GeneChip® Tomato Genome Array. The principal component analysis plots placed the wild type and transgenic in different regions, indicating differential transcript regulation on cold exposure. The differential gene expression analysis performed using pairwise comparison for transgenic and wild type indicated modulation of 307 out of 3770 genes, by 10 or higher fold on cold treatment. Sugar and amino acid metabolism together constituted the maximum of the annotated products of the differentially expressed genes. The results revealed modulation of expression of responsive genes involved in various functions in the transgenic tomato on cold treatment.

Significance statement A genome-wide transcript expression analysis performed with an Affymetrix GeneChip® Tomato Genome Array revealed modulation of expression of responsive genes involved in various functions in the cold-tolerant *Osmotin* transgenic tomato.

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/s40011-021-01249-8.

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Published online: 19 March 2021

Keywords Genetic engineering · Cold stress · Osmotic · Micro-array · Transcript expression

Introduction

Osmotin belongs to pathogenesis responsive PR-5 family of proteins in plants. Among all the PR-5 proteins, Osmotins have a basic isoelectric point (pI) [1]. Though named "pathogenesis responsive," these proteins participate in both biotic and abiotic stress response of the plants. Osmotin has been named so on the basis of its induction by osmotic stresses of lower water potential. Presently, Osmotins are known to have expression modulated by cold and other abiotic [2–5] and, a variety of biotic stresses [1, 5]. Further, a number of transgenic and native expression studies have been carried out for Osmotin in various plants under conditions of different biotic and abiotic stresses (reviewed by [1]). Despite that knowledge on signaling pathways associated with their induction is still developing.

Overexpression of the gene in transgenic plants is known to impart tolerance against the various stress factors [6]. For instance, Mandal et al. [4] exhibited salt tolerance in Osmotin overexpressing indica rice variety Ananda. Similar observations were reported by Silvestri et al. [3] in olive plants transformed with Osmotin gene from tobacco under drought stress. In *Petunia*, Osmotin was shown to be induced by *Penicillium funiculosum, Erwinia stewartii* and *Pseudomonas syringae* infections along with aspirin, wounding, and salicylic acid [5]. Osmotin overexpression has also shown to enhance the shelf life of strawberries [7].

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CNS & Neurological Disorders - Drug Targets

Title: Deciphering the Influence of Cigarette Smoke Carcinogens on CNS Associated Biomolecules: A Computational Synergistic Approach

VOLUME: 20

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Keywords: Cigarette smoke (https://www.eurekaselect.com/search/aws_search.php?searchvalue=Cigarette smoke), carcinogens (https://www.eurekaselect.com/search/aws_search.php?searchvalue= carcinogens), CNS (https://www.eurekaselect.com/search/aws_search.php?searchvalue= CNS), Network analysis (https://www.eurekaselect.com/search/aws_search.php?searchvalue= Network analysis), System biology (https://www.eurekaselect.com/search/aws_search.php?searchvalue= System biology), Molecular interaction (https://www.eurekaselect.com/search/aws_search.php?searchvalue= Molecular interaction)

Abstract: Background: Human health issues caused by cigarette smoke carcinogens (CSC) are increasing rapidly every day and challenging the scientific community to provide a better understanding in order to avoid impact on communities. Cigarette smoke also contains tobacco-based chemical compounds harmful to human beings either smokers or non-smokers. Objective: We have tested 7H-Dibenzo[c,g]carbazole (7H-DBC) and Dibenz[a,h]acridine (DBAD) derivatives of Asz-arenes along with N'-Nitrosoanabasine (NAB) and N-Nitrosoanatabine (NAT) derivatives of N-Nitrosamines molecular interaction with CNS biomolecules.

Methods: Computational synergistic approaches like system biology and molecular interaction techniques were implemented to conduct the analysis

Results: CSC efficiently interacted with NRAS, KRAS, CDH1, and RAC1 molecular targets in CNS. We have also performed the interactome analysis followed by system biology approaches and found that HSPA8 is the most important hub protein for the network generated for CSC hampered genes of CNS. We have also identified 6 connector proteins namely TP53, HSP90AA1, PPP2CA, CDH1, CTNNB1, and ARRB1. Further analysis revealed that NRAS and CDH1 have maximum interactions with all the selected CSC.

Conclusion: The obtained structural analysis data could be utilized to assess the carcinogenic effect of CSC and useful in the treatment of CNS diseases and disorders induced especially by tobacco-specific carcinogens or could be used in vivo/ in vitro experimentation model designing.

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Exploration of Indian culture in Sudha Murthy's Mahashweta

Vanshika

Prof. A.S Rao

Abstract

Sudha Murthy in her work demonstrates the essence of Indian Culture. In her work, Mahashweta she portrays the marriage structure in Indian Culture. According to Indian Culture, marriage is an unbreakable bond. In her work, Murthy portrays the absolute reality of relations of people in the Indian society. In orthodox Indian Culture, a girl is neither accepted as the part of her own house nor in her in laws house. As we explore deeply Indian Culture, we find that there is dualism in thoughts of people. It is different for both male and female. Indian culture still holds its ancient beliefs and values. The culture is a mixture of thousand unique cultures that are flourishing in the western winds but still holds its root deeply to its Indian essence. This paper presents the reflection of Indian consciousness in Mahashweta in a serious and comprehensive way. It also focuses on the superstition beliefs that destroy the protagonist married life in the novel. It also shows the superstition nature of people in the society. Though people are educated but they still trapped in the superstition beliefs.

Keywords: Essence, Indian Culture, Unbreakable bond, Dualism, Indian consciousness

Introduction

Indian culture, the culture which still holds its ancient beliefs and values. The culture which is a mixture of thousand unique cultures. The culture which gets flourished in the western winds but still holds its root deeply to its Indian essence. The country has its diversity but still it has uniqueness. India where there is diversity in seasons, festivals, cultures, languages, religions. It's like five different fingers in hand and all together they form a fist. The culture where a girl seen as the shadow of goddess. But on other side, they are at the inferior section of the society. In the institution of marriage, a girl's side is always typical.

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SUBMISSION AND SACRIFICE OF WOMEN: IN THE BIRTHMARK AND THE OVAL PORTRAIT

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Abstract

The paper join vivacious conversations in the literature about feminist discussions that is submission and sacrifice of women in the male dominated society. It explores the literary presence of women how they submitted and sacrifice themselves to men. Collectively , in these short stories this study articulates how women have made themselves an object in the hands of a men and that they can play with their lives too either in the form of an experiment or in the form of representing an art (beauty).

By objectifying themselves these women results in devastating consequences. Submission and sacrifice occurs when individual treat themselves as objects to be viewed and evaluated based upon their appearance. In this paper will know what were the roles of these women and feminist theory? Study of Marxist philosophical concept of cultural hegemony which refers to the domination of society by a ruling class. We can see in our paper the domination by ruling class that is a male society.

KEYWORDS: Submission and Sacrifice, Feminism, Marxist Philosophy, Art, Experiment

Introduction

As illustrated by his biographers, women often played crucial roles in Nathanial Hawthorne's development. In Hawthorne's work the question of women is the dominating one which gives rich images of women; about their changing lives, dreams and frustrations. In his short stories, Hawthorne creates a broad spectrum of female characters. Some are independent-minded, self-confidents others embody the gender expectations of women in Hawthorne's day, weak and dependent on men.[1]

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Bioethanol production from industrial paper wastes using native strains of *Saccharomyces cerevisiae*

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Running title: Bioethanol production

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ABSTRACT

A variety of waste materials can act as a substrate for the production of bioethanol by *Saccharomyces cerevisiae*. Currently, bioethanol is produced from sugar or starch-based raw materials that are scarce. The ethanol produced from the cellulosic wastes at the cheaper cost will be a great advantage to the oil companies in producing blended petrol at a cheaper price. The cellulosic wastes like industrial paper wastes, which otherwise create lots of environmental pollution on burning, has been successfully used as a substrate for bioethanol production in this experimental study. This work utilizes industrial paper waste as a substrate for ethanol production. It was found that bioethanol production is greatly influenced by the culture conditions and media components. The potential strains were isolated from over-ripened fruits such as apples, plums, grapes, etc. The incubation period of 32 h and maintaining the temperature and pH at 27°C and 4 respectively was found optimum for maximum bioethanol production. Ethanol production was measured after a week fermentation with *S. cerevisiae;* and the highest yield of ethanol was found to be 15.6%.

Keywords: Yeasts, ethanol, blending, substrate, fermentation.

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Asian Journal of Chemistry; Vol. 32, No. 11 (2020), 2821-2828

ASIAN JOURNAL OF CHEMISTRY

https://doi.org/10.14233/ajchem.2020.22850

Design, Spectroscopic Characterization and Theoretical Studies of Organotin(IV) and Organosilicon(IV) Complexes with Schiff Base Ligands Derived from Amino Acids

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Received: 9 June 2020; *Accepted*: 18 July 2020; *Published online*: 28 October 2020; AJC-20104

A new series of organotin(IV) and organosilicon(IV) complexes were synthesized using the Schiff base ligands [2-((3,4-dimethoxybenzylidene)amino)-3-(1*H*-indol-3-yl)propanoic acid (L^1H) and 2-((3,4-dimethoxybenzylidene)amino)-3-methylbutanoic acid (L^2H)]. The synthesized compounds were characterized by IR, NMR (^1H and ^{13}C), elemental analysis and theoretical studies. The molar conductivity values of the complexes in DMF implied the presence of non-electrolyte species. Spectral data showed that in these complexes the metal atoms are coordinated with the Schiff base ligand acts as a bidentate ON moiety, coordinating to the metal through its carboxylate oxygen and imine nitrogen. The IR spectra of the complexes showed large differences between ν_{asy}(COO) and ν_{sy}(COO), $\Delta\nu$ (ν_{asy}(COO)–ν_{sy}(COO)) of 260-276 cm^{-1}, indicating monodentate nature of the carboxylate group. Furthermore, the density functional theory (DFT) calculations were executed at the B3LYP/6-31G(d,p)/LanL2DZ basis set of theory for the optimized geometry of Schiff base complexes. The structural parameters, bond length, bond angles, chemical potential, electronegativity, hardness, softness, global electrophilicity index have been studied theoretically by density functional theory (DFT) to support the experimental results.

Keywords: Amino acids, Schiff base, Complexes, Spectral studies, Theoretical studies.

INTRODUCTION

Schiff bases are considered as valuable compounds in coordination chemistry due to their potentiality for stable complex formation with metal ions [1,2]. Structural presence of donor atoms such as nitrogen, oxygen and sulfur are helpful in chelating properties which makes foundation for the stable complex formation with metal ions [3,4]. Biological activities are enhanced drastically when Schiff bases coordinate with metal ions [5]. Easy and facile synthesis and wide spread applications of these metal complexes make them very interesting and significant in various industries. Remarkable contribution of Schiff base metal complexes is used for development of catalysis and enzymatic reactions, molecular architectures, materials and pharmaceutical chemistry [6-8].

Metal complexes of Schiff base ligands have gained importance in synthetic biology and industrial chemistry fields due to their vital role as antibacterial, antiviral and antifungal agents [9,10]. Anticancer activities of Schiff bases metal complexes drastically enhanced when they are in complex form which make them useful as potential anticancer drugs [11,12]. These are extensively investigated because of their interesting structural design and functional framework [13]. Various organic syntheses which involve oxidation and reduction reactions and number of electrochemical reduction processes are studied with the help of catalytic uses of transition metal complexes with imine ligands [14,15].

In this category of metal ligand Schiff base complexes organotin(IV) and organosilicon(IV) possess versatile applications in the industrial, environmental and pharmaceutical sectors [16,17]. Both of these organosilicon(IV) and organotin(IV) complexes because of their stability, various geometries and coordination numbers becomes significant and remarkable [18,19]. Two main properties structural diversity and coordination geometries of organotin(IV) complexes make them useful as anticarcinogenic, antibacterial, antifungal, tuberculo-

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Asian Journal of Chemistry; Vol. 33, No. 3 (2021), 531-536

ASIAN JOURNAL OF CHEMISTRY

https://doi.org/10.14233/ajchem.2021.23050

Synthesis of New Schiff Base of 1,3-Oxazine and 1,3-Thiazine Derivatives Derived from 4-Phenyl Substituted Chalcones and Evaluation of their Antibacterial Activity

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Received: 3 November 2020; *Accepted*: 25 December 2020; *Published online*: 16 February 2021; AJC-20245

Oxazine and thiazine heterocycles have distinctive interests due to their important class of natural and non-natural products and exhibit high biological activities in the pharmaceutical and biological fields. This work was planned to synthesize Schiff base of 1,3-oxazine and 1,3-thiazine derivative from 4-phenyl substituted chalcones. The structures of the newly synthesized targeted compounds were established from UV, IR, ^{1}H NMR, ^{13}C NMR and DFT calculations. The molecular properties HOMO-LUMO energy, energy gap, softness and harness were calculated using DFT/B3LYP/6-311G (d,p) basis set. *in vitro* Antibacterial activities of Schiff bases of 1,3-oxazines and 1,3-thiazines derivatives were investigated against Gram-positive (*Staphylococcus aureus*) and Gram-negative bacteria (*Escherichia coli*) and compared with each other. It was found that thiazine derivatives showed higher activity.

Keywords: Schiff base, Chalcones, Spectral, DFT, Antibacterial studies.

INTRODUCTION

Chalcone compounds and their heterocyclic derivatives are known to possess important medicinal and pharmacological activities such as antibacterial, antifungal, anti-inflammatory, analgesic, antitubercular, antimalarial, antiviral, antioxidant, antiulcer and antihyperglycemic [1-4]. These properties of heterocyclic derivatives show great potential to be used as chemotherapeutic agents. Due to the increased resistance to antibiotics, there is a need to develop alternative medicines to fight the pathogenic microorganisms. In recent years there is immense focus on the medicinal properties (antifungal, antibacterial, cytotoxic, antiviral and analgesic) of the novel oxazine and thiazine derivatives of chalcones [5-7]. Oxazines and thiazines are heterocyclic compounds containing one nitrogen and one oxygen/sulfur in a six-membered ring. Three isomers are found depending on the relative position of the heteroatoms and double bonds [7].

Heterocyclic compounds are abundant in nature and have learned more significance because their structural subunits are exhibit in many natural products like vitamins, hormones, antibiotics, *etc.* 1,3-Thiazines-nitrogen and sulfur and 1,3-oxazine contains-nitrogen and oxygen in their six-membered heterocyclic ring (N-C-S, N-C-O linkage). The heterocyclic compounds which contain nitrogen, sulfur and oxygen possess vast significance in the field of medicinal chemistry [8]. Derivatives of thiazine and oxazine have various activities such as antifungal, anti-inflammatory, antitubercular, antibacterial, analgesic, anticancer, *etc.* A new series of biologically important Schiff bases were synthesized and substituted with an aromatic aldehyde to give substituted chalcones [9]. The compound 4-(4-bromophenyl)-6-(*N*,*N*-dimethylaminophenyl)-*N*-[(*E*)(4-chlorophenyl)methylidene]-6*H*-1,3-oxazin-2-amine was screened for its antimicrobial activity against *Staphylococcus aureus*, *Escherichia coli* and *Candida albicans* and were found to be very active. Some of the reported oxazine derivatives showing chemotherapeutic properties include benzo-1,3-oxazines, efavirenz, a trifluoromethyl-1,3-oxazin-2-one and naphthoxazines [10-13]. Considering their antibacterial and antifungal activity, it would be exciting to explore more oxazines derivatives [11].

In present work, some new derivatives of Schiff bases derived from 1,3-thiazines, 1,3-oxazines are synthesized, characterized and also evaluated their potential as antibacterial agents and comparative kinetic stability. The derivative of chalcones is used as the starting material for the synthesis of thiazines,

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Wesleyan Journal of Research, Vol.13 No47(December 2020) Research Article (Mathematics)

Graph Invariant of Isomorphism in terms of Decyclization and Pebbling

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Abstract: Consider any two isomorphic graphs whose parameters are equivalent to each other such as decyclization and pebbling numbers. This paper will be a combination of two aspects of graph theory.

Keywords: Pebbling Number, Isomorphic Graphs, Decyclization of Graphs.

2010 AMS: 68R10, 94C15, 97K30, 05C30

Article History

Received: 31/10/2020; Accepted: 12/12/2020

1. Introduction

Graphs are powerful data structure to represent objects and their concepts. Graph theory is the extension of new possibilities in several fileds. It helps out to explore the reason behind the main problem in easy manner, in a manner of way where everybody can easily understand [1]. The isomorphic graphs are used to demonstrate the similarity between the any two objects in real life, i.e. the graphs represent any two objects which are similar or differ to each other with the help of numbers of invariant [7]. Graph isomorphism is the area of pattern matching and widely used in various applications such as image processing, protein structure, computer and information system, chemical bond structure, Social Networks [2, 7]. The decyclization can be applied to analysis of Petri nets, evaluation of circuits and programs etc. The known methods are reviewed but they are not effective for big graphs [4]. Acyclic graphs are widely used in applications for example, in logical design algorithms. The origins of graph pebbling reside in combinatorial number theory and graph theory [2, 5]. Graph pebbling can also be used as a model for the distribution of the consumable resources over a network. Graph pebbling is a mathematical game and area of interest played on a graph with pebbles on the vertices [2, 5, 6].

Now, consider an undirected graph $G(V, E, W)$ with non empty sets of vertices set $V = \{v_i\}$, edges set $E = \{e_i\}$ and weighted set $W = w_i$ for $i \in N$ [1].

When two graphs are isomorphic then their set of vertices, edges are same and degree of each vertices v_i are same. These two graphs G and G' are isomorphism graphs [1, 2].

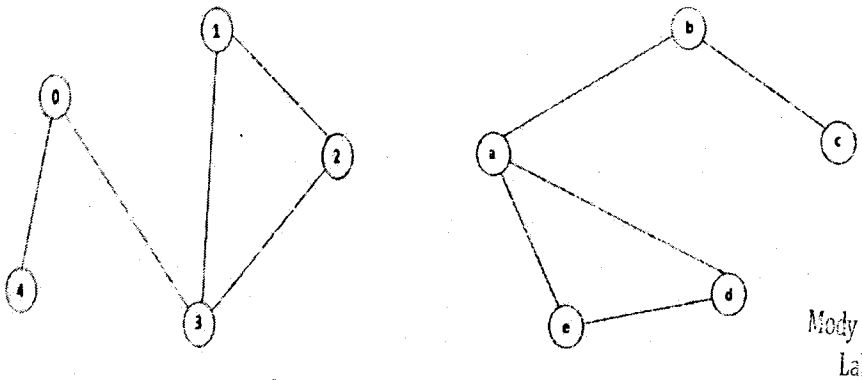

Figure 1. Graph G and G'

The pebbling on graph is the mathematical game which is played on the vertices of graphs with number of pebbles (generally, in graph theory pebbles are represented by the whole numbers) [6]. If a graph contains set of pebbles on vertices set is known as graph pebbling. Pebbling step is the shifting of two pebbles from

06/12/2020
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International Journal of Future Generation Communication and Networking
Vol. 13, No. 3, (2020), pp. 3497–3505

Modeling and Simulation of Quantum Memory Management Problem with Impetus of Graph Isomorphism, Graph Decyclization and Graph Pebbling

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Abstract

The cover pebbling number of graph is the minimum number of pebbles can be configurated in a manner where after a series of pebbling steps, it is possible to have at least one pebble on every vertex ofgraph. In case of directed trees, cover pebbling number is applicable insists of pebbling number. We apply the graph invariant of isomorphism in terms of decyclization and pebbling in quantum memory management problem. Any two isomorphic graphs whose parameters are equivalent to each other such as decyclization and pebbling numbers with impetus of quantum memory management problem.

Keywords: CoverPebbling Number, Graph Isomorphism, Decyclization, Quantum Memory, Directed Acyclic Graph.

AMS[2010]: 68R10, 94C15, 97K30, 05C30

1. INTRODUCTION

Graph theory is the extension of new possibilities in several fileds. To explore the reason behind the main problem in easy manner, in a manner of way where everybody can easily understand [4]. The graph isomorphism demonstrate the similarity between the any two objects in real life, that is the graphs represent any two objects which are similar or differ to each other with the help of numbers of invariant [8]. The decyclization can be applied to analysis of Petri nets, evaluation of circuits and programs etc. The known methods are reviewed but they are not effective for big graphs [9]. Acyclic graphs are widely used in applications for example, in logical design algorithms of circuit design.

Graph pebbling can also be used as a model for the distribution of the sources of information over a network. Graph pebbling is a mathematical game and area of interest played on a graph with pebbles on the vertices [5, 2, 7]. When two graphs are isomorphic then their set of vertices, edges are same and degree of each vertices $v_i$are same [4, 5]. Now, consider a directed graph $G(V, A, W)$ with non-empty sets of vertices set V, arc set A and weighted set W. The decyclization of any directed graph is the removal of such edge or edges set which makes the graph acyclic i.e. minimum edges set removal from graph G [4, 9].

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2. Graph pebbling and rubbling

Pebbling on graph is introduced by Chung. Consider, a graph$G$ contains set of vertices and set of edges where the incidence relationship is preserved. Pebbling step is the shifting of two pebbles from an arbitrary vertex and attachment of one pebble on its adjacent vertex. Graph pebbling is the collections of pebbling steps on the n number of vertices on graph with different configurations is known as the pebbling number of graphs G i.e. $\pi(G)$. The pebbling number of graphs is equal to number of vertices of graph is known as demonic. Consider $p(v)$ is the number of pebbles on vertex v

ISSN: 2233-7857 IJFGCN
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International Journal of Advanced Science and Technology
Vol. 29, No. 11s, (2020), pp. 2891-2895

Pebbling Number of $C_5 \times C_5 \times C_5$

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Abstract

A graph pebbling is mathematical game play on the vertices of graph with respect to the pebbling steps. The pebbling step is the shifting of two pebbles and attachment of one pebble on the specified arbitary vertex. We propose the pebbling number of $C_5 \times C_5 \times C_5$, where $C_5 \times C_5 \times C_5$ graph is consists of 125 vertices.

Keywords: Pebbling Number, Cycle Graphs, Complete Graphs, Graham's Conjectures.

AMS[2010]: 68R10, 94C15, 97K30, 05C30

1. INTRODUCTION

Graph Pebbling in literature was introduced by F.R.K. Chung in 1989 [3]. Graph pebbling comes from the foundations of graph theory, group number theory and combinatorial theory. Graph pebbling is the study of whether pebbles from one set of vertices can be moved to another while pebbles are lost in the process. The number of variations on the theme have been presented over the years [3]. Pebbles are represented by positive integers that is whole numbers on the vertices of graph. Now, pebbling number is depicted as new parameter which evaluates the graph on computer and widely used in the field of animations. For an example, consider the pebbles as fuel tankers or containers, then the loss of the pebble during a move is the cost of transportation and shipment of fuel takes place between the initial and final destination or vertices [5].

Consider a graph which is set of vertices and set of edges where incidence relationship is preserved. Pebbling step is the shifting of two pebbles from an arbitary vertex and attachment of one pebble on its adjacent vertex. Graph pebbling is the collections of pebbling steps on the n number of vertices on graph with different configurations of pebbles which is known as $f(G)$ or the pebbling number of graphs G [4]. For an example,

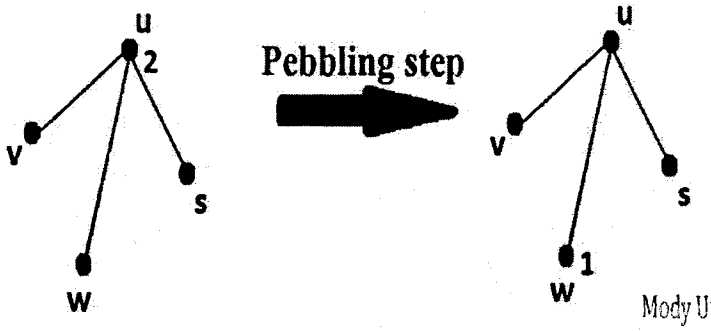

Figure 1. Pebbling step on graph G

The pebbling number of graphs is equal to number of vertices of graph is known as demonic. $p(v)$ represents the number of pebbles on vertex v.

Cartesian product of any two graphs $G = (V_G, E_G)$ and $H = (V_H, E_H)$ is defined by direct product of $G \times H$ where vertex set and edges set are follows [7]:

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Journal of Indian Acad. Math.
Vol. 42, No. 1 (2020) pp. 57-64

ISSN: 0970-5120

Jitendra Binwal[1] *and* *Madhu*[2]

A REVIEW STUDY OF MATHEMATICAL INDUCTION AND PIGEONHOLE PRINCIPLE WITH APPLICATIONS

Abstract: In this paper, we present a review study mathematical induction and pigeonhole principle with applications which have importance in the theory of automata.

Keywords: Mathematical Induction, Strong Induction, Pigeonhole Principle, Extended Pigeonhole Principle.

Mathematical Subject Classifications (2010) No.: 46A13, 03B48, 03D70, 05-XX.

1. Introduction

The very first use of mathematical induction was seen in the works of a sixteenth century mathematician named Francesco Maurolico (1494-1575). In his book Arithmeticorum Libri Duo, he presented various properties of integers and their proofs [1, 2].

Mathematical induction can be used to prove statements that assert that $P(n)$ is true for all positive integers n, where $P(n)$ is a propositional function. A proof by mathematical induction has the following three parts,

Steps of Mathematical Induction

- Basis Step: Verifying the preposition $P(1)$ is true.

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Journal of Indian Acad. Math.
Vol. 42, No. 1 (2020) pp. 65-74

ISSN: 0970-5120

Jitendra Binwal[1] and *Preeti Sheoran*[2]

A REVIEW STUDY OF ATTRIBUTES OF REAL NUMBERS WITH APPLICATIONS

Abstract: In this paper, we present a review study of attributes of real numbers with applications in signal processing.

Keywords: Natural Number, Integers, Rational and Irrational Numbers, Real Number, Signal.

Mathematical Subject Classifications (2010) No.: 46A30, 30C15, 26E70, 92F05, 05-XX.

1. Introduction

For defining the algebraic structure of the set of natural number N = {1, 2, 3....}, to each pair a, b of natural numbers, there corresponds a natural number denoted by $a + b$ the sum of a and b is called the Addition Composition and a natural number denoted by ab the product of a and b is called Multiplication Composition in the set of natural numbers. The fact of these existing in the set N of natural numbers these compositions is referred as possessing an algebraic structure [1, 7].

1.1. Basic Properties of the Two Compositions in N

1.1.1 Commutatively of addition and multiplication

$$a + b = b + a;\ ab = ba, \qquad \forall\, a, b \in N.$$

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International Journal of Gastronomy and Food Science 22 (2020) 100251

Contents lists available at ScienceDirect

International Journal of Gastronomy and Food Science

journal homepage: www.elsevier.com/locate/ijgfs

Effect of *Prosopis cineraria (L) druce* pods and camel milk for nutritional enrichment in traditionally fermented minor millet's drink

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ARTICLE INFO

Keywords:
Food intervention
Protein digestibility
Glycemic index
Sensory analysis
Antioxidants

ABSTRACT

Nations around the world are faced with various nutritional challenges in terms of malnutrition and unbalanced nutrition to maintain healthy lifestyles and longevity of their populations. The quest for innovative interventions in existing traditional food recipes hold promises to address local and regional nutritional issues. It includes amalgamation of traditional foods with locally available ingredients for nutritional efficacy and enrichment. Such an attempt has been made on a traditional food called *'Rabadi'* from western arid and semi-arid regions of the Great Indian Thar Desert. It is prepared by fermentation of 'Bajra' – a pearl millet (*Pennisetum glaucum*) cereal with addition of country buttermilk derived from defatted buffalo or cow milk yogurt. Its intervention was replacement of the buttermilk with inoculated camel milk and incorporation of local ingredients as soybean and flour of 'Khokha' – the ripe fruit pods of 'Khejri' (*Prosopis cineraria*) tree. The results exhibited significant enhancement of bioavailable proteins, higher digestibilities and starch hydrolysis to improve glycemic response with overall good acceptability in sensory analysis. The comprehensive results demonstrate promising enrichment of nutrition and a fair capable solution for better health prospects in proposed intervention of the traditional food recipe.

Introduction

People in various regions of India traditionally use different pulverized cereal grains to make porridges/deserts/fermented foods. In its arid and semi-arid north-western regions of the Thar Desert, a beverage known as *'Rabadi'* is prepared from the whole pulverized flour of a cereal locally called as *'Bajra'* (*Pennisetum glaucum*)- a member of the minor millet family. This is fermented with country buttermilk by placing it in the sunlight for 3–4 h and finally boiled with addition of salt and spices to taste (Modha and Pal, 2011). The fermented food is traditionally consumed by local people on a regular basis as part of their survival in hot climate which keeps them cool, active and away from summer ailments (Garg et al., 2017).

Bajra constitutes a major source of proteins and calories for millions in the Indian population. Protein digestibility of the pearl millet is low, like that of other plant foods. Starch also forms a major component of carbohydrates in the pearl millet which is relatively more resistant to attack by pancreatic amylase (Dhanker and Chauhan, 1987). Its fermentation reduces the level of phytic acid and improves protein and starch digestibility (Sindhu and Khetarpaul, 2001; Inyang and Zakari, 2008). Similarly, traditional fermentation of the pearl millet not only reported for improved protein bioavailability (Munishamanna, 2014) but also enhanced its mineral content and antioxidant properties (Amadou et al., 2011). Its potassium and magnesium contents help to regulate blood pressure and the insoluble fibre assists a great deal in digestion and bowel movement (Garg et al., 2017). Further, addition of soybean (*Glycine max*) to the pearl millet increases its lysine level and improves the amino acid profile (Coulibaly and Kouakou, 2012).

In the Thar Desert regions, delicacies like *Sangri*, the unripe fruit pods of the plant *P. cineraria* (L.) Druce. (Family: Fabaceae, subfamily: Mimosoideae) are considered a gourmet delight and have provided nutrition to the local communities over generations in the harsh desert climate (Garg et al., 2017). Its ripe pods - locally called as *Khokha*, are rich in calcium, phosphorus, carbohydrates, protein and fiber. The pods also contain copper, manganese, zinc, scores of essential fatty acids and phyto-constituents. These bioactive compounds demonstrated anti-hyperlipidemia, antioxidant effects, estrogenic activity and action against certain pathogens (Islam et al., 2019).

P. cineraria is a sacred and indigenous tree of the vast Thar Desert and is locally called *Khejri* (Mann and Saxena, 1980). The tree is worshiped

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https://doi.org/10.1016/j.ijgfs.2020.100251
Received 29 November 2019; Received in revised form 1 August 2020; Accepted 3 August 2020
Available online 14 August 2020
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06/12/2024
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J Food Sci Technol
https://doi.org/10.1007/s13197-021-05018-3

SHORT COMMUNICATION

In-vitro biotransformation of tea using tannase produced by *Enterobacter cloacae* 41

Rasiravathanahalli Kaveriyappan Govindarajan[1,2] · Chartchai Khanongnuch[2] · Krishnamurthy Mathivanan[3] · Douglas J. H. Shyu[4] · Kanti Prakash Sharma[5] · Surajit De Mandal[6]

Revised: 29 January 2021 / Accepted: 31 January 2021
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Abstract Tannase is a widely used enzyme that improves the quality of tea by facilitating the release of water-soluble polyphenolic compounds, as well as reduces the formation of tea creams. The microbial tannase enzymes are often employed for tea biotransformation by hydrolyses esters of phenolic acids, including the gallated polyphenols found in blacks teas. The study was focused to investigate the tannase enzyme mediated biotransformation of black tea such as CTC-(Crush, tear, curl) & Kangra orthodox which are commonly used by the south Indian peoples. HPLC spectral analysis revealed that tannase treatment on tea cream formation (CTC & Kangra orthodox tea) allows the hydrolysis of the EGC, GA, ECG, and EGCG. A significant reduction in the formation of tea cream and increased antioxidant activity has been observed in the CTC (1.62 fold) and Kangra orthodox (1.55 fold). The results revealed that tannase treatment helps to improve the quality of black tea infusions with respect to cream formation, the intensity of colour, and sensory characteristics of tea. The result of this study indicates that *E. cloacae* 41 produced tannase can be used to improve the quality of both tea samples.

Keywords *Enterobacter cloacae* 41 · Tannase enzyme · CTC · Kangara orthodox · HPLC · DPPH

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Published online: 21 February 2021

Introduction

Over the last several decades, peoples are using various types of drinks especially black tea is one of the most famous beverages worldwide (Li et al. 2017). Tea contains several polyphenolic compounds like flavanols as well as flavonoids, and glycosides which reduce the incidence of chronic diseases in humans (Balentine et al. 1997; Yang et al. 2011). These polyphenolic compounds are also known to possess several beneficial properties such as a anti-oxidant, anti-tumor, anti-aging and anti-inflammatory and neurological protective activities (Conde et al. 2015; Xu et al. 2019). The DPPH activity of black tea depends on the redox properties of the phenolic secondary compounds, which is allow them to act as reducing complex agents, single-oxygen condensers, singlet-oxygen quenchers, and heavy elements and surfactant (Macedo et al. 2011; Roy et al. 2018; Fang et al. 2019). However, studies based on clinical reports and *invivo* model have shown that depsite the proven antioxidant power of secondary polyphenolics,

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Research Article

False Memories for Semantic and Category Associates: Comparing Retrieval Strategies and Retention Interval

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Abstract

False memories are memories that people believe indeed correspond to actual events from the past. Experimental investigation of false memories involves varied methodologies, including semantic and category associate technique. While the category method depends on the frequency of intra-list items, semantic associate measures semantic association of intra-list items. The present study compares false memory generation through category and semantic associates. Additionally, the mode of retrieval (recall, recognition) and retention interval (short, long) were manipulated to measure their effect on false memory generation. The result of the study suggests that retention interval and mode of retrieval did influence false memories generated using words (semantic associates) and line drawings (category associates).

Keywords: false memory, category associate, semantic associate, recall, recognition

Table of Contents

Method
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Discussion
Conclusion
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✓ FDA approved antiviral & antinfection agents as a potential inhibitor

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Journal of Infection and Public Health

Volume 14, Issue 5, May 2021, Pages 611-619

Aminoglycosides as potential inhibitors of SARS-CoV-2 main protease: an *in silico* drug repurposing study on FDA-approved antiviral and anti-infection agents

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Received 28 October 2020, Revised 19 January 2021, Accepted 23 January 2021, Available online 9 February 2021.

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Mini-Reviews in Organic Chemistry, 2021, *18*, 1-22

REVIEW ARTICLE

Diverse Routes for the Synthesis of Indole-Fused Complex Architecture from Simple Molecules

Shivendra Singh[1], Suresh Singh Chauhan[1], Neeraj Kumar Sharma[2], Sunil Dutt[3] and Keshav Lalit Ameta[1,*]

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ARTICLE HISTORY

Received: November 08, 2020
Revised: March 09, 2020
Accepted: March 10, 2020

DOI:
10.2174/1570193X17999200521101255

Abstract: Several easy, efficient and convenient procedures to access indoles fused heterocyclic systems are described in this review. These heterocyclic systems were synthesized from several cyclic or acyclic molecules *via* a variety of reactions such as Diels-Alder reaction, Michael addition, Morita-Baylis-Hillmann reaction and many other domino/Cascade approaches with high selectivity. Most of the given protocols in this review proceed through organocatalytic pathways; however, some underwent different catalytic and non-catalytic reactions.

Keywords: Analgesic, domino approach, indole heterocycles, multicomponent reactions, nootropic agents, organocatalysis, psychoanaleptic.

1. INTRODUCTION

The indole-fused heterocycles have been recognized as an important building block, which exhibits several interesting bioactive properties, such as analgesic, psychoanaleptic and nootropic agents [1]. Some of their synthetic analogues are part of natural products and pharmacologically active compounds. For instance, 4-aminomethyl substituted Tetrahydro-thiopyrano Indole (THTPI) and substituted 4-aminomethyl THTPI derivatives have been found to show excellent analgesic and nootropic properties [2].

Efficient synthetic protocols for the preparations of a series of biologically as well as synthetically challenging complex heterocyclic molecules having indole as a core moiety have been rapidly growing interest in recent years because these building blocks have enormous applications in several fields of chemical science [3-5]. Especially, the synthesis of additional rings on indole rings is a prime target for synthetic organic and medicinal chemists. The major reason would be that these frameworks constitute many marketable drugs, bioactive natural products, active pharmacophores, functional materials, *etc.* Some of these are as shown in (Fig. **1**).

In view of the great importance, a large number of classical and modern protocols have been exploited for efficient access to indole fused heterocyclic molecules.

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1570-193X/21 $65.00+.00

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2. APPROACHES TO ACCESS INDOLE FUSED HETEROCYCLES

2.1. Transition Metals and Their Salts Mediated Reactions

The cobalt-catalyzed C-2 selective C-H alkenylation/annulations cascade transformation of substituted pyridine-indoles with internal alkynes under the nitrogen atmosphere was established by Yang and his co-workers. In the reported methodology, $Cu(OAc)_2.H_2O$ was used as an oxidant and the reaction was carried out in the presence of $AgBF_4$ at 135°C in DCE to afford a series of pyrido-pyrimido-indoles in high yields (82-88%) (Scheme **1**) [6].

Xie and his associates [7] revealed gold-catalyzed tandem cyclization of several 1,2-*bis*(alkynyl)-2-en-1-ones with indole in DCE at room temperature for 1-3 h to furnish indole fused heterocycles and furan rings in mediocre to high yields (47-90%). The reaction proceeds through cascade carbonyl-yne cyclization/Friedel-Crafts/indole-yne cyclization sequences (Scheme **2**).

Pd-catalyzed cyclization strategy of diarylacetylene to afford several tetracyclic indolo[3,2-*c*]isoquinolinones in good to excellent yields (79-95%) was unfolded by Zhu and his associates in 2012 [8]. The reaction followed a sequential amination/N-demethylation/amidation process. The reaction conditions were oxidative in the presence of DMSO solvent at 50°C for 24 h as shown in Scheme **3**.

Nazare *et al.* [9] established one-pot synthesis of fused indoles involving several 2-chloroanilines and cyclic ketones under the presence of palladium catalysts, $[Pd(^tBu_3P)_2]$

Received: 5 March 2020 | Revised: 26 May 2020 | Accepted: 3 July 2020

DOI: 10.1002/ptr.6823

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REVIEW

Cysteine-rich antimicrobial peptides from plants: The future of antimicrobial therapy

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06/12/2020

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There has been a spurt in the spread of microbial resistance to antibiotics due to indiscriminate use of antimicrobial agents in human medicine, agriculture, and animal husbandry. It has been realized that conventional antibiotic therapy would be less effective in the coming decades and more emphasis should be given for the development of novel antiinfective therapies. Cysteine rich peptides (CRPs) are broad-spectrum antimicrobial agents that modulate the innate immune system of different life forms such as bacteria, protozoans, fungi, plants, insects, and animals. These are also expressed in several plant tissues in response to invasion by pathogens, and play a crucial role in the regulation of plant growth and development. The present work explores the importance of CRPs as potent antimicrobial agents, which can supplement and/or replace the conventional antibiotics. Different plant parts of diverse plant species showed the presence of antimicrobial peptides (AMPs), which had significant structural and functional diversity. The plant-derived AMPs exhibited potent activity toward a range of plant and animal pathogens, protozoans, insects, and even against cancer cells. The cysteine-rich AMPs have opened new avenues for the use of plants as biofactories for the production of antimicrobials and can be considered as promising antimicrobial drugs in biotherapeutics.

KEYWORDS
AMPs, cyclotides, cysteine-rich peptides, defensins, therapeutics, thionins

Abbreviations: AMP, antimicrobial peptide; CRP, cysteine-rich peptide; Cys, cysteine; HDP, host defense peptide; HPLC, high-performance liquid chromatography; Ile, isoleucine; LC–MS, liquid chromatography–mass spectrometry; Leu, leucine; LTP, lipid transfer protein; MALDI-TOF, matrix-assisted laser desorption/ionization-time of flight; MBP, myelin basic protein; Phe, phenylalanine; s-s, disulphide; Trp, tryptophan; Val, valine.

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Physica E 130 (2021) 114711

Contents lists available at ScienceDirect

Physica E: Low-dimensional Systems and Nanostructures

journal homepage: http://www.elsevier.com/locate/physe

Compact MIM plasmonic ring resonator for nano-interconnect applications

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ARTICLE INFO

Index Terms:
Ring resonator
Surface plasmon
Nano-interconnect
Optical filters

ABSTRACT

In this article, a compact plasmonic metal-insulator-metal ring resonator has been proposed and investigated. The proposed waveguide structure can be turned into a Plasmonic optical filter through alteration in various parameters of the structure geometry, such as radius of ring resonator, width of the waveguide channel, dielectric constant of insulating material and the shifting of the output channel. It is observed that the transmission peaks exhibit redshift with increased radius of the ring resonator and decreased channel width. Several metals have been successfully trialed, in which the silver metal shows high response with near 90% transmission. For the first time, three transmission peaks have been observed in the near infrared regime with air cavity over a wide range of bandwidth, which makes it strong candidate for the significant nano-interconnect and sensing applications.

1. Introduction

In 1996, Surface plasmons (SPs) become a fascinating research topic as it provides the possibility of guiding light at subwavelength scale. SPs are the electromagnetic waves which propagate along the metal-insulator (MI) interface with an exponentially decay to both sides [1, 2]. The two types of plasmonic waveguides: the insulator-metal-insulator (IMI) waveguide and the metal-insulator-metal (MIM) waveguide have been investigated and it has found that second one is more compact and easier to integrate into optical devices at subwavelength scale. The MIM waveguides are the plasmonic structure which are composed of a thin layer of an insulator sandwiched between two metal claddings. The easily manageable design and subwavelength scale light confinement are the prominent features of this waveguide system [1–5]. Optical filters based on MIM waveguides have become one of the most prominent components of fluorescent microscopy, machine vision systems, wavelength division multiplexing (WDM) and telecommunication applications. Plasmonic bandpass filter and band stop filter using MIM waveguide used to realize multifunctionalities was designed in Refs. [3–7]. Among the passband types, the MIM structure filters can be divided into narrow-band band-pass type, narrow-band band-stop type, flat-bottom band-stop type, and flat-top band-pass type categories. For multifold applications, Liang et al. [1] proposed a periodic metal-dielectric-metal (MDM) free standing stack geometry which include application to design ultra-thin near-infrared filter with high transmission efficiency.

Several authors have investigated MIM based plasmonic waveguides, Gao et al. [2] investigated a novel non-porous composite grating array with anomalous transmission to get high-performance plasmonic filter with a narrower line width by using the coupling of different propagation-type SPs. Plasmonic optical filters (PFs) have also been studied using ring and circular shaped nano-resonator [8], circular ring cavity [9], circular ring cavity with elliptical core [10], square ring cavity [11] and hexagonal ring cavity [9]. Recently Wang et al. [20] have presented transmission characteristics of SPs in an MIM ring resonator-based waveguide to show the filtering application by changing the radius of ring. However, several structures demonstrated inherent multi-mode property and limited alteration of resonance wavelength. Khani et al. [13] have reported a hexagonal nano-resonator with resonance transmission mode at higher wavelength. Despite the better performance, the design suffers from the complex nanofabrication process. Ring nano-resonator can be a good candidate for a simple fabricable Plasmonic optical filter design with high performance. It has certain minimum requirements for corrugated MIM waveguide and critical dimension uniformity rather than simple waveguide shows the flexibility to control. The cutoff frequency shift providing efficient filtering and de-multiplexing properties [15–18]. Silver is recorded as the most efficient plasmonic material for MIM based plasmonic ring resonator, because of the major challenges to plasmonic material include Ohmic losses and large Bandwidth. Whereas Ohmic losses relate to imaginary permittivity of material. Silver is the material which possess less imaginary permittivity at visible and near infrared spectrum and as well as less bandwidth. Therefore, silver shows lesser losses than other noble metals including gold and even than graphene [24]. The

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https://doi.org/10.1016/j.physe.2021.114711
Received 5 January 2021; Received in revised form 19 February 2021; Accepted 25 February 2021
Available online 9 March 2021
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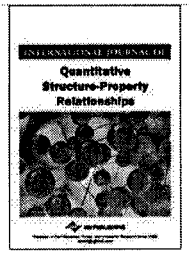

GA-SMLR-Based QSAR Modeling and Molecular Docking Studies of Bisamidine Derivatives as NMT Inhibitors

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Source Title: International Journal of Quantitative Structure-Property Relationships (IJQSPR) (/journal/international-journal-quantitative-structure-property/126552) 5(4)

Copyright: © 2020 | Pages: 31

DOI: 10.4018/IJQSPR.2020100101

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Abstract

The present investigation deals with a combination of genetic algorithm-stepwise multiple linear regression (GA-SMLR)-based QSAR modeling and molecular docking applied to bisamidine analogues in an attempt to explore their role as novel NMT inhibitors of Candida albicans. In this regard, 43 bisamidine analogues were investigated for the development of mathematical models. The robustness of the proposed QSAR model was not only ascertained through traditionally used internal and external validation statistical parameters (Q2= 0.740, R2 = 0.819, R_Pred^2 = 0.636) but also through various R_(m)^2 metrics proposed by Roy and Mitra. The descriptors recognized in the QSAR analysis have culminated a significant role of atomic van der Waals volume, topology, nature of bond and dipole moment to modulate the antifungal activity of compounds under investigation. The most active compound revealed enhanced binding potency with MolDock score of -183.451 kcal/mol and displayed hydrogen bond interactions with active amino acids Leu177, Thr211, Tyr225, and Ile111 of NMT.

Article Preview

Top

Introduction

Systemic fungal infections can be life-threatening and may turn out to be the major reason of morbidity and mortality (Brown *et al.*, 2012). It has been shown that *Candida* and *Aspergillus* are the most common fungal pathogens, specifically among patients with compromised immune function (Richardson, 2005; Garbino *et al.*, 2002; Hobson, 2003). Even after significant progress in antifungal drug development, currently available three main classes of antifungal drugs namely polyenes, azoles and echanocandins suffer from the problems like limited antifungal spectrum, poor efficacy, renal toxicity, drug interactions and resistance (Dismukes, 2000; Chang *et al.*, 2017; Chen & Sorrell, 2007; Lai *et al.*, 2008; Vandeputte, Ferrari & Alix, 2012) . Fungal infections pose a great threat and global economic burden (Hoffman *et al.*, 2005; Daele, 2019). In this context, research on new classes of potent antifungal drugs and targets is an urgent need for scientific society (Sangamwar, Deshpande, & Pekamwar, 2008; Sheng & Zhang, 2011; Ngo, Garneau, & Green 2016; Mazu, 2016).

Candida albicans is the principal cause of systematic fungal infections in immuno-compromised persons (Andes, 2012). Genetic and biochemical studies have revealed that enzyme myristoylCoA:protein N-myristoyltransferase (NMT) plays crucial role to sustain the viability of *Candida albicans*. In this line of action, NMT seems to be an emerging target for antifungal drugs (Devadas *et al.*, 1997; Bhatnagar *et al.*, 1999; Prasad, Toraskar, & Kadam, 2008).

Bisamidine derivatives have been screened as anti-bacterial, anti-cancer and anti- inflammatory drug candidates, thereby attracting the interest of researchers (Panchal *et al.*, 2009; Butler *et al.*, 2010; Arya, Kumar, Roy, & Sondhi, 2013). Recent studies have shown their potential for antifungal activity against a diverse panel of pathogenic fungi with unique mechanism of action to kill fungi by binding and inhibiting DNA replication as well as RNA synthesis (Nguyen, 2015).

Traditionally, drugs were discovered by synthesizing compounds which is an expensive, challenging, lengthy and interdisciplinary approach. Pharmaceutical industry is striving for ways to improve the efficacy of drug discovery process. To combat, accelerate and economize these problems, structure and ligand based drug design have emerged as revolutionary tools in recent years (Tang *et al.*, 2006; Jorgensen, 2009; Yang *et al.*, 2012; Roy, 2019) .

Researchers have been successfully using these computer aided tools to investigate new drug candidates that are highly potent for the antifungal activity. QSAR (Quantitative Structure-Activity Relationship), one of the ligand-based modeling tools has helped researchers in stretching a large library of possible drug candidates for selectivity and potency (Cronin, 2010;Roy, Kar, & Das, 2015). QSAR relies on generation of virtual models so as to explore dependence of physico-chemical activities with chemical structure of the concerned compound (Topliss, 1993; Selassie, 2003). Additionally, the structure-based drug designing approach, "molecular docking", is a highly useful technique to explore the most active region of protein where the ligand–receptor interaction becomes prominent (Ferreira, 2015; Lounnas *et al.*, 2013).

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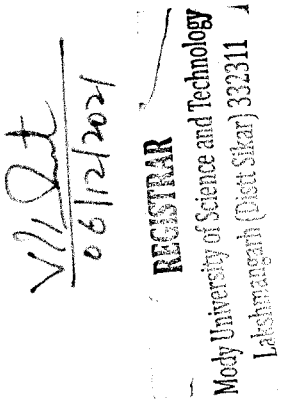

Current Trends in Biotechnology and Pharmacy
Vol. 13 (4) 357-365, October 2019, ISSN 0973-8916 (Print), 2230-7303 (Online)

Biochemical characterization and dye decolorization of selective microbial isolates from natural sources

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Abstract

The estimation of dye decolorizing efficiency of microorganisms was initially carried out by the primary screening of isolates from the soil samples of Ambabari region Jaipur. Two microbial strains *Bacillus subtilis* and *Pseudomonas stutzeri* were isolated from the soil samples. Dye decolorizing efficiency was checked by plating and shake culture flask experiments, provided with the optimized conditions of temperature / time period. Selective isolated microbial strains were further analyzed spectrophotometrically for decolorization percentage, morphological analysis carried out by visualizing the colony parameters with respect to their size/ shape or color. Selective microbial isolate *Bacillus subtilis* was found with the capability of 73.52% to decolorize 1 ppm methyl red in 96 h and 79.71% capability to decolorize 100 ppm methyl red in 96 h. The same isolate *Bacillus subtilis* was found with the capability of 74.64% to decolorize the 1 ppm orange G in 96 h and 80.80% capability to decolorize the 100 ppm orange G in 96 hrs. *Pseudomonas stutzeri* was found with the capability of 70.18% to decolorize 1 ppm methyl red in 96 h and 77.17% capability to decolorize 100 ppm methyl red in 96 h. Microbial isolate pseudomonas stutzeri was having capability of 72.80% to decolorize the 1 ppm orange G in 96 h and 75.81% capability to decolorize 100 ppm orange G.

Keywords: dye, microorganisms, soil, decolorization

Introduction

Dye is synthetic organic compound that is used for the coloration of textiles. These organic chemicals are usually classified as azo, anthraquinone, vat, phtalocyanine, indigo, polyethylene, carbonium and nitro dyes [Abrahart 1977, Sponza 2006]. There are two components in the dyes by which they attach to the fibers and make resistance towards the other chemicals like soap and detergents. The first component is chromophore which is capable to absorb the light in UV region, like -N=N-, -C=N, -N=O, CH=CH and the components with the properties of chromophore are known as chromogen. The second component is auxochrome, these are the stable chemical bonds by which the fibres make bonding with dyes, like: NH, NHR, NR these are basic in nature and OH, -SO3H, -COOH these are acidic in nature[Wang et al., 2009]. If the compound do not have the properties of auxochrome then it is impossible to colorize the textiles because of the lack of stable chemical bonds between the fibres and dyes.Azo dye contains azo bonds (-N=N-). It is highly persistent in aquatic environment and highly toxic and carcinogenic and explosive in nature because of the presence of aromatic rings, azoic linkages and amine groups. There are approximately 10,000 different synthetic dyes available in the market with a global annual production of almost 800,000 tons [Bazin et al., 2012]. These synthetic dyes are widely used in the textile, photography, paper, cosmetic and food industries. It is estimated that 10-19% of the total production of colorants in textile industriesis lost during the dyeing process

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EFFECT OF CONTAMINATED IRRIGATION WATER ON EXTERNAL MORPHOLOGICAL CHARACTERS IN EDIBLE VEGETABLES

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Published: Aug 25, 2020

Page: 54-60

NAVNEET JOSHI
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Abstract

In this study, external morphological characters were studied each in brinjal and radish plants. These are related to differences in external morphological appearance only and not related with data values. These characters were thoroughly studied and their respective figures were recorded at both control and polluted soil sites. These polluted sites contain the effluents from the nearby industries of sanganer region, Rajasthan, India. It was experimentally recorded that both mature vegetable plants showed significant morphological differences when allowed to grown with different irrigation conditions.

Keywords:

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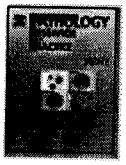
Pathology - Research and Practice
Volume 216, Issue 12, December 2020, 153247



EP4 receptor as a novel promising therapeutic target in colon cancer

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Abstract

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Arabian Journal of Geosciences (2021) 13:1244
https://doi.org/10.1007/s12517-020-06344-1

REVIEW PAPER

Study of bio-materials for removal of the oil spill

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Received: 3 October 2020 / Accepted: 10 November 2020
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Abstract
The major battle that the human civilization is facing in the present era is regarding pollution; one of a serious threat among these pollutions is the contamination of water bodies due to oil spills. Oil spills from ships, tankers, or leaks in marine oil pipes are something that is needed to deal with to make the earth a better place. To protect the water and the environment, this oil should be removed from the water or the surface. The chances for oil spills have reduced as we have observed there is a significant change in the pattern with the decrease of the use of tankers and pipelines for oil and petroleum derivatives. The point should be that according to the researchers, the marine ecosystem is damaged even more by the other sources of pollution even though the event of oil spills is certainly much sensational. There is an urgent requirement of advanced eco-friendly tools to eliminate spilled oil. Some studies suggest that the use of organic matter may be an effective step in such an oil spilled scenario. Organic matter acts as a sorbent, a surfactant, and a separator and can make using a variety of ingredients such as organic, inorganic, synthetic, or different, but they must interact with the biological system. Some organic materials can contaminate the water more than the oil that is spread, so eco-friendly, non-toxic, low-cost organic matter should be used for oil removal and recovery. If the oil is recovered from the environmental surface, then after the successful removal of that oil, it can be conducive to sustainable development. This review summarizes the overall perspective on the potential of different biomaterials for the removal of accidentally spilled oils.

Keywords Pollution · Spilled oil · Biomaterials · International convention · Sustainable development · Sorbent · Accidentally spilled oil

Introduction

Worldwide, oil is considered a source of energy in various industrial applications. Many raw materials for the production of chemical and synthetic polymers are derived from oils (Almeida et al. 2019). Increasing globalization has become a major cause of over-reliance on oil energy, and the use of such oils continuously pollutes the environment. Oil spill accidents have been observed very frequently for almost three decades, and several oil carriers are responsible for these accidents. These accidental spilled oils are one of the major causes of environmental pollution. Besides, salinity, temperature, and waves are also responsible for the increase in rates of oil transportation and weathering (Dasht et al. 2018). The world's biggest spilled oil accident ever happened in the Gulf of Mexico in 2010. During this time, millions of gallons of oil spilled over the oceans over more than 85 days, during which time the crude oil continued to affect marine ecosystems (Allan et al. 2012). Accidental oil spills occur due to mechanical dysfunction, transportation, utilities, and poor storage conditions, which we cannot avoid (Chen and Chand 1992). Due to the evaporation process, most of the oil disappears from the ocean, some part mixes with the surface, and some remains in the environment as a fine droplet, and they continue to pollute the environment. Crude and heavy oils like petroleum do not easily disappear from the environment unless it

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Published online: 21 November 2020

Springer

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Life Sciences
Volume 275, 15 June 2021, 119369

Silencing STAT3 enhances sensitivity of cancer cells to doxorubicin and inhibits tumor progression

Navneet Joshi [a, 1], Farnaz Hajizadeh [b, c, 1], Ehsan Ansari Dezfouli [d], Angelina Olegovna Zekiy [e], Mohsen Nabi Afjadi [f], Seyedeh Mahboubeh Mousavi [c], Mohammad Hojjat-Farsangi [g], Vahid Karpisheh [c], Ata Mahmoodpoor [h], Hadi Hassannia [i], Sanam Dolati [j], Hamed Mohammadi [k], Mehdi Yousefi [l], Farhad Jadidi-Niaragh [c, m]

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Abstract

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Journal of Experimental Biology and Agricultural Sciences, April - 2021; Volume – 9(2) page 231 – 238

Journal of Experimental Biology and Agricultural Sciences

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ISSN No. 2320 – 8694

PLANT GROWTH POTENTIAL OF SALT TOLERANT ENDOPHYTE *Pseudomonas Siluiensis* ISOLATED FROM CHICKPEA

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Received – January 01, 2021; Revision – April 09, 2021; Accepted – April 20, 2021
Available Online – April 25, 2021

DOI: http://dx.doi.org/10.18006/2021.9(2).231.238

KEYWORDS

Endophyte

Semi-arid zone

Salt stress

Exopolysaccharide

ABSTRACT

Bacterial endosymbionts are well characterized for plant growth promotion. In this study, the root, nodules, and stem of the *Cicer arietinum* crop planted in a semi-arid zone were used as a source to isolate potential plant growth bacteria. The ability to grow under salt stress was determined, and the potential isolate was screened for plant growth promotion traits. The selected isolate was identified by the 16S *r*DNA method. Pot trials were conducted to know the ability of the isolate to promote plant growth *in-vivo*. Among various isolates obtained, a bacterial isolate obtained from root showed the ability to grow in the presence of 10 % Sodium fluoride (NaF). The isolate produced Indole Acetic acid

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Ad Litteram: An English Journal of International Literati
(*A Peer-Reviewed Refereed e-Journal*)
December 2020: Volume *5* ISSN: 2456 6624

Dialectics of Ostracism and Identity Expedition in the Select Postcolonial Literary Texts

Priti Vyas
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Introduction

Identity crisis has always enjoyed a defining significance in the thematic framework of the Indo-Anglican novels. The novels of R. K. Narayan, Mulkraj Anand and Raja Rao redesigned the techno-thematic fabric of Indian English fiction and laid the foundation of the new Indian English fiction. The postcolonial age represented by these three novelists was chiefly a quest for identity along with different dimension of socio-political and economic order of India. This constant quest for identity and its subsequent assimilation by the marginalized has been discoursed in this research which aims to explore R.K. Narayan's *The Guide* and Jhumpa Lahiri's *The Namesake* in the postcolonial light to discuss the issue of the marginalization of women and immigrants, and their quest for identity in the society. *The Namesake* portrays the painful and tormenting experiences of the immigrants who have a constant sense of dislocation and desire of belonging. Similarly, the literature across the globe is full of the images of women, who have suffered due to their gender/class/caste or race and the story of *Rosie* in *The Guide* is one such story.

Discourse on Ostracism and Identity Expedition in *The Guide* and in *The Namesake*

R. K. Narayan's *The Guide* has probed deep into the psychological turmoil of Rosie to present her predicament, quandary and quest for identity in full intensity. Ujjwal Jana in his article *Mapping out Gendered Space: A Study in Narayan's The Guide* (2009:98) says that the two figures, Rosie and Raju's mother, are ostracized in their respective homes

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Research Article

First report of papaya leaf curl virus and its associated papaya leaf curl betasatellite infecting *Catharanthus roseus* plants in India

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Accepted 30 Mar 2021, Published online: 13 Apr 2021

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ABSTRACT

Catharanthus roseus (Madagascar periwinkle) plants exhibiting typical begomovirus symptoms, i.e., leaf yellowing and curling were found in Lakshmangarh, Rajasthan, India. Symptomatic and healthy leaf samples were collected and subjected to DNA extraction and polymerase chain reaction, using universal primers conserved for the coat protein region of begomoviruses. The full length of viral DNA was amplified by rolling circular amplification (RCA) followed by cloning and sequencing. We identified the viral DNA sequence as papaya leaf curl virus (PaLCuV: KX353619) and papaya leaf curl betasatellite (PaLCuB: KX353621). Analysis of complete viral DNA component

JABB Journal of Applied Biology & Biotechnology

Volume: 8, Issue: 1, Jan-Feb, 2020
DOI: 10.7324/JABB.2020.80101

Research Article

In silico analysis of chili encoded miRNAs targeting *Chili leaf curl begomovirus* and its associated satellite

Megha Mishra[1], Rajesh Kumar[1], Rajarshi Kumar Gaur[2], Rakesh Kumar Verma[1]

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1. INTRODUCTION

The chili (*Capsicum annuum*) is an economically important and widely cultivated vegetable cum spice crop of the family *Solanaceae*. Various pathogens affect the chili crop and limit its production [1–3]. Viruses are the main cause of loss in chili production. Around 65 viruses are known to cause leaf curl disease in chilies (ChiLCD) throughout the world, among which begomoviruses (family-*Geminiviridae*) are one of the most destructive plant viruses [4]. ChiLCD is characterized by curling of leaves, thickening, and swelling of veins, reduced leaf size, and stunted plant growth [5,6]. Geminiviruses are non-enveloped, circular, single-stranded DNA viruses having one (DNA-A, monopartite) or two (DNA-A and B, bipartite) DNA molecule of 2.5–3.0 kb size with nine genus, namely, *Becurtovirus, Begomovirus, Capulavirus, Curtovirus, Eragrovirus, Grablovirus, Mastrevirus, Topocuvirus,* and *Turncurtovirus* [7]. The transmission vectors of begomoviruses are Whiteflies (*Bemicia tabaci*) [8]. *Begomovirus* has bidirectionally organized six open reading frames (ORFs) on virion sense and complementary strand and an Intergenic region with the origin of replication [9]. Sense strand has V1 (CP: Coat Protein), V2 (Pre-CP: Pre Coat Protein) ORFs and C1 (Rep: Replication associated protein), C2 (TrAP: Transcriptional activator protein), C3 (REn: Replication Enhancer protein), and C4 ORFs are present on complementary strand [10].

RNA interference (RNAi) induces RNA silencing either by transcriptional silencing or by post-transcriptional gene silencing through the interaction of endogenous or externally introduced small RNAs (sRNAs) with target RNA. Thus, RNAi can work as a significant defense strategy to hinder virus attack in plants [11]. These sRNAs include micro RNAs (miRNAs) and small-interfering RNAs (siRNAs). miRNAs are involved in only post-transcriptional gene regulation and are derived from endogenous single-stranded hairpin precursors. Hairpin precursor or double-stranded RNA is processed by Dicer or a Dicer-like protein into around 22-nt double-stranded RNA. Later, one strand of this 22-nt RNA, called "guide" strand, loaded into the RNA-induced silencing complex helps binding it to a complementary strand of the target, leading to cleavage or translational repression of the target [12].

Sequence-specific interaction of miRNA and target mRNA transcript leads to its cleavage or translational repression by proteins involved in RNAi mechanism [13]. Many computational tools have been developed to predict target genes of these miRNAs, as prediction is crucially important for down-sizing potential genes–miRNA interactions for further downstream interaction analysis using wet-lab methods, and for understanding their effects on gene expression [14]. These *in silico* target prediction tools use various miRNA-target interaction features for prediction such as complementarity between miRNA and target site, target site accessibility, and thermodynamic stability of miRNA-target duplex using MFE calculations [15]. These miRNAs play a critical role in regulating the growth and development of plants' cell development and cell differentiation, regulation of development processes, biotic, and abiotic stress responses [16,17]. In this study, we have predicted the chili-encoded miRNAs that could be used for silencing against *chili leaf curl virus* (ChiLCV) infection. ChiLCV was isolated, sequenced, and submitted to the National Center for Biotechnology Information GenBank database under the accession number MF737343. An *in silico* analysis was applied to predict chili miRNAs that could target genes present in the ChiLCV genome (Fig. 1). It may serve as an initial approach for understanding the viral gene expression regulation by host miRNAs and could pave a way into design strategies for defense in chili (*C. annuum*) plant against ChiLCV infection. This is the first study reporting the identification of potential chili miRNAs capable of targeting essential genes of the ChiLCV genome and associated satellites.

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2. MATERIALS AND METHODS

2.1. Source of miRNA and Genomic Data

To search potential conserved miRNA in chili, genome sequence of *C. annuum* cv. CM334 published by Kim et al. [18] and 15,041 mature miRNA of plants available in the Plant Non-Coding RNA (PNRD) database were

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ORIGINAL RESEARCH
published: 07 October 2020
doi: 10.3389/fmicb.2020.512957

Biology and Interaction of the Natural Occurrence of Distinct Monopartite Begomoviruses Associated With Satellites in *Capsicum annum* From India

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Specialty section:
This article was submitted to Microbe and Virus Interactions with Plants, a section of the journal Frontiers in Microbiology

Received: 18 November 2019
Accepted: 03 September 2020
Published: 07 October 2020

Citation:
Mishra M, Verma RK, Marwal A, Sharma P and Gaur RK (2020) Biology and Interaction of the Natural Occurrence of Distinct Monopartite Begomoviruses Associated With Satellites in Capsicum annum From India. Front. Microbiol. 11:512957. doi: 10.3389/fmicb.2020.512957

Chili (*Capsicum annuum* L.) is an important vegetable and spice crop of tropical and subtropical regions. Chili plants showing upward leaf curling, leaf crinkling, and leaf yellowing symptoms, collected from Sikar district of Rajasthan, India, were found to be associated with begomovirus and satellite molecules. The presence of virus was confirmed by PCR using virus-specific primer. The full-length genomic DNA-A of three begomovirus (MM-1, CS-1 and RV-1) and two satellites (MM-2 and MM-3) were cloned which was identified from single symptomatic chili plant. The genome organization of isolated three viruses is similar to those of other Old World monopartite begomoviruses. The comparison of the sequences and closest phylogenetic relationships for the begomoviruses, betasatellite and alphasatellite DNAs revealed that MM-1 was designated as DNA-A of *Chili leaf curl virus* (ChiLCV), CS-1 is considered to be a new distinct species of *Tomato leaf curl Gujrat virus* (ToLCGV) whereas RV-1 as a new strain of *Cotton leaf curl Multan virus* (CLCuMuV). The DNA-A component of ChiLCV showed 8.6%, ToLCGV of 16.6% and CLCuMuV of 7.7% average evolutionary divergence, concomitantly, the betasatellite and alphasatellite molecule had 9.9% and 5.9% overall sequence divergence, respectively. Interestingly, most of the begomoviruses were found to be intra-species recombinants. The dN/dS ratio and Tajima *D* value of all viral DNA-A component and their associated betasatellite showed their selective control on evolutionary relationships. The nucleotide substitution rates were determined for the DNA-A genomes of ChiLCV (7.22×10^{-4} substitutions site^{-1} year^{-1}), CLCuMuV (1.49×10^{-4} substitutions site^{-1} year^{-1}), ToLCGV (7.47×10^{-4} substitutions site^{-1} year^{-1}), the genome of associated ChiLCB (4.20×10^{-4} substitutions site^{-1} year^{-1}) and CLCuMuA (1.49×10^{-4} substitutions site^{-1} year^{-1}). Agro-inoculation studies indicate that the presence of DNA betasatellite induce severe symptoms in *N. benthamiana* and chili, suggesting prerequisite association for typical disease development.

Keywords: *Capsicum annum*, mixed infection, satellites, sequence variability, recombination

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Kala: The Journal of Indian Arts History Congress
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27. Investigating Dementia in William Shakespeare's *King Lear*

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Abstract

In this paper we have compared King Lear's mental condition with some contemporary understanding of the condition labelled-Dementia.

Our main focus would be to comprehend the thin line of difference between Dementia and a generalized form of madness, which Shakespeare inflicted King Lear with, at the same time bringing out the more advanced concept of Dementia in the same personality. King Lear, despite being a tragedy, is loaded with the most creative message for humanity which believes in 'A product and not a process' which believes in accumulation but not disintegration. Lear stands here as a character who has lost everything, even his personhood, but dynamically morphs into a better version of his self that demonstrates that even a demented personality is capable of sustaining a newly acquired Avatar due to benevolent caregivers.

Lear's eternal query that also has roots in Indian spiritualism 'who is it that I call me who I am?' resonates with our own times. It poses the burning question "What it means to be human?" Is to be human the accumulation of various public, social and relational selves that a person imbibes or does it have to do more with aligning our most private self with our deepest desires and fears?

It is only at the time when we are threatened to lose human connection with that we understand what is truly important, as human interaction is one of the core functions that the important things in life are not what materially surround us but which is basically residing the [illegible]

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Mini-Reviews in Organic Chemistry, 2021, *18*, 1-22

REVIEW ARTICLE

Diverse Routes for the Synthesis of Indole-Fused Complex Architecture from Simple Molecules

Shivendra Singh[1], Suresh Singh Chauhan[1], Neeraj Kumar Sharma[2], Sunil Dutt[3] and Keshav Lalit Ameta[1,*]

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ARTICLE HISTORY

Received: November 08, 2020
Revised: March 09, 2020
Accepted: March 10, 2020

DOI:
10.2174/1570193X17999200521101255

Abstract: Several easy, efficient and convenient procedures to access indoles fused heterocyclic systems are described in this review. These heterocyclic systems were synthesized from several cyclic or acyclic molecules *via* a variety of reactions such as Diels-Alder reaction, Michael addition, Morita-Baylis-Hillmann reaction and many other domino/Cascade approaches with high selectivity. Most of the given protocols in this review proceed through organocatalytic pathways; however, some underwent different catalytic and non-catalytic reactions.

Keywords: Analgesic, domino approach, indole heterocycles, multicomponent reactions, nootropic agents, organocatalysis, psychoanaleptic.

1. INTRODUCTION

The indole-fused heterocycles have been recognized as an important building block, which exhibits several interesting bioactive properties, such as analgesic, psychoanaleptic and nootropic agents [1]. Some of their synthetic analogues are part of natural products and pharmacologically active compounds. For instance, 4-aminomethyl substituted Tetrahydro-thiopyrano Indole (THTPI) and substituted 4-aminomethyl THTPI derivatives have been found to show excellent analgesic and nootropic properties [2].

Efficient synthetic protocols for the preparations of a series of biologically as well as synthetically challenging complex heterocyclic molecules having indole as a core moiety have been rapidly growing interest in recent years because these building blocks have enormous applications in several fields of chemical science [3-5]. Especially, the synthesis of additional rings on indole rings is a prime target for synthetic organic and medicinal chemists. The major reason would be that these frameworks constitute many marketable drugs, bioactive natural products, active pharmacophores, functional materials, *etc*. Some of these are as shown in (Fig. 1).

In view of the great importance, a large number of classical and modern protocols have been exploited for efficient access to indole fused heterocyclic molecules.

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2. APPROACHES TO ACCESS INDOLE FUSED HETEROCYCLES

2.1. Transition Metals and Their Salts Mediated Reactions

The cobalt-catalyzed C-2 selective C-H alkenylation/annulations cascade transformation of substituted pyridine-indoles with internal alkynes under the nitrogen atmosphere was established by Yang and his co-workers. In the reported methodology, $Cu(OAc)_2.H_2O$ was used as an oxidant and the reaction was carried out in the presence of $AgBF_4$ at 135°C in DCE to afford a series of pyrido-pyrimido-indoles in high yields (82-88%) (Scheme **1**) [6].

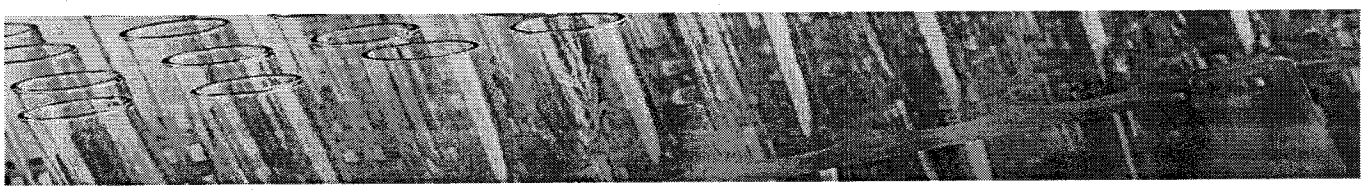
Xie and his associates [7] revealed gold-catalyzed tandem cyclization of several 1,2-*bis*(alkynyl)-2-en-1-ones with indole in DCE at room temperature for 1-3 h to furnish indole fused heterocycles and furan rings in mediocre to high yields (47-90%). The reaction proceeds through cascade carbonyl-yne cyclization/Friedel-Crafts/indole-yne cyclization sequences (Scheme **2**).

Pd-catalyzed cyclization strategy of diarylacetylene to afford several tetracyclic indolo[3,2-*c*]isoquinolinones in good to excellent yields (79-95%) was unfolded by Zhu and his associates in 2012 [8]. The reaction followed a sequential amination/N-demethylation/amidation process. The reaction conditions were oxidative in the presence of DMSO solvent at 50°C for 24 h as shown in Scheme **3**.

Nazare *et al.* [9] established one-pot synthesis of fused indoles involving several 2-chloroanilines and cyclic ketones under the presence of palladium catalysts, $[Pd(^tBu_3P)_2]$

AJOMC Asian Journal of Organic & Medicinal Chemistry

(/) E-ISSN No: 2456-8937 | CODEN: AJOMB2



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Synthesis of Novel Substituted 1,5-Benzothiazepines Containing 1,4-Benzodioxane Sulfonyl Moiety

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Abstract

An efficient synthesis of novel 2,3,4-trisubstituted 1,5-benzothiazepines (**4a-e**) incorporating the sulfonyl group is described. Compound (**4a-e**) was synthesized by the reaction of 3-(1,4-dioxane-6-sulfonyl)- 2,4-dimethyl/4-methyl-2-phenyl/2,4-diphenyl/2-ethoxy-4-methyl/2,4-diethoxy propane-1,3-dione (**3ae**) with 2-aminobenzenethiol with ZnOnanoparticles/pyridine. Formation of compound (**3a-e**) was achieved by the reaction of 1,4-dioxane-6-sulfonyl chloride (**1**) with 2,4-dimethyl/4-methyl-2-phenyl/2,4-diphenyl/ 2-ethoxy-4-methyl/2,4-diethoxy propane-1,3-dione (**2a-e**). The benzothiazepines (**4a-e**) obtained were purified by column chromatography (benzene: $CHCl_3$, 40:60, 30:70, 20:80, 10:90) and crystallized from methanol. The purity of the compounds was checked by TLC using ($CHCl_3$: CH_3OH, 9:1) as the mobile phase. The structure of the compounds has been established by elemental, IR, ^1H NMR, ^{13}C NMR and Mass spectral analyses. Frontier molecular orbitals of the title compounds have been studied in the ground state speculatively. The reactivity of a molecule using diverse descriptors such as softness, electrophilicity, electronegativity, HOMO-LUMO energy gap is calculated additionally discussed.

Keywords

Propane-1,3-dione, ZnO nanoparticles, Substituted benzothiazepine, 1,4- Benzodioxane, Sulfonyl compound, Spectral studies

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Application of geospatial technique in identification of cropping pattern and cropping intensity in central Gujarat, India

Sukanta Kumar Saha, Vodadora;
Tathagata Ghosh, Rajasthan; and
Rolee Kanchan*, Vadodara

Abstract

The agricultural sector in India has gone through several changes with increasing population and infrastructural development in the last few decades. Cropping pattern and cropping intensity are two important aspects of agriculture. The spatial pattern of these aspects varies over space and time with the changing determining factors. Identification of the changing nature of these agricultural aspects in a timely manner with considerable accuracy is not only the need of the time but also necessary for the future. The application of geospatial techniques is elementary in this context. The present study, was restricted to the analysis of the cropping pattern and cropping intensity with the help of geospatial technique in the central Gujarat region of India, covers an area of 2941 sq. km of area. IRS Resourcesat-2A LISS-III satellite images of 2015-16 were used in the study. Band rationing technique namely Enhanced Vegetation Index (EVI 2) was adopted to detect cropping patterns of different seasons. Further from the cropping pattern, the crop combination was prepared. In this study, the result showed that EVI 2 method is very much suitable for the identification of cropping pattern and cropping intensity with better accuracy. It was also found that salinity is controlling both the cropping pattern and cropping intensity in the presented area.

Keywords: *cropping pattern, cropping intensity, band rationing, EVI2.*

Introduction

From primitive subsistence agriculture to present day market oriented advanced commercial farming; the agricultural sector has gone through a positive change throughout the world in general and in India in specific. Looking at the past few decades, India showed a positive escalation in different crops as population growth was the major driving force in association with the green revolution. Cropping pattern, productivity and intensity are the three major yardsticks for the quantification of agricultural output. Hence, to understand the development in the agricultural sector, timely quantification of growth parameters is critical. Natural factors like temperature, precipitation, physiography, soil etc. and anthropogenic factors like demand, the market economy, use of fertilizers and pesticides etc. definitely have an impact on these aspects. The cropping pattern in India varies over a year as different crops are grown in June-July to October–November (Kharif), October–November to February–March (Rabi), January–February to April–May (Zaid). In this context, cropping pattern as well as cropping intensity varies

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Purakala
(UGC Care Journal)

ISSN: 0971-2143
Vol-31-Issue-18-April-2020

SEASONAL PATTERN OF GROUNDWATER GEOCHEMISTRY USING MULTIVARIATE STATISTICAL TECHNIQUE IN THE BENGAL ALLUVIAL TRACT, INDIA

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Keywords: Bengal alluvial tract, geochemical parameter, multivariate techniques, geostatistics.

Abstract:

Geochemical and geostatistical approach have been undertaken in the present study to comprehend the characteristics of groundwater in the central alluvial tract of West Bengal, India. Groundwater samples were collected from the entire study area comprising of 5,324 km^2 in three time periods (premonsoon, monsoon and postmonsoon). Geochemical parameters like depth, arsenic, pH, Total Dissolved Solids (TDS), Electrical Conductivity (EC), iron, chloride, sulfate, total hardness as $CaCO_3$ and nitrite were analysed. The main objective of the present work is to depict the seasonal pattern of groundwater characteristics with the help of multivariate statistical analysis (factor analysis (FA)). Factor analysis explained 61%, 63% and 62% of total variability of data for three seasons respectively. Although the total variability showed a very minute variation in different seasons but overall result portrayed significant results.

Introduction:

Substantial shift of dependency from surface water to groundwater and faster growth of population in several parts of the world, were the major events that occurred in the last few decades. Ever growing population has its impact on this natural resource when it is over exploited for different purposes. Over exploitation is associated with both the issues of quality and quantity. The former is associated with the higher rate of exploitation and lesser rate of recharge of groundwater while the later one is related to the mixing of different contaminants with groundwater either by natural or anthropogenic processes. To ensure safety and portability of groundwater, it is necessary to comprehend the factors and processes that control its characteristics. Aquifer condition, weather, slope of the land, physiography, local geology, soil condition, hydrology and anthropogenic activities are some of the determinants which controls the nature of groundwater (Ravenscroft et al. 2001). Thus, for the evaluation of groundwater quality and its categorization it is necessary to understand the controlling processes. Schot et al. (2012) studied spatio temporal pattern of groundwater of Naardermeer wet land of Netherlands with 15 parameters. Results showed that the nutrient of water like NO_3, PO_4, NH_4 and redox sensitive parameters like Fe and Mn had relatively higher variation in different seasons. Seasonal and spatial pattern of groundwater parameters was analyzed in the Red River Delta of Vietnam by using Self Organizing Maps (SOM) and the water quality was classified on the basis of salinity in different seasons. Further Gibb's diagram helped in

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International Journal of Gastronomy and Food Science 22 (2020) 100251

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Effect of *Prosopis cineraria (L) druce* pods and camel milk for nutritional enrichment in traditionally fermented minor millet's drink

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ARTICLE INFO

Keywords:
Food intervention
Protein digestibility
Glycemic index
Sensory analysis
Antioxidants

ABSTRACT

Nations around the world are faced with various nutritional challenges in terms of malnutrition and unbalanced nutrition to maintain healthy lifestyles and longevity of their populations. The quest for innovative interventions in existing traditional food recipes hold promises to address local and regional nutritional issues. It includes amalgamation of traditional foods with locally available ingredients for nutritional efficacy and enrichment. Such an attempt has been made on a traditional food called *'Rabadi'* from western arid and semi-arid regions of the Great Indian Thar Desert. It is prepared by fermentation of 'Bajra' – a pearl millet (*Pennisetum glaucum*) cereal with addition of country buttermilk derived from defatted buffalo or cow milk yogurt. Its intervention was replacement of the buttermilk with inoculated camel milk and incorporation of local ingredients as soybean and flour of 'Khokha' – the ripe fruit pods of 'Khejri' (*Prosopis cineraria*) tree. The results exhibited significant enhancement of bioavailable proteins, higher digestibilities and starch hydrolysis to improve glycemic response with overall good acceptability in sensory analysis. The comprehensive results demonstrate promising enrichment of nutrition and a fair capable solution for better health prospects in proposed intervention of the traditional food recipe.

Introduction

People in various regions of India traditionally use different pulverized cereal grains to make porridges/deserts/fermented foods. In its arid and semi-arid north-western regions of the Thar Desert, a beverage known as *'Rabadi'* is prepared from the whole pulverized flour of a cereal locally called as *'Bajra'* (*Pennisetum glaucum*)- a member of the minor millet family. This is fermented with country buttermilk by placing it in the sunlight for 3–4 h and finally boiled with addition of salt and spices to taste (Modha and Pal, 2011). The fermented food is traditionally consumed by local people on a regular basis as part of their survival in hot climate which keeps them cool, active and away from summer ailments (Garg et al., 2017).

Bajra constitutes a major source of proteins and calories for millions in the Indian population. Protein digestibility of the pearl millet is low, like that of other plant foods. Starch also forms a major component of carbohydrates in the pearl millet which is relatively more resistant to attack by pancreatic amylase (Dhanker and Chauhan, 1987). Its fermentation reduces the level of phytic acid and improves protein and starch digestibility (Sindhu and Khetarpaul, 2001; Inyang and Zakari, 2008). Similarly, traditional fermentation of the pearl millet not only reported for improved protein bioavailability (Munishamanna, 2014) but also enhanced its mineral content and antioxidant properties (Amadou et al., 2011). Its potassium and magnesium contents help to regulate blood pressure and the insoluble fibre assists a great deal in digestion and bowel movement (Garg et al., 2017). Further, addition of soybean (*Glycine max*) to the pearl millet increases its lysine level and improves the amino acid profile (Coulibaly and Kouakou, 2012).

In the Thar Desert regions, delicacies like *Sangri*, the unripe fruit pods of the plant *P. cineraria* (L.) Druce. (Family: Fabaceae, subfamily: Mimosoideae) are considered a gourmet delight and have provided nutrition to the local communities over generations in the harsh desert climate (Garg et al., 2017). Its ripe pods - locally called as *Khokha,* are rich in calcium, phosphorus, carbohydrates, protein and fiber. The pods also contain copper, manganese, zinc, scores of essential fatty acids and phyto-constituents. These bioactive compounds demonstrated anti-hyperlipidemia, antioxidant effects, estrogenic activity and action against certain pathogens (Islam et al., 2019).

P. cineraria is a sacred and indigenous tree of the vast Thar Desert and is locally called *Khejri* (Mann and Saxena, 1980). The tree is worshiped

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https://doi.org/10.1016/j.ijgfs.2020.100251
Received 29 November 2019; Received in revised form 1 August 2020; Accepted 3 August 2020
Available online 14 August 2020
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06/12/2021
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Article

Investigation of Precise Molecular Mechanistic Action of Tobacco-Associated Carcinogen 'NNK' Induced Carcinogenesis: A System Biology Approach

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Received: 14 June 2019; Accepted: 24 July 2019; Published: 26 July 2019

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Abstract: Cancer is the second deadliest disease listed by the WHO. One of the major causes of cancer disease is tobacco and consumption possibly due to its main component, 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK). A plethora of studies have been conducted in the past aiming to decipher the association of NNK with other diseases. However, it is strongly linked with cancer development. Despite these studies, a clear molecular mechanism and the impact of NNK on various system-level networks is not known. In the present study, system biology tools were employed to understand the key regulatory mechanisms and the perturbations that will happen in the cellular processes due to NNK. To investigate the system level influence of the carcinogen, NNK rewired protein–protein interaction network (PPIN) was generated from 544 reported proteins drawn out from 1317 articles retrieved from PubMed. The noise was removed from PPIN by the method of modulation. Gene ontology (GO) enrichment was performed on the seed proteins extracted from various modules to find the most affected pathways by the genes/proteins. For the modulation, Molecular COmplex DEtection (MCODE) was used to generate 19 modules containing 115 seed proteins. Further, scrutiny of the targeted biomolecules was done by the graph theory and molecular docking. GO enrichment analysis revealed that mostly cell cycle regulatory proteins were affected by NNK.

Keywords: NNK; cancer; systems biology; protein–protein interaction network; topological analysis; gene ontology

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LOSS OF IDENTITY IS CENTRAL TO KIRAN DESAI'S THE INHERITANCE OF LOSS

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ABSTRACT

Kiran Desai's second novel The Inheritance of Loss, published in 2006, bagged her, the coveted, Man Booker prize for that year, amongst other accolades. She was plummeted to the ranks of authors such as V.S. Naipaul, Salman Rushdie & Arundhati Roy, who had trodden the same path before her. What makes her different from these stalwarts though, is her characterization, simplicity of the plot and the stark way in which she tells her story. Doing justice to the title of her book, Kiran Desai has brought out the desolate feeling of loss of identity through all of her characters in the novel. Not only the central characters- Sai & Biju, all the others too seem to have been uprooted from their soils and thrown into the world with a constantly present feeling of loss around them. Nearly all of them are in a state of confusion as to their place in the world. There is not only geographical crisis of identity but also racial, national, communal, economic, social and cultural. Kiran Desai has succeeded in conveying the dilemmas of what a person has against what he desires and fails to achieve, through her characters. The Inheritance of Loss will always be cited as one of the greatest examples of cultural and socio- political realities penned down by an Indian author.

Keywords- Loss, Identity, Immigration, Colonial syndrome, Dislocation Dilemma, Alienation

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International Journal of English, Literature and Social Sciences (IJELS) Vol-4, Issue-6, Nov – Dec 2019
https://dx.doi.org/10.22161/ijels.46.10 ISSN: 2456-7620

Feminist Consciousness and Traditionalism in Dollar Bahu by Sudha Murthy

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Abstract— *The purpose of the paper is to study Feminist Consciousness And Traditionalism in the novel Dollar Bahu by Sudha Murthy, taking in account the complexity of life, different histories, culture and different structure of values, the women's question, greed for money and working abroad as status symbol in Indian society. The article mirrors that Indian mentality which is fascinated by Dollar ...the foreign currency which is valued more than sentiments, morals and relationship. Murty is considered to be one of the most realistic authors, for she is able to bring the true picture of psyche of the women changing with the times. Her concern for the women who are caught in the dilemma of liberty and individuality or stability and protection is understandable. The paper displays the way in which the Urban middle class women struggle for self identity yet rooted deep into values of being a women who binds together the family in Sudha Murty's Dollar Bahu . The novel is women centered and woman's emotions and attitudes are delineated quite meticulously. We see a very clear touch of Traditionalism in this novel in the way a woman rate down another women low blinded by glow of Dollar. The study of the research highlights the dominance of the mighty Dollar in every pursuit of life. Today's new women are ready to accomplishing their aspirations. An Indian woman unlike a man, is stronger morally and emotionally. The novel deciphers the fact that it is the power of 'SHE' that can make or break a family.*

Keywords— Chauvinist, Disposition, Feminism, Modernism, Repertoire, Stereotypes, Titular.

I. INTRODUCTION

History of English language and literature in India starts with the advent of East India Company in India. It was in late seventies that a new breed of Convent, boarding school educated and elite class of novelists and writers started to come on block. To begin at the very beginning, the contributions of Bankim Chandra Chatterjee and Toru Dutt cannot escape our attention.

Bankim's contribution was the first English novel by an Indian, Rajmohan'sWife(1864). A novel, where the female protagonist's (Maatangini) romanticism is snatched away and she is punished for her personal revolt against the mundane life and its meaningless shackles. An extremely modern novel of it's times – the plot and it's message remains socially relevant even today.

Toru Dutt (1856 – 1877), virtually unknown during her short life of 21 years, made her mark posthumously in the world of literature by sheer purity of the spirit in her writings.Traditionally, the work of Indian Women Writers has been undervalued due to patriarchal assumptions about the superior worth of male experience .Indian Women Writers in English are victims of a second prejudice vis-a-vis their regional counterpart's.

As Chaman Nahal writes about feminism in India: "Both the awareness of woman's position in society as one of disadvantage or in generality compared with that of man and also a desire to remove those is advantages" [1].

The majority of novels written by Indian women writers depict the psychological sufferings of the frustrated homemakers. Among such writers is a name that takes readers heart is Sudha Murthy [2].

Among the various prolific writers of English in India is a name that does not need an introduction per se. Sudha Murthy is an immensely accomplished business woman, teacher, social worker and an author to reckon with.

In her notable writing career, she has penned nine novels, each of which is a reflection of what she has grown up with and observed in middle class India. She has been lucky to have lived through an era where traditionalism was waning to pave way for modernism. The transition neither complete nor sudden, nevertheless, gave her enough to write about.

Out of the many issues that make up her writing repertoire, the condition of women remains the most highlighted one. She wrote about feminism and the concept of equality for women in the choices they make and the lives they lead. The significant thing isn't the content but the timing of her revelations. She spoke about women issues and highlighted their plight when it wasn't 'in vogue'. She drew the attention of readers to things which had been socially acceptable, in fact a prerequisite,

06/12/2019
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Online ISSN: 2582-3574
Print ISSN: 2582-4406

SMART MOVES JOURNAL IJELLH

International Journal of English Language, Literature & Humanities

VOLUME 8, ISSUE 1, JANUARY 2020

DOI: https://doi.org/10.24113/ijellh.v8i1.10355

Orthodox Belief and Social Stigma in Sudha Murthy's Novel Mahashweta

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Sustainable Humanosphere
ISSN: 1880 - 6503, | March 2020
Volume: 16 Issue: 1

From Suffrage to Universal Issues: Evolution of Feminism

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Abstract–Women, all over the world have fought for their minimum human rights throughout the history of the world. Today, it might seem preposterous that, there was a time when women had to fight for their basic survival rights, but, it was a case all over the world in the continents of Europe, Asia, America and Africa. Fighting for right to work, voting, abortion has been a continuous struggle for the better half population of the world. Winning suffrage rights is considered as a hallmark event in the history of feminist struggle, but the story does not end here. Prior and post suffrage rights, there have been a host of issues that have led the feminist activists all over the world to strive for the better treatment and equal rights for the women. This paper traces the history of women's rights movements leading upto the suffrage struggleand continues into today's definition of feminism and how the concept has evolved and changed over the period of time.

*****

1. INTRODUCTION

The historians and the early philosophers have always believed that the people of the world, who are divided into different races and cultures are inherently different to each other and some of these races are remarkably and visibly superior to others. They cite achievements of some races against others as proof of this theory, and the world has already witnessed the extreme pain and displacement of a race owing to this thinking during Hitler's reign in Germany. But, there is one unifying trait in all these so-called superior and inferior races where one cannot differentiate them, and that is their treatment of their women. Considered as weak and dependent, almost of these communities relegated their women to household responsibilities and looked at them as tools of recreation and reproduction, in any order that one may want to fit them.

Women could not conduct business on their own, they must have a male partner; they could not exercise control over their children without the expressed consent of their husbands, they could not own property in their name, or study as per their choice, or hold public offices; they needed to cover their heads when they moved in the public spaces; even, the husbands were within their rights to sell off their wives if they felt like it. This description gives us an indication that this is the description of women's pitiable condition in the Middle East or Asian subcontinent. But, that is not the case, all these malpractices and restrictive and repressive practices were followed in Europe during the 18th, 19th and even 20th century. Women, all over the world, had to fight for a decent living and their basic human rights for a life of dignity. It is out of this fight for dignity and their rights that the feminist movement originated in the western world. Although, it originated in the western society, it soon spread all over

06/12/2024
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Lakshmangarh (Distt Sikar) 332311

International Journal of Applied Mathematics
& Statistical Sciences (IJAMSS)
ISSN(P): 2319–3972; ISSN(E): 2319–3980
Vol. 9, Issue 2, Feb–Mar 2020; 31–40
© IASET

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CASE STUDY FOR VINAYAK RESTAURANT QUEUING MODEL

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ABSTRACT

Waiting time and service system is a part of our daily life in various service areas such as: restaurant, ATM, Clinic, Toll tax, Ticket window in cinema, Bus stand and Railway station. Here, our focus is on Restaurant Management System. Every restaurant loses their customers just because of a long queue and maximum waiting time. Restaurant provides more waiting chairs only. We need to be improving the service time which shows improvement in queuing situation. Here, we apply queuing model. This paper aims to shows the multi-channel queuing model M/M/S. We use M/M/S queuing model since this restaurant has 10 service stations. We have obtained one month daily customers data from a restaurant named "Vinayak restaurant" in Laxmangarh, Sikar city. Using little's theorem and the multi-channel waiting line model M/M/S. we have determined the arrival rate λ service rate μ. The utilization rate ρ and the average waiting time in the queue before getting service. At Vinayak restaurant, the arrival rate λ is 1.40 customers per minute (cpm). Customer waiting time is 10 minute and the utilization rate is 0.49. We have discussed the benefits of applying queuing model to a busy restaurant.

KEYWORDS: *Queue, Little's Theorem, Restaurant M/M/S Queuing Model, Waiting Time, Restaurant Data, (A, B, C, D…… X, Y, Zmanner)*

Article History

Received: 06 Feb 2020 | Revised: 27 Feb 2020 | Accepted: 07 Mar 2020

INTRODUCTION

Queuing theory is the mathematical study of the congestion and delays of waiting in line. A waiting line system or queuing system is defined when a person or object spends time in waiting line to complete a transaction or activity. A waiting time can be measured by its two extreme point of service: a low level of service and a high level of service. Queue or waiting lines are familiar event to all, waiting line are not only the lines of human beings but also the aeroplane seeking to land at busy airport, ships to unloaded machine parts to be assemblies, cars waiting in traffic, etc. Queuing theory is concerned with the statistical description of the behaviour of queues with finding.

Queuing theory assesses two keys aspects – customer arrival at the facility and service. This theory is used to model and predict waiting time and the number of customer arrival. This paper uses queuing theory to study the waiting line in Vinayak restaurant at Laxmangarh in Sikar. This is the busiest restaurant in Sikar. It provides 60 tables for 52 customers. There are 10 waiters working at one time. During weekdays (Monday to Thursday) there are over 200

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Synthesis, spectroscopic, and theoretical studies of tin(II) complexes with biologically active Schiff bases derived from amino acids

DOI 10.1515/mgmc-2015-0039
Received October 17, 2015; accepted July 26, 2016; previously published online August 24, 2016

Abstract: New tin(II) complexes of general stoichiometry $[Sn(L)_2]$ with bidentate ligand, derived from amino acids with isatin, 5-chloroisatin have been synthesized. It is characterized by elemental analyses, molar conductance measurements, and molecular weight determinations. Bonding of these complexes is discussed in terms of their UV-visible, infrared, and nuclear magnetic resonance (^1H, ^{13}C, and ^{119}Sn NMR) spectroscopic studies. The ligands act as bidentate towards metal ions, via the azomethine nitrogen and deprotonated oxygen of the respective ligands. The bond length, bond angles, highest occupied molecular orbital, lowest unoccupied molecular orbital, chemical hardness, global softness, and the lowest energy model structure of the complexes have been determined by density functional theory (DFT) calculations at B3LYP/LanL2DZ level. A few representative ligands and their tin complexes have been screened for their antibacterial activities and found to be active in this respect.

Keywords: antibacterial studies; DFT calculations; spectroscopic studies; tin(II) complexes.

Introduction

Schiff bases are an important class of compounds in both the medicinal (Kelley et al., 1995; Singh et al., 2007) and pharmaceutical (Pandeya et al., 1999; Turan-Zitouni et al., 2007; Amanullah et al., 2011) activities. In recent years, there has been a rapidly growing interest in the synthesis of Schiff base and their metal complexes, due to their potential applications in the field of coordination and organometallic chemistry (Ferrari et al., 1999; Tarafder et al., 2002; Cozzi, 2004; Raman et al., 2007; Arulmurugan et al., 2010). Amino acids, which constitute a very important class of biomolecules, can act as potential oxygen and nitrogen donor ligands. It has been found that they utilize their functional groups as fully as possible in metal coordination (Arish and Nair, 2012). Therefore, several metal derivatives of different amino acids have been reported (Singh et al., 2014) and some of these have been found to have significant biological activity. For example, tricyclohexyltin alaninate has been found to be active as a fungicide and bactericide for seeds and plants (Liu et al., 2013). It has also been reported that metal complexes of amino acid Schiff bases with transition metals have anticarcinogenic (Zuo et al., 2013), antimicrobial (Nath and Goyal, 1995), and antitumor (Wang et al., 1999) activities.

In the present studies, ligands are obtained by the condensation reaction between amino acids (alanine, isoleucine, valine, methonine, tryptophan, and histidine) and isatin/chloroisatin with the hope that it may provide us valuable theoretical information for exploring metal-based bacteriostatic and carcinostatic pharmaceuticals with high efficacy and low toxicity. In this effort, we have also introduced an azomethine (>C=N–) linkage with the concern that it may permit a notable variety in the remarkable chemistry and behavior of such compounds. The synthesized amino acid derived compounds $[Sn(L^{1-8})_2]$ have been exposed to act as bidentate towards divalent metal atom solely through the azomethine nitrogen and carboxylate oxygen forming a stable five-membered chelate ring. Unlike tin(IV) compounds which usually prefer regular tetrahedral or bipyramidal geometries depending on the coordination numbers, tin(II) compounds are mostly bent, pyramidal, or distorted. In order to confirm the geometries and the bonding featured by these tin(II) compounds, density functional theory (DFT) calculations are performed.

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Results and discussion

The reactions of tin(II) acetate with these ligands have been carried out in 1:2 molar ratios using anhydrous

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- 10.1515/mgmc-2015-0039
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International Review of Pure and Applied Mathematics
Volume 15 • Number 1 • Jan-June 2019

A STUDY OF MODELING AND SIMULATION OF GRAPH PEBBLING WITH IMPETUS OF INTERDISCIPLINARY EXPLORATION

Jitendra Binwal and Aakanksha Baber***

Abstract: Consider a connected graph G with finite number of vertices and edges whose vertices are assigned with whole numbers represents the number of pebbles on each vertex. Pebbling step and pebbling number of a connected graph G are playing a vital role. In this paper, we discuss and give an overview of mathematical modeling and simulation of graph pebbling on undirected graphs as well as directed graphs with available literature of what arrangement of directed graphs allow for pebbling to be meaningful. We also discuss the pebbling numbers of various orientations of directed graphs such as directed wheel graphs, directed complete graphs, directed demonic graphs etc. In this continuation, we discuss the importance of demonic directed graphs with that the sharp upper bound and lower bound of the pebbling numbers of the directed graphs is the same as that of the undirected graphs. These are the impetus of interdisciplinary exploration in context of mathematical modeling and simulation for certification of graph isomorphism and decyclization of graphs. We also propose the condition for two strongly connected digraphs are having equal pebbling numbers [3, 4].

Keywords: Pebbles, Pebbling Number, Isomorphism, Decyclization.

AMSC 2010: 05C07, 05C12, 05C20, 97K30, 68R10, 81Q30.

1. INTRODUCTION

A graph $G = (V, E)$ is an well-ordered pair of sets, where V is non-empty set of vertices and E is a set of pairs of elements of V. The cardinality of vertex set of a graph is the order [8]. The graph is said to be not directed graph if the elements of E are unordered pairs and not an undirected graph if they are ordered pairs. Consider a graph G, Assign whole numbers to the vertices of G. If the vertex v is related with the integer label m, we say that m pebbles are placed on v. If the sum of all the integers' labels on G is n, we say n pebbles are distributed on G.

1.1. Pebbling Step

A pebbling step is defined as an activity of subtracting two pebbles from the label of a vertex and adding one pebble to the label of an adjacent vertex.

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International J. of Math. Sci. & Engg. Appls. (IJMSEA)
ISSN 0973-9424, Vol. 13 No. I (June, 2019), pp. 1-6

A REVIEW OF ANALYTICAL STUDY OF SOME ASPECTS OF MATHEMATICAL MODELING AND SIMULATION OF PROBABILITY DISTRIBUTIONS WITH IMPETUS OF RANDOM NUMBER GENERATIONS

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Abstract

Mathematical Modeling is all about describing deterministic and probabilistic system. In probabilistic system, the behaviour is determined by random events. Random number generations are vital in mathematical modeling and simulation. The cumulative distribution function of uniform distribution, exponential distributions etc. are playing an important role in mathematical modeling and simulation. In this paper, we will present a review of analytical study of some aspects of mathematical modeling of probability distribution in testing of hypothesis with some examples using simulation with impetus of random number generations and inverse transform techniques.

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Key Words : *Modeling and Simulation, Probability Distribution, Random Numbers.*

2010 AMS Subject Classification : 60 A05, 60 C05, 60 E05, 68 R10.

© http: //www.ascent-journals.com

UGC approved journal (Sl No. 48305)

Journal of Indian Acad. Math.
Vol. 41, No. 1 (2019) pp. 39-45

ISSN: 0970-5120

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and
Aditi [2]

A GENERAL COMPARATIVE STUDY OF SOME ASPECTS OF GRAPH ISOMORPHISM

Abstract: Mathematical modeling and simulation for the graph isomorphism problems is to apply whether two graphs are isomorphic or not isomorphic. Finding a simple and efficient criterion for detection of isomorphism is still actively pursued and is an important unsolved problem in graph theory. In this paper, we will present a review in the form of a general comparative study of some aspects of graph isomorphism [1, 3, and 5]. We will also discuss graph isomorphism problem with impetus of Markovian property [1, 4] using MATLAB.

Keywords: Graph Isomorphism, Mathematical Modeling and Simulation, Markovian Property.

Mathematical Subject Classifications (2010) No.: 60A05, 60C05, 60E05, 68R10, 05C10, 97K30.

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1. Introduction

Two graphs H_1 and H_2 are isomorphism or not can be determined by the many methods. There is some necessary and sufficient condition for graph isomorphism. Necessary condition for two isomorphism- (1) V (H_1) = V (H_2), E (H_1) = E (H_2), Degree sequence of H_1 and H_2 are same (The degree sequence of a graph is the sequence of the degrees of the vertices in ascending order). Sufficient condition is [3, 5]

(1) Adjacency matrix of H_1 and H_2 are same.

(2) All column vector of $P_U^I[x]$ are different in Probability Distribution Matrix.

Biocatalysis and Agricultural Biotechnology 21 (2019) 101342

Contents lists available at ScienceDirect

Biocatalysis and Agricultural Biotechnology

journal homepage: http://www.elsevier.com/locate/bab

Tannin degradation by phytopathogen's tannase: A Plant's defense perspective

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ARTICLE INFO

Keywords:
Tannin
Tannase
Plant defense
Pathogen
Virulence

ABSTRACT

Tannins are plant secondary metabolites and characterized as plant defensive molecules. They impose a barrier against phytopathogens invasion in plants and thus oppose diseases occurrence in them. Tannase is an enzyme known for its ability to degrade plant tannins. Important plant pathogens also possess tannase coding sequence in their genome. Researches on tannase are till date focused on its applications in animal nutrition, in bioremediation and in food industries etc. The information about tannase role with respect to pathogen's virulence is very scanty or almost nil in scientific literature. The presence of tannase in pathogen's genome is an adaptive feature which may be a part of its strategy to overcome the negative effects of plants tannins. The present review summarizes important aspects of tannase and its possible role in disease causing ability of pathogens in plants.

1. Introduction

Tannins are universally present in plants and represent the fourth most abundant group of secondary metabolites after cellulose, hemicellulose and lignins (Chowdhury et al., 2004). These are naturally occurring water soluble polyphenols and found in many parts of plants such as leaves, bark and wood etc. (Haslam, 1989). Besides above, these compounds also widely occur in common foodstuffs such as tea, strawberries, blackberries, grapes, mangoes, cashew nuts, hazelnuts and walnuts etc. (Clifford and Scalbert, 2000). They are unique among their contemporaries as they precipitate proteins, minerals, starch, cellulose etc. from solutions (Aguilar et al., 2001).

Broadly tannins are classified into two major groups; hydrolysable and condensed tannins. Hydrolyzable tannins are esters of gallic acid (gallotannins) and ellagic acid (ellagitannins) with a sugar core (usually glucose) and are readily hydrolysed by the action of either enzymes or acids into their respective monomeric units. Condensed tannins are lacking in sugar core and are composed of flavonoids (flavan 3-ol or flavan 3, 4-diol) units. These are also commonly known as proanthocyanidins. Some researchers classify tannins into four groups named as gallotannins, ellagitannins, complex tannins, and condensed tannins (Khanbabaee and Ree, 2001). In gallotannins, galloyl units are bound to diverse polyols, catechins or tri-terpenoid units. In ellagitanins at least two galloyl units are C–C coupled to each other, and do not contain glycosidically linked catechin units. The ellagitannins are not hydrolysable, but they are nevertheless for historical reasons classified as hydrolyzable tannins (Zhang et al., 2001). In complex tannins, a catechin or epicatechin unit is bound glycosidically to a gallotannin or an ellagitannin unit to yield catechin or epicatechin and gallic acid or ellagic acid upon hydrolysis. The fourth categories of tannins are the condensed tannins. These are oligomeric and polymeric proanthocyanidins formed by linkage of C-4 of one catechin with C-6 or C-8 of other catechin, and are more difficult to be hydrolysed (Hagerman, 1988).

Tannins serve dual functions in plants. They protect plants against insects, pathogens and animal herbivory (Peters and Constabel, 2002; Barbehenn et al., 2005; Kumar et al., 2013). They also attract insects towards flowers and thus are helpful in cross pollination (Winkel–Shirley, 2002; Bovy et al., 2007). On the other hand tannins slow down the process of soil humus formation by inhibiting the activity of various enzymes of the soil microorganisms. This is because of their ability to precipitate pectinase, amylase, lipase, protease, β-galactosidase and cellulase and other macromolecules by virtue of their functional groups (Mueller-Harvey et al., 1987; Scalbert, 1991; Chung et al., 1998). They also reduce food digestibility in animals by precipitating digestive enzymes and thus are classified with anti-nutritive compounds (Makkar et al., 1988). These are also responsible to reduce quality of fruit juices, beer and wine during their low temperature storage owing to precipitation of proteins and carbohydrates present in them (Rout and Banerjee, 2006).

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https://doi.org/10.1016/j.bcab.2019.101342
Received 27 April 2019; Received in revised form 3 September 2019; Accepted 14 September 2019
Available online 14 September 2019
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Biocatalysis and Agricultural Biotechnology 21 (2019) 101306

Contents lists available at ScienceDirect

Biocatalysis and Agricultural Biotechnology

journal homepage: http://www.elsevier.com/locate/bab

Production, purification and characterization of pectin lyase from *Bacillus subtilis* isolated from moong beans leaves (*Vigna radiata*)

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ARTICLE INFO

Keywords:
Pectin lyase
Production optimization
Purification and characterization

ABSTRACT

Pectin lyase (E.C. 4.2.2.10) is the enzyme known to act on highly esterified pectin substances via β-elimination mechanism without producing methanol. It is potentially applied in fruit juice extraction and clarification in food and beverages industry. In pulp and paper industry, its application is explored for bio-bleaching of kraft paper and recycling of wastepaper. It is also in high demand in textile industry for retting of natural fibers and to eliminate pectin present in it. In the present study pectin lyase production was optimized for parameters as concentration of substrate and K_2HPO_4, pH of medium, nitrogen source and time course of pectin lyase production from *Bacillus subtilis*. The enzyme was purified and found to be of 38 kDa in molecular weight. EDTA, Ba^{+2} and Hg^{+2}showed stimulatory effects on the enzyme activity while Zn^{+2}, Mn^{+2} and Fe^{+2} inhibits the enzyme activity. To the best of our knowledge the study describes first time alkalophilic pectin lyase form a bacterium isolated from diseased plants.

1. Introduction

Pectinases are group of enzymes involved in pectin degradation. These are classified according to their mode of action and substrate specificity into two categories: (1) de-esterifying enzymes (Pectin esterase) and (2) De-polymerizing enzymes. Later are divided into two groups: (i) Hydrolyases (Polygalacturonase; 3.2.1.15) and (ii) Lyases (Pectate lyase; 4.2.2.2 and pectin lyase; 4.2.2.10) (Satyanarayana et al., 2013). Amongst these, Pectin lyases are of particular interest as they degrade highly esterified pectin without the prior action of any other pectinase by the β elimination mechanism. Pectin lyase is produced by many fungi (Yadav et al., 2017a; Carrasco et al., 2019), but rarely reported in bacteria (Demir et al., 2014) and Yeast (Alimardani-Theuil et al., 2011).

Pectin caused turbidity and viscosity interferes in fruit juice extraction. Its hydrophobicity causes problem in dyeing process in textile industry. Conventionally pectin removal requires harsh chemicals and use of high temperature in most of the industrial processes. Bioscouring is an ecofriendly approach for removal of non-cellulosic impurities from fibers with pectinolytic enzymes to make fiber more hydrophilic (Garg et al., 2016). Several reports of pectinases from microbial sources besides pectin lyase from bacterial sources are available in literature (Yadav et al., 2009a). Among fungus pectin lyase have been exploited from *Aspergillus flavus* (Yadav et al., 2008), *Aspergillus terricola* (Yadav et al., 2009b), *Penicillium citrinum* (Yadav et al., 2009c), *Aspergillus flavus* MTCC 10938 (Yadav et al., 2013), *Aspergillus niger* (Xu et al., 2015), *Penicillium griseoroseum* (Lima et al., 2017), *Aspergillus brasiliensis* (Pili et al., 2018) and *Fusarium oxysporum* (Yadav et al., 2017b) etc. The purified alkaline pectin lyase of *Fusarium lateritum* MTCC 8794, showed optimum temperature of enzyme was 40 °C and stability up to 50 °C for 30 mins (Yadav et al., 2017a). *Bacillus* sp. DT7 (Kashyap et al., 2000), *Paenibacillus amylolyticus* (Sakiyama et al., 2001) and *Geobacillus stearothermophilus* (Demir et al., 2011) are characterized for pectin lyase production. Kashyap et al. (2000) purified the enzyme from *Bacillus* sp. DT7 and found its molecular weight 106 kDa, optimum temperature and pH of enzyme was 60 °C and 8.0 respectively. In another study an acid stable and thermostable pectin lyase having molecular weight 36 kDa was purified. The enzyme activity was affected by Ca^{+2}, Cu^{+2}, Hg^{+2}, Zn^{+2}, Fe^{+2}, Mg^{+2}, Mn^{+2}, EDTA, L-cysteine and ascorbic acid (Demir et al., 2011). Extracellular pectin lyase of *Bacillus pumilus* (P9) was purified with 36.36-fold purification and 1.736 U/mg specific activity (Nadaroğlu et al., 2010).

Pectin is naturally present in plants as structural element. The possibility of finding potential isolate for pectin degradation is thus likely to be infected plant sources. In view of pectinolytic enzymes applications at high pH the study in present manuscript is aimed to purify and

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https://doi.org/10.1016/j.bcab.2019.101306
Received 13 July 2019; Received in revised form 7 August 2019; Accepted 23 August 2019
Available online 23 August 2019
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06/12/2024
REGISTRAR
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Annals of Agri-Bio Research 25 (1) : 6-10, 2020

Isolation, Screening and Identification of Yeast for Pectinolytic Activity

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(Received : June 16, 2019; Accepted : August 18, 2019)

ABSTRACT

Pectinolytic enzymes break down pectin, an important component of fruit cell wall. Preparations containing pectin-degrading enzymes have been extensively used in the clarification of fruit juices and wines. Currently, they are widely used in industry for retting of natural fibers and extraction of oils from vegetable and citrus peels. There are numerous reports of pectinolytic microorganisms but among them information about yeast which can work at neutral pH is very little. In the present investigation, yeast was isolated and tested for pectinolytic activity by plate assay, pectin lyase assay and polygalacturonase assay. Zone of clearance was observed in plate assay as an indicator of pectin lysis. Effect of carbon sources, nitrogen sources, pH and temperature was analyzed. The organism showed optimum pH and temperature at 7.0 and 40°C, respectively. Maximum activity was observed with 1% pectin, 0.1% glucose and 0.2% peptone. The isolate was identified by 26s rDNA sequencing as *Hyphopichia burtonii*. To the best of our knowledge, this is the first report of isolation of *H. burtonii* from papaya fruit for pectinolytic activity.

Key words : Pectin, pectin lyase, polygalacturonase, optimization

INTRODUCTION

Pectin is a heteropolysaccharide which is present in the middle lamella of plant cell wall. It not only provides mechanical strength to the plants but also acts as barrier for pathogens which invade the plant tissues to cause infection and decay. Pectin is the first complex carbohydrate encountered by the pathogens during their attack. Complete degradation of pectin requires a group of complex enzymatic system, which is collectively known as pectinases. The interactions between pectin and pectin degrading enzymes are complex but specific depending upon the type of substrate present. The enzymes involved are pectin lyase, methyl esterase, hydrolase, etc. (Khan *et al.*, 2013).

Pectin imposes various problems to textile industry, fruits and juice industry, etc. and thus its removal through an ecofriendly approach is high in demand. In textile industry, they do not allow staining of cotton fiber easily with dyes. In beverages, pectin makes the extraction process of fruit juices complex from their sources. The traditional method of pectin removal relies on use of chemicals, high temperature which is discouraged now-a-days due to its environmental impact. Thus, hereby microbial pectinases prove themselves suitable for their applications in various industries like fruit juice extraction and clarification, retting, degumming and scouring of natural fibers, wine processing, extraction of vegetable oil, processing of animal feed, tea and coffee, recycling of waste paper, waste treatment and development of functional food. Pectinases are produced by various microorganisms such as bacteria, actinomycetes, filamentous fungi and yeast (Garg *et al.*, 2016). Yeast has some advantages over filamentous fungi due to their unicellular nature and simple growth requirements. The first description of yeast degrading pectin by their endo-polygalacturonase activity was reported by Luh and Phaff (1951). Da Silva *et al.* (2005) isolated yeast species for pectinase activity. Very few of them were found pectin lyase among them. Pectin lyase is having advantage over hydrolases and pectin esterases as it can break pectin without using water and without producing methanol, respectively. Alkaline pectin lyase activity is preferred for removal of pectin from cotton fiber in conjugation with alkali treatment at industrial scale. Keeping the importance of yeast and its pectin lyase applications to remove pectin from cotton fiber in consideration, the study was planned to isolate, identify yeast and to optimize its growth and nutrient conditions for pectin lyase production.

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Annals of Agri-Bio Research **25** (2) : 284-289, 2020

Nutritional Characteristics of Biscuits Prepared from Flour of Minor Millets and Pods of *Prosopis cineraria* (L.) Druce

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(Received : December 31, 2019; Accepted : February 20, 2020)

ABSTRACT

Composite flours using cereals, minor millets, *Prosopis cineraria* pod flour and dairy ingredients were used for preparing multi-nutrient biscuits. Biscuits were evaluated for proximate properties, *in vitro* digestibility and sensory evaluation and compared against control biscuits (without minor millet flours and *Prosopis* flour) and high-fibre commercial biscuits (EC). Predicted glycemic index was also calculated using first order kinetics in carbohydrate digestibility of biscuit food models. The highest protein digestibility of 67.13% was recorded for test model which was higher than control model. Test model biscuits had significantly (P≤0.05) lower glycemic index calculated compared to control (C). The resistant starch values of test model were significantly (P≤0.05) higher than C and EC, resulting in lower glycemic response. Nutrient content of test biscuits (with minor millet and *Prosopis* flours) were significantly (P≤0.05) higher than C biscuits. Sensory evaluation showed test model biscuits especially had similar acceptability and were equivalent to C models.

Key words : Multi-nutrient biscuits, nutrient content, sensory quality, *in vitro* digestibility

INTRODUCTION

Bakery foodstuffs are admired due to their expediency, unique taste and easy accessibility at practical cost. Among bakery products, biscuits/cookies and crackers are the most accepted and versatile snack foods (Nagi *et al.*, 2012) due to its low cost, varied taste, easy availability and longer shelf life. Refined wheat flour is commonly used for biscuit making owing to its high gluten content but is nutritionally very poor. Thus, there is a need to identify alternative flours which can substitute refined flour partially or completely in bakery products (Agrahar-Murugkar *et al.*, 2015). Wheat (*Triticum aestivum*) and rice (*Oryza sativa*) flours are staple cereals, while finger millet (*Eleusine coracana*) and pearl millet (*Pennisetum glaucum*) flours are from minor millets rich in polyphenols and minerals (Sharma *et al.*, 2016).

Innovations to turn the traditional recipes into super foods are creating new grounds in food science (Ray *et al.*, 2016). *Prosopis cineraria* (L.) Druce is a state tree of Rajasthan. The ripened pods of this tree are known for its nutraceutical properties (Malik *et al.*, 2013; Sharma and Kaur, 2017). In biscuit manufacturing, *Prosopis* flour addition can be innovative effort for improvement in nutritional content of these low-cost baked goodies. Its high sucrose content makes possible to decrease sugar requirements in traditional biscuit recipes (Bigne *et al.*, 2016). At present, no such study was reported on *P. cineraria* (L.) Druce. However, applications have been studied widely on mesquite (*P. pallid* and *P. laevigata*), sister species native from semi-arid region of American continent (Díaz-Batalla *et al.*, 2018).

The rheological behaviour of mesquite-wheat composite flours has been studied (Bigne *et al.*, 2016). Mesquite flour caused the dough resistance to decrease and the dough elasticity to increase (Cruz-Gracida *et al.*, 2019), which, from a practical point of view, resulted in softer but smaller pieces of leavened bread (Bigne *et al.*, 2019). Sweet bread with 5% (w/w) mesquite flour was good in texture and taste. A slightly bitter after taste has been reported in the

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06/12/2021
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Annals of Arid Zone 59(1&2): 21-27, 2020

Quality Evaluation of Syrup Food Models Derived from *Prosopis cineraria* (L.) *Druce* Ripened Pods

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Received: December 2019

Abstract: Khejri (*Prosopis cineraria* (L.) *Druce*) is among the most endemic hardy plant species of semi-arid tropical regions of Thar Desert. Its ripened pods has considerable amount of natural sugars, minerals and importantly high amounts of proteins. The aim of the present work was to evaluate different food models by quality of syrups obtained from khejri pods (*Prosopis cineraria* (L.) *Druce*). The syrups were obtained through concentrated pod extract. Physicochemical parameters (protein content, moisture and specific gravity) were evaluated considering the quality parameters for syrups. The *in vitro* digestibility tests for proteins and starch were conducted and estimated glycemic index were calculated through first order kinetics. *Prosopis* pod syrup food models presented quality parameters statistically different from the control (honey) used in this study for comparison. The values observed for honey match with range reported by other authors for standards from several parts of the world. The syrups presented superior nutritional quality regarding their protein and mineral contents. The *Prosopis* syrup might be considered a good protein and mineral source for human nutrition.

Key words: *Prosopis cineraria*, Syrups, physicochemical properties, *in vitro* digestibility.

Khejri (*Prosopis cineraria* (L.) *Druce*) is among the most adaptable and nitrogen fixing trees in arid regions and traditionally became natural to semi arid tropical regions of Thar Desert (Khandelwal *et al.*, 2015). This tree has been regarded as valuable source of food and fodder. Sweet, fresh pods are commonly used as vegetables in indigenous cuisines (Khatri *et al.*, 2010), and immature pods were consumed raw by children and adults in rural areas (Mann and Saxena, 1980). However, with changing times more exotic and tropical fruits replaced this tradition and the ripened pods of this wonder tree are now almost forgotten. The pods generally get ripened in peak summers and get rotten after falling on ground.

The unripened green pods are used for making curry and pickle. These are consumed as vegetables and is considered as one of the best delicacies in western India. The flour of mature pods is used for cookies preparation and other local dishes. The leaves and dry pods are annually harvested for cattle and sheep feed (Sobhy Amin Afifi and Abu Al-rub, 2019). A resin occurring naturally on the tree, known as *Prosopis* gum, is also occasionally eaten by people and known for its medicinal use in traditional remedies (Siddiqui *et al.*, 2017).

These pods has considerable amounts of natural sugars, minerals and importantly high amounts of proteins (Sobhy Amin Afifi and Abu Al-rub, 2019). The similar pods from different species of same genus are used to make enriched syrups called 'algorrobina' made from *Prosopis pallida* in rural areas of northern Peru (Quispe *et al.*, 2014). The process of making this syrup is carried out on a household level in rural Peru using very simple kitchen equipment, and the "algarrobina" produced is sold in reusable glass bottles. No quality standards exist for this product (Guilherme *et al.*, 2009).

The concentration of fruit juices and plant extracts is a good way of preserving foodstuffs without the need of additives or the use of refrigerated systems. In this work, concentrated khejri pod extracts was processed to obtain syrups with medium sugar content. The quality properties of the final products were evaluated. Syrups rich in proteins and minerals and sugars obtained from plant extracts are suitable for food industry applications. In confectionary industries, plant syrups can be used to replace glucose syrups (caramels, toffees, gums and fudges), which are the most

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08/12/2021

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Poll Res. 38 (August Suppl. Issue) : S77-S80 (2019)
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ISSN 0257–8050

EVALUATION OF ALKALINE PECTIN LYASE OF *PSEUDOMONAS SP.* FOR TEXTILE INDUSTRY EFFLUENT MANAGEMENT

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(Received 26 April, 2019; accepted 19 June, 2019)

ABSTRACT

Pectin is a heteropolysaccharide present in plant cell wall. It provides mechanical strength to the plants and acts as a barrier for plant pathogens. Pectin imposes various problems to textile industries related with finishing and dyeing process. Pectin removal by traditional methods utilizes strong acid and alkali which generates toxic effects on the ecosystem. An alternative way to remove pectin is the use of biological methods which are comparatively safe to the environment. These methods are dependent upon the use of enzymes involved in pectin degradation. In the present study, alkaline pectin lyase of *Pseudomonas sp.* was isolated from diseased leaves of *Cyamopsis tetragonobola*. The enzyme was found suitable for bioscouring of cotton fabric as it resulted in reduction of COD and BOD values of textile effluent. To the best of our knowledge this the first report of *Pseudomonas*'s pectin lyase application towards bioscouring of cotton fiber.

KEY WORDS : Pectin, Pectin lyase, Bioscouring, COD.

INTRODUCTION

Pectinases are one of the most promising enzymes of the today's commercial sector and their importance is increasing day by day. Microbial pectinases share about 25% of the global food enzymes sales. The Pectinolytic enzymes are widely distributed among higher plants, fungi and bacteria (Jayani *et al.*, 2005). Pectinase mainly divided into three sub categories: hydrolases, lyases and esterases. Among all known pectinases, pectin lyase is the emerging enzyme whose industrial applications are yet to be explored. It is the only enzyme that can degrade highly esterified pectin by β- elimination reaction without producing methanol and prior action of any other pectinase (Yadav *et al.*, 2009). Thus, this enzyme is the best suited for degradation of natural fiber (Yadav *et al.*, 2017), plant tissue maceration, fruit juice extraction and waste water treatment (Garg *et al.*, 2016).

Pectin lyase is produced by many fungi (Gummadi *et al.*, 2007), but very less reported in bacteria (Demir *et al.*, 2014) and Yeast (Geralda Da Silva *et al.*, 2005). Cotton fiber is composed of mainly cellulose and traces of pectin, wax, proteins, lignin, hemicellulose and mineral compounds. These elements are present as impurities which impose hydrophobic characteristic to the fiber. To make fiber hydrophilic and suitable for dyeing and finishing, these impurities must be removed (Shanthi and Krishnabai, 2013). Conventional chemical scouring uses strong alkali at high pH and temperature. This process generates large amount of textile effluent having high COD, BOD, total dissolved solids, total suspended solids and reduce dissolved oxygen of waste water along with residues of dyes (Madhav *et al.*, 2018). This highly polluted effluent makes the environment unfit for the living organisms. Therefore, research is going on to look for an alternative to the chemical processes which are ecofriendly and energy efficient. The use of enzyme-based process to above problem was suggested by various researchers (Rocky, 2012; Hebeish *et al.*, 2013; Ibrahim *et al.*, 2019). Microbes or their enzyme based scouring of cotton is known as bioscouring. Bioscouring has an advantage over chemical method as it does not damage the cellulose backbone of fiber occurred in chemical scouring

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A Versatile Pre and Post Ugi Modification for the Synthesis of Natural Product Inspired Fused Peptide-Carboline Scaffolds as Potential Anti-Leishmanial Agents

Dr. Irfan Khan, Dr. Jaybir Singh, Dr. Vivek Kumar, Dr. Ved Prakash Verma, Monika Shukla, Dr. Anupam Dhasmana, Dr. Puspendera Singh Naruka, Prof. Ajay Kumar Goswami, Dr. Keshav Lalit Ameta ✉, Dr. Shahnawaz Khan ✉ ... See fewer authors ^

First published: 13 November 2019 | https://doi.org/10.1002/slct.201902441 | Citations: 1

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26/12/2021
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Abstract

A series of novel β-carboline-peptide (**5 a-5 f**)/ tetrahydro-β-carbolines-peptide (**10 a-10 f**) has been synthesized *via* natural product inspired molecular hybridization approach. All the hybrids were examined for their anti-leishmanial potential. Most of the screened derivatives exhibited significant *in vitro* anti-leishmanial activity against promastigote and intracellular amastigotes (IC_{50} ranging from **2.43 to 7.61** μM) than the control, miltefosine (**IC_{50} = 8.2 μM**), with less cytotoxicity in comparison to the standard drugs (sodium stibogluconate, and miltefosine). Compound **5 a** was also able to inhibit Leishmania donovani TR (LdTR). A molecular modeling study based on docking and subsequent binding free energy evaluation was carry out in the active site of LdTR to understand their possible binding site. Our results show that **prototype 1(5 a-5 f) & 2 (10 a-10 f)** represent a new structural lead for anti shmanial Chemotherapy.

Arabian Journal of Chemistry (2020) 13, 3714–3723

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ORIGINAL ARTICLE

Simultaneous determination of Hg(II) and Cu(II) in water samples using fluorescence quenching sensor of N-doped and N,K co-doped graphene quantum dots

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Received 5 October 2019; accepted 31 December 2019
Available online 8 January 2020

KEYWORDS
Graphene quantum dots;
N doped GQDs;
N,K co-doped GQDs;
Fluorescence quenching sensor;
Copper (II);
Mercury (II)

Abstract The present study was aimed to use of N doped graphene quantum dots (N-GQDs) and N,K co-doped graphene quantum dots (N,K-GQDs) as a fluorescence quenching sensor to determine both mercury and copper in water sample, simultaneously using simple fluorescence protocol. Each of N-GQDs or N,K-GQDs was optimized separately with 1–5% (w/v) HNO_3 or KNO_3, respectively, and their quantum yields were determined and compared. It was found that N-GQDs, obtained from 3% (w/v) HNO_3 doped resulted higher fluorescence intensity at the maximum excitation and emission wavelengths of 370 and 460 nm, respectively, with higher quantum yield (QY = 83.42%) compared with that of undoped GQDs (QY = 16.35%). While N,K-GQDs obtained from 5%(w/v) KNO_3 gave somewhat different fluorescence spectrum, but still had the same maximum excitation and emission wavelengths with rather highest QY (94.07%). However, it is interesting that detection sensitivity expressed as slope of their calibration curve ($y = 5.43x - 19.48$; $r^2 = 0.9971$) of the N-GQDs is rather higher than that ($y = 1.29x + 17.66$; $r^2 = 0.9977$) of the N,K-GQDs for Hg^{2+} fluorescence quenching sensor, and the fluorescence intensity of N-GQDs had better selectively quenching effect only by both Hg^{2+} and Cu^{2+}. Thus, their quenching effects were selected to develop the fluorescence turn-off sensor for trace level of both metal ions in real water samples. For method validation, the N-GQDs exhibited high sensitivity to detect both Hg^{2+} and Cu^{2+} with wide linear ranges of 20–100 μM and 100–500 μM, respectively. Limit of detection (LOD) and limit of quantitation (LOQ) were 0.42 μM & 1.41 μM for Hg^{2+} and 13.19 μM & 43.97 μM for Cu^{2+}, respectively, with their precision expressed as an intra-day and an inter-day analysis of 6.98% & 11.35% for Hg^{2+} and 11.78% & 9.43% for

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https://doi.org/10.1016/j.arabjc.2019.12.014
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06/12/2021
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Chem. Biol. Lett. 2020, 7(1), 55-62 Article

Chemical Biology
LETTERS

Integrated Science

Anti-microbial and anti-tumor studies of newly synthesized 2-(4-morpholinyl)-4,6-diarylpyrimidines using nanosized NiO catalytic framework

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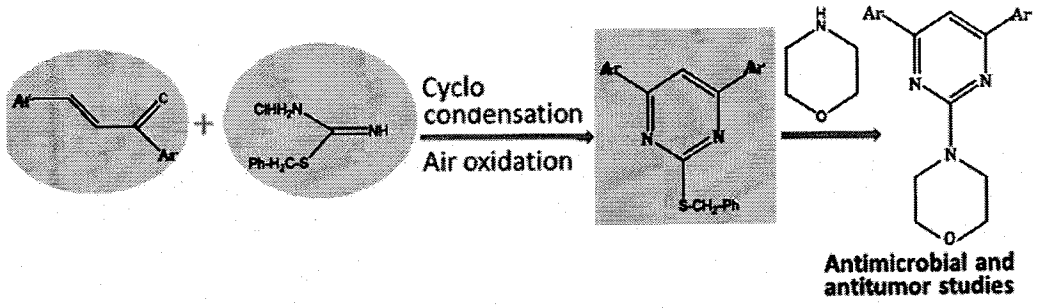
Submitted on: 14-Dec-2019, Accepted on: 14-Feb-2020, Published on: 25-Feb-2020

ABSTRACT



A convenient and cost-effective methodology has been developed for the synthesis of some 2-substituted-4,6- diarylpyrimidines through one-pot conversion of various substituted chalcones, S-benzylthiouronium chloride (SBT) and morpholine using NiO nanoparticles as a reusable and economic catalyst. The deployment of this catalyst empowers the synthesis of variety of 2-(4- morpholinyl)-4,6-diarylpyrimidines in improved yields with easy work-up in a relatively short reaction time. The synthesized compounds have been studied for their potential anti-microbial and anti-tumor activities.

Keywords: NiO nanocatalyst, S-benzylthiouronium chloride (SBT), Pyrimidines, Chalcones, Anti-microbial, Anti-tumor

INTRODUCTION

Catalysis is becoming a strategic field of research since it represents a new pathway to meet the challenges of energy and sustainability. The discovery of nanoparticles with different properties and composition has stretched the limits of technology and allowed the use of nanocatalysis to prepare a variety of catalysts with excellent activity, greater selectivity, and high stability.[1-3] Nowadays, the heterogeneous catalysis especially nanocatalysis is widely used by the organic chemists in research to achieve excellent yield. This is achieved by controlling the shape, size, electronic structure, spatial distribution, surface composition, thermal and chemical stability of the individual nanocomponents. Decrease in the surface area of the catalyst, resulted enormously higher catalytic activity.[4,5] Many other studies are also available in the literature where nickel-based nanoparticles have been used as catalysts during organic transformations.[6,7] Since these nanoparticles are easily recoverable by simple workup that prevents contamination of products, they are considered as cost-effective, promising, safe, and reusable catalysts, compared to traditional ones.

Chalcones are basically α,β- unsaturated carbonyl compounds which are widely used as precursors for the synthesis of different sized bioactive heterocycles of pharmacological importance like antiviral,[8] antimicrobial,[9,10] antimalarial,[11,12] antileishmanial, antioxidant and anticancer.[13]

Over the past few decades, heterocyclic compounds have been considered as a significant synthetic target compounds in medicinal applications. Heterocyclic compounds containing

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Cite as: *Chem. Biol. Lett., 2020, 7(1), 55-62.*
URN:NBN:sciencein.cbl.2020.v7.104

©IS Publications ISSN: 2347–9825 http://pubs.iscience.in/cbl

Chemical Biology Letters

06/12/2021
REGISTRAR
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Changes in Ecophysiology, Osmolytes, and Secondary Metabolites of the Medicinal Plants of *Mentha piperita* and *Catharanthus roseus* Subjected to Drought and Heat Stress

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Received: 15 November 2019; Accepted: 24 December 2019; Published: 27 December 2019

Abstract: Global warming contributes to higher temperatures and reduces rainfall for most areas worldwide. The concurrent incidence of extreme temperature and water shortage lead to temperature stress damage in plants. Seeking to imitate a more natural field situation and to figure out responses of specific stresses with regard to their combination, we investigated physiological, biochemical, and metabolomic variations following drought and heat stress imposition (alone and combined) and recovery, using *Mentha piperita* and *Catharanthus roseus* plants. Plants were exposed to drought and/or heat stress (35 °C) for seven and fourteen days. Plant height and weight (both fresh and dry weight) were significantly decreased by stress, and the effects more pronounced with a combined heat and drought treatment. Drought and/or heat stress triggered the accumulation of osmolytes (proline, sugars, glycine betaine, and sugar alcohols including inositol and mannitol), with maximum accumulation in response to the combined stress. Total phenol, flavonoid, and saponin contents decreased in response to drought and/or heat stress at seven and fourteen days; however, levels of other secondary metabolites, including tannins, terpenoids, and alkaloids, increased under stress in both plants, with maximal accumulation under the combined heat/drought stress. Extracts from leaves of both species significantly inhibited the growth of pathogenic fungi and bacteria, as well as two human cancer cell lines. Drought and heat stress significantly reduced the antimicrobial and anticancer activities of plants. The increased accumulation of secondary metabolites observed in response to drought and/or heat stress suggests that imposition of abiotic stress may be a strategy for increasing the content of the therapeutic secondary metabolites associated with these plants.

Keywords: secondary metabolites; drought; heat stress; *Mentha piperita*; *Catharanthus roseus*

1. Introduction

One of the biggest issues concerning the impact of climate change on human being and natural ecosystems is the reaction of the Earth's hydrologic cycle to global warming [1,2]. As sessile species,

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ISSN 1070-3632, Russian Journal of General Chemistry, 2019, Vol. 89, No. 9, pp. 1760–1764. © Pleiades Publishing, Ltd., 2019.
Russian Text © The Author(s), 2019, published in Zhurnal Obshchei Khimii, 2019, Vol. 89, No. 9, pp. 1356–1352.

Skeletal Diversity in Catalytic Synthesis of (1,3-Oxazacycloalk-3-ylmethyl)-Substituted Pyrroles

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Received April 9, 2019; revised April 9, 2019; accepted April 12, 2019

Abstract—A series of bi- and trinuclear pyrrole derivatives was prepared by the 5 mol % $ZrOCl_2 \cdot 8H_2O$-catalyzed CH-sp^3-aminomethylation reaction of pyrrole with bis(1,3-oxazacycloalk-3-yl)methanes. The reaction proceeds at the positions 2, 5 or 2 of pyrrole depending on the amount of aminomethylating reagents obtained from formaldehyde and α,ω-amino alcohols (2-aminoethan-1-ol, 3-aminopropan-1-ol, 4-aminobutan-1-ol). The aminomethylation reaction of indole with bis(1,3-oxazolidin-3-yl)methane proceeds at the position 3. In the case of carbazole, *N*-aminomethylation proceeds under these conditions.

Keywords: pyrrole, indole, carbazole, amino alcohols, formaldehyde, aminomethylation

DOI: 10.1134/S1070363219090056

Aromatic compounds containing dihydro- and tetrahydro-1,3-oxazole moieties have neurotransmitter properties [1–4]. [3+2] Cyclocondensation of α-functionalized benzyl alcohol with guanidine or [4+1] cyclocondensation with bromine [2–4] is used to form phenyl-substituted 1,3-oxazole rings, for example, in the synthesis of pemoline or aminorex drugs. Fused pyrrolo[1,2-*c*]-oxazol-1-ones and oxazolo[3,4-*a*]indol-1-ones have been obtained by a multistep method [5]. There are no data on the synthesis of 1,3-oxazol-3-yl-, 1,3-oxazinan-3-yl- and 1,3-oxazepan-3-yl substituted pyrroles.

In continuation of studies on the synthesis of new pharmacologically active derivatives of a number of azoles [6], we synthesized di- and trinuclear compounds with pyrrole and tetrahydro-1,3-oxazole rings in the molecules, as well as their six- and seven-membered cyclic homologs—1,3-oxazinanes and 1,3-oxazepanes. Hybrid molecules with pyrrole pharmacophore (indole, carbolines, carbazole) are promising as multi-agent neuroprotective substances [7].

We proposed a new method for the synthesis of tetrahydro-1,3-isoxazolidin-3-yl substituted pyrroles, indoles, and carbazoles based on the aminomethylation reaction in the presence of 5 mol % of $ZrOCl_2 \cdot 8H_2O$ as a catalyst. The choice of the catalyst is due to its activity in the reactions of CH-sp^3-aminomethylation of pyrrole and indole, as well as *N*-aminomethylation of carbazole [8].

The aminomethylating reagent, bis(1,3-oxazolidin-3-yl)methane **1**, was obtained by condensation of 2-aminoethan-1-ol with paraform (Scheme 1) [9]. In this reaction, bicyclo[4.4.1]-1,6-diaza-3,8-dioxaundecane **2** (30–35%) was also formed as a result of intermolecular heterocyclization of two 2-aminoethan-1-ol molecules with 3 moles of formaldehyde [10]. Under the reaction conditions, reactive bis(1,3-oxazolidin-3-yl)methane **1**, apparently, eliminates the oxazolidine molecule with the formation of aminomethylating intermediate **A**.

$ZrOCl_2 \cdot 8H_2O$-catalyzed reaction of pyrrole with bis(1,3-oxazolidin-3-yl)methane **1** in a ratio of 1 : 2 leads to the formation of trinuclear 2,5-bis(1,3-isoxazolidin-3-ylmethyl)-1*H*-pyrrole **3** with a yield of 65%. The reaction selectively takes place at a reagent ratio of 1 : pyrrole = 1 : 1 with the formation of the binuclear derivative, 2-(1,3-isoxazolidin-3-ylmethyl)-1*H*-pyrrole **4**, with a yield of 74% (Scheme 2). Similar reactions with indole and carbazole afforded 3-(1,3-isoxazolidin-3-ylmethyl)-1*H*-indole **5** (87%) and 9-(1,3-isoxazolidin-3-ylmethyl)-9*H*-carbazole **6** (52%), respectively.

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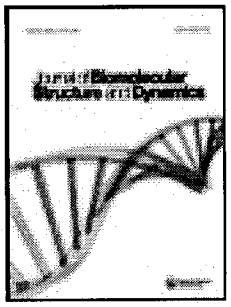

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Journal of Biomolecular Structure and Dynamics

ISSN: 0739-1102 (Print) 1538-0254 (Online) Journal homepage: https://www.tandfonline.com/loi/tbsd20

Identifying novel inhibitor of quorum sensing transcriptional regulator (SdiA) of *Klebsiella pneumoniae* through modelling, docking and molecular dynamics simulation

Mohammad Z. Ahmed, Ghazala Muteeb, Saif Khan, Ali S. Alqahtani, Pallavi Somvanshi, Mohammed S. Alqahtani, Keshav Lalit Ameta & Shafiul Haque

To cite this article: Mohammad Z. Ahmed, Ghazala Muteeb, Saif Khan, Ali S. Alqahtani, Pallavi Somvanshi, Mohammed S. Alqahtani, Keshav Lalit Ameta & Shafiul Haque (2020): Identifying novel inhibitor of quorum sensing transcriptional regulator (SdiA) of *Klebsiella pneumoniae* through modelling, docking and molecular dynamics simulation, Journal of Biomolecular Structure and Dynamics, DOI: 10.1080/07391102.2020.1767209

To link to this article: https://doi.org/10.1080/07391102.2020.1767209

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Accepted author version posted online: 13 May 2020.
Published online: 20 May 2020.

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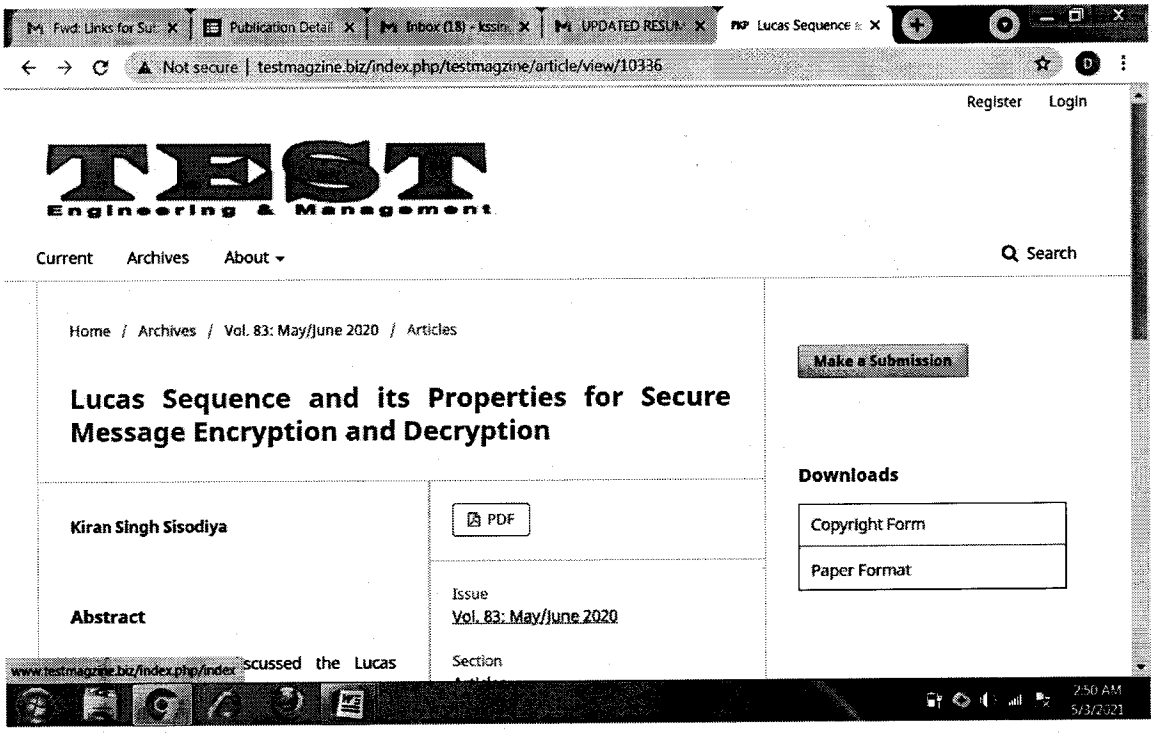

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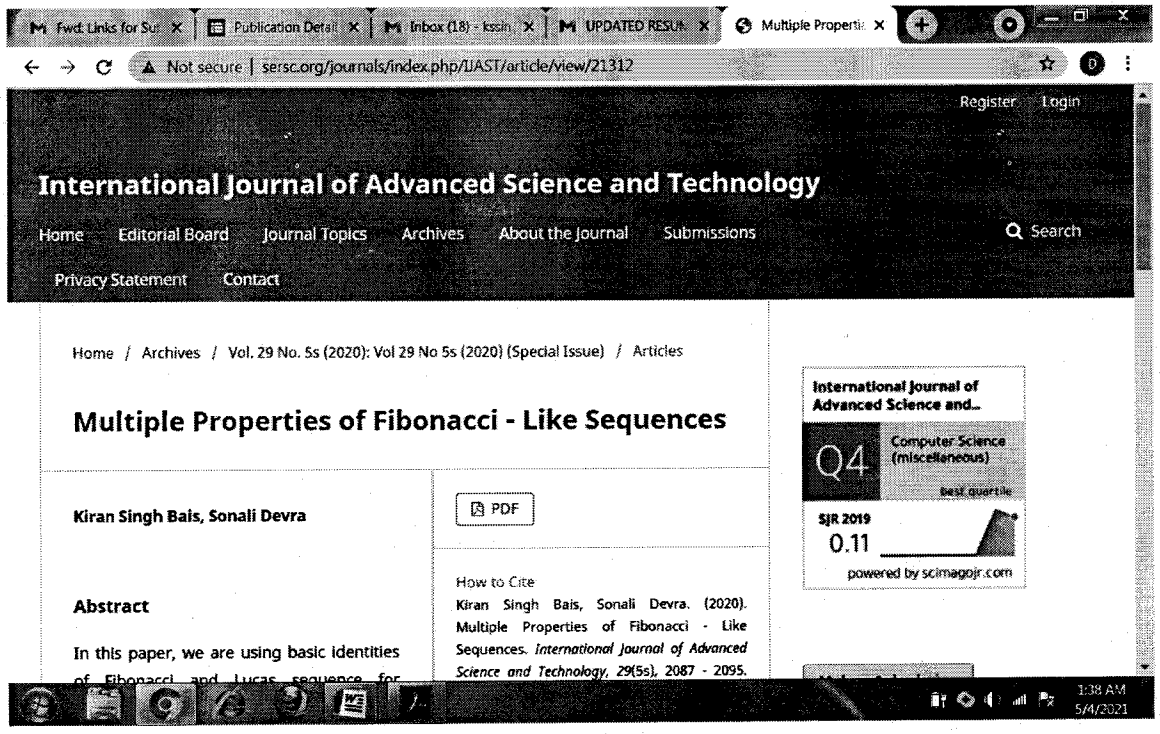

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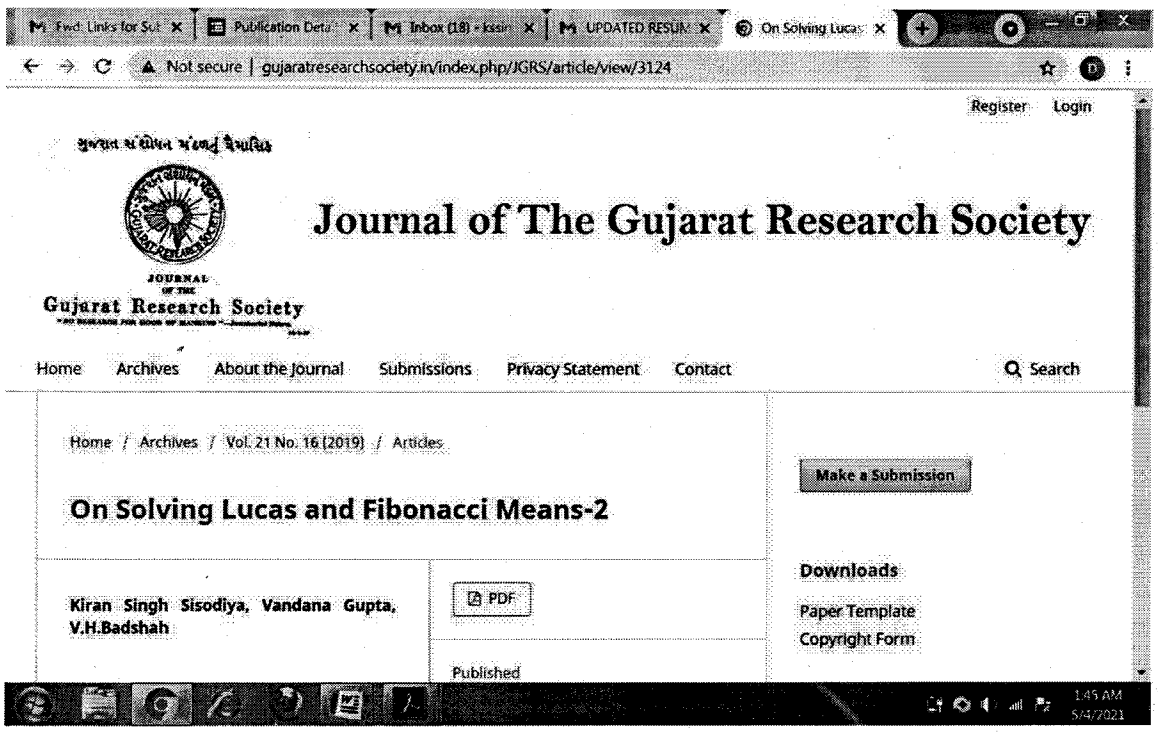

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...Acad. Math.
...No. 1 (2019) pp. 91-98
ISSN-0972-8125

K. P. S. Sisodia

FUZZY STRONGLY QUASI CONTINUITY IN FUZZY BITOPOLOGICAL SPACES

Abstract: In the present paper, the concept of Fuzzy strongly quasi continuity has been introduced which is a generalization of Fuzzy quasi continuity for Fuzzy Bitopological spaces and some of their basic properties are studied. Fuzzy strongly quasi continuity is stronger than Fuzzy quasi continuity in Fuzzy Bitopological spaces.

Keywords: Fuzzy topology, Fuzzy Bitopology, Fuzzy Quasi Open and Closed, Fuzzy Quasi and Strongly Quasi Continuous.

Mathematical Subject Classification (2000) No.: Primary 54A40, 54E55.

1. Introduction

Zadeh [7] introduced the concept of Fuzzy set which formed the back bone of Fuzzy mathematics. In 1968, Chang [2] introduced the concept of Fuzzy Topological space as a generalization of Topological space. Later Kandil [3] introduced the concept of Fuzzy Bitopological space as a generalization of Fuzzy topological space. U. D. Tapi, S. S. Thakur and G. P. S. Rathore [5] and S. N. Maheshwari, G. I. Chai and P. C. Jain [4] introduced the concept of Fuzzy quasi open sets in Fuzzy Topological spaces. Recently U. D. Tapi, S. S. Thakur and G. P. S. Rathore [6] introduced the concept of Fuzzy quasi continuity in Fuzzy Bitopological space.

A Fuzzy set is a pair (X, μ), where X is a set and $\mu : X \to [0, 1]$ is a membership function. For each $x \in X$, $\mu(x)$ is called the degree of membership of x in (X, μ), $\mu(A)$ is the membership function of the Fuzzy set $A = (X, \mu(A))$.

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Kritika[1]
and
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SOLUTION OF LINEAR AND NON-LINEAR ORDINARY DIFFERENTIAL EQUATIONS USING NATURAL DECOMPOSITION METHOD

Abstract: In the present paper, we present a new method called Natural Decomposition Method. By using this method we solve linear and non-linear differential equations and we also study the properties of Natural Transform. This method gives exact solutions in the form of a rapid convergence series. The Natural Decomposition Method (NDM) is an excellent method to solve non-linear differential equations especially initial and boundary value problems.

Keywords: Natural Transform, Sumudu Transform, Laplace Transform, Non-linear Differential Equations.

Mathematical Subject Classification No.: 35Q61, 44A10, 44A15, 44A20, 44A30, 44A35, 81V10.

1. Introduction

Linear and Non-linear differential equations played important role in [illegible] and applied mathematics. There have been many integral transform methods [illegible] [7], [8], [9] and [10] exists in the literature for solving PDEs, ODEs and [illegible] equations. The most used one is the Laplace transform [13]. The most recent [illegible] used to solve ODEs and PDEs are the Sumudu transform [1] and Elzaki [illegible] [5], [6], [7], [8], [9] and [10]. Fethi Belgacem and R. Silambarasan [illegible] N-Transform to solve the Maxwell's equations. Zafar H. Khan and [illegible] [11] used the N-Transform to solve linear differential equations and [illegible] with some properties of the N-Transform of differentials [illegible]

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2020 International Conference on Emerging Trends in Communication, Control and Computing (ICONC3)
Mody University of Science and Technology, Lakshmangarh, Feb 21-22, 2020

Investigation of Power Transfer between Two Asymmetric Proximate Plasmonic Waveguides

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Abstract— **This article presents the investigation of the power transfer between two nearby MIMIM based Plasmonic coupler using the FDTD method simulation. The study includes the effect of EM radiation's wavelength on coupling length as well as asymmetry in waveguide's thickness and the dielectric constant of waveguide's material.**

Keywords— Coupler, Surface Plasmon Polariton

I. INTRODUCTION

The manufacturing of nano-scale optical devices becomes impossible due to the diffraction limit, which could be easily conquered by surface plasmon polaritons (SPP) [1], [2]. The SPPs are the evanescent waves confined at the interface between a metal and dielectric. The Plasmons are the quasi-particle consequential from the quantization of plasma oscillations of the free electron gas density of the metal. When these Plasmons couple with photons, they create another quasi-particle called a Plasmon Polariton. When these Plasmon Polaritons are formed on the interface of metal and dielectric, they are called Surface Plasmons Polaritons (SPPs). These SPPs can propagate along the metal surface. In 1975, Rufus Ritchie [3] had predicted the existence of surface plasmons. The information transmission in nano-devices utilizing surface Plasmons are called Plasmonics [4]. In recent years SPPs have found tremendous space in research because growing range of potential applications, name to few are biological nanosensors [5], sub-wavelength imaging [6], and the integration of electronic circuits with optical devices [7].

Nowadays, SPPs have found valuable space into nano-waveguide active or passive devices, such as Mach-Zehnder interferometers [8], bends and splitters [9], filters [10], and directional couplers [11]. Further, multilayer metallic waveguides have been impressive optical structures as they produce couplers, modulators, and beam splitters in integrated optics, which are based on coupled mode theory [12]. The relocation of energy in a coupled-waveguide-directional-coupler can be represented mathematically by the equations [18],

$$\frac{\partial a_1}{\partial z} = -j\delta a_1 - j\kappa a_2 \qquad (1)$$

$$\frac{\partial a_1}{\partial z} = -j\delta a_1 - j\kappa a_2 \qquad (2)$$

where a_1,a_2,κ and δ are the field amplitude in the first waveguide, the filed amplitude in the second waveguide, the coupling coefficient and the phase mismatch factor, respectively. Hence it has become crucial to investigate Plasmon and Surface Plasmon Polaritons (SPP) in these structures. In this article, we have presented the study on MIMIM (metal-insulator-metal-insulator-metal) based Plasmonic coupler on power transfer dynamics.

II. MODELING AND SIMULATION

This article investigates a five layers MIMIM Plasmonics coupler numerically using the FDTD (finite difference time domain) method [13] for the power transfer dynamics. The coupler structure consists of two parallel grieving's cut out in a metal sheet. Here metal could be Silver 'Ag', Gold 'Au', Copper 'Cu' or Aluminum 'Al' but we have taken silver mostly. These grieving are used to confine electromagnetic (EM) energy and termed as waveguides. These waveguides could be made with air or any other linear transparent materials. The design of the coupler is shown in Fig (1). The length 'L' of waveguides is taken as 600 nm, and the width 'w' of each waveguide is initially set to 50 nm but could be increased or decreased as per requirement. These waveguides are separated by distance of 9 nm from each other. A plane-wave EM source is applied to the top wave-guide and the power spectrum is recorded in both waveguides along coupler length 'L'. The wavelength 'λ' of the EM source has been set in the range from 600 nm to 1600 nm as the structure supports the wave propagation for these wavelengths. Here we have chosen the coupler structure by taking silver metal and air as a waveguide in most of the investigation. In all the figures, dotted (or red) line represents the power amplitude in the waveguide in which the EM radiation is incident, whereas solid (or blue) line represents the second waveguide.

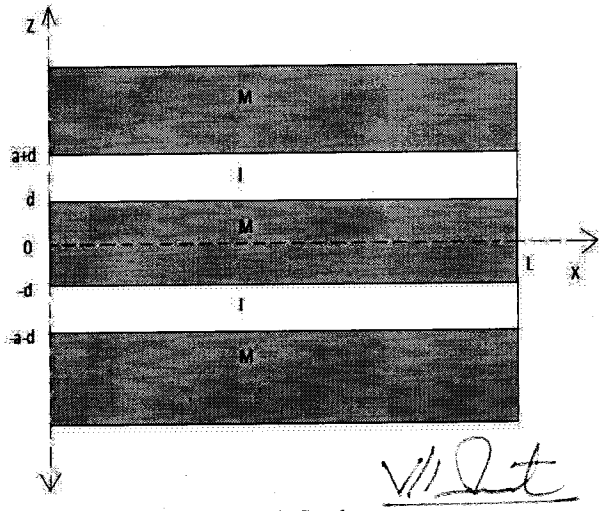

Fig. 1. Structure of MIMIM Plasmonic Coupler

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Numerical simulation of a chain of super-Gaussian beam in a highly nonlocal media

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Abstract: We will demonstrate the propagation dynamics of a chain of super-Gaussian (*SG*) beam in highly nonlocal nonlinear media, which has been modeled by nonlocal nonlinear Schrödinger equation (*NNLSE*) and simulated by split step Fourier method (*SSFM*) for propagation dynamics of SG beams. © 2019 The Author(s)

OCIS codes: 060.2330, 190.4420,190.5940

1. Introduction

The accessible solitons are the spatial solitons in a nonlocal nonlinear medium, which were first proposed by Snyder and Mitchell [1]. The nonlocality of optical material is categorized as local, weakly nonlocal, generally nonlocal, and strongly nonlocal based on the relative length of optical beam width L_w and length of response function L_R [2]. The nonlocality is called weak nonlocal, strong nonlocal and general nonlocal for $L_R << L_w, L_R >> L_w$ and $L_R \approx L_w$ respectively. There are two types of the response function, one is a Gaussian-type [3] and another is an exponential-decay [4]. Investigations on weakly nonlocal spatial solitons [2], generally nonlocal spatial solitons [5], and strongly nonlocal spatial solitons [6] have revealed many phenomena, which are different from local solitons. In highly nonlocal media propagation characteristics of Super-Gaussian beam has been presented [7], however, the propagation characteristics of many soliton beams are still unknown, hence in this short communication, we will simulate two, four and six beams soliton to study interaction dynamics.

2. Mathematical model

The propagation of an optical beam through nonlocal nonlinear medium is modeled by NNLSE of the form

$$i\frac{\partial \psi}{\partial z} + \mu\frac{\partial^2 \psi}{\partial x^2} + \rho\psi\int_{-\infty}^{\infty} R(x-x')I(x',z)dx' = 0 \tag{1}$$

where $\psi(x,z)$ is a slowly varying envelop, $\mu = 1/2k$, $\rho = k\eta$, k is the wave number, η is the material constant, z is the longitudinal propagation distance, $R(x)$ is the nonlocal response function, and $I(x',z)$ is the intensity of the paraxial beam. In present investigation, we consider a quasi-monochromatic partially incoherent beam propagating in isotropic nonlocal kerr media possessing a Gaussian nonlocal response kernel $R(x)$ such that $\int R(x)dx = 1$, where, $R(x) = (1/\sqrt{\pi}\sigma)\exp(-x^2/\sigma^2)$ where σ is the extent of the nonlocality or the length of response function. In strongly nonlocal media, the width of $R(x)$ is much larger than the beam width, hence expansion of response function to the second order by Taylor series gives a linear model of optical beam propagation into highly nonlocal medium, which is suggested by Snyder and Mitchell [1,6],

$$i\frac{\partial \psi}{\partial z} + \mu\frac{\partial^2 \psi}{\partial x^2} + \rho\psi\frac{P_0}{2\sqrt{\pi}\sigma}\left(1-\frac{x^2}{\sigma^2}\right) = 0. \tag{2}$$

The analytical study of Eq. (2) using variational method has been given in reference [7]. Here we are interested in numerical simulation of it using SSFM.

3. Soliton Interaction

The interaction properties of accessible solitons are well known [1,4]. We further investigated the interaction of SG beams in highly nonlocal nonlinear media by taking co-propagating two, four and six beams with initial peak separation of $2d$, which can be written as,

$$\psi(x,z) = \sum_{i=1}^{N}\left[\sqrt{\frac{nP_0}{w_0}\Gamma\left(\frac{1}{2n}\right)}\left(\exp\left(-\frac{1}{2}\left(\frac{x-i*d}{w_0}\right)^{2n}\right)+\exp\left(-\frac{1}{2}\left(\frac{x+i*d}{w_0}\right)^{2n}\right)\right)\right] \tag{3}$$

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Giant Nonlinear AlGaAs-Doped Glass Photonic Crystal Fibers for Efficient Soliton Generation at Femtojoule Energy

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DOI:10.1109/JPHOT.2019.2927492
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Manuscript received May 15, 2019; revised July 1, 2019; accepted July 3, 2019. Date of publication July 9, 2019; date of current version July 30, 2019. This work is funded by Vietnam National Foundation for Science and Technology Development (NAFOSTED) under grant number "103.02-2017.02" and Vietnam Academy of Science and Technology (VAST) under grant number "VAST03.05/18-19". Corresponding authors: Thu Trang Hoang; Quang Minh Ngo (e-mail: tranght@ims.vast.ac.vn; ngo-quang.minh@usth.edu.vn).

Abstract: In this paper, a unique semiconductor-doped glass photonic crystal fiber has been designed, which is suitable for soliton propagation at tento-Joule energy. The fiber promises to yield low and uniform anomalous dispersion profile and very large optical nonlinearities 25 211 $W^{-1}km^{-1}$ at telecommunication wavelength, and, thus, facilitating soliton formation at ultralow energy. The observed magnitude of nonlinearity is the highest reported ever till date in AlGaAs-doped glass. The soliton dynamics has been investigated taking into account of higher order dispersions and nonlinearities. Propagating solitons breadth and experience large frequency shift, this decrease with the increase in the initial pulse width and increase with the increase in pulse energy. Temporal width of solitons oscillates, the frequency and amplitude of oscillations increase with the increase in the value of pulse energy.

Index Terms: Photonic crystal fiber, dispersion, effective optical nonlinearity, soliton generation, dispersive wave.

1. Introduction

Optical solitons in photonic crystal fibers (PCF) open new opportunities, which find applications in telecommunications, sensing technologies, supercontinuum and bio-photonics [1]–[10]. Among notable efforts on this topic, Sharma *et al.* [6], Wadsworth *et al.* [11], Khan *et al.* [12] and Nishizawa *et al.* [13] have investigated soliton propagation in solid core PCFs. On the other hand, Luan *et al.* [10], Ouzounov *et al.* [14] and Saleh *et al.* [15] have investigated soliton propagation in hollow-core photonic band gap fibers. Till date, though most of the investigations on optical soliton

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Current Computer-Aided Drug Design, 2019, *15*, 00-00

RESEARCH ARTICLE

Towards Further Understanding the Structural Requirements of Combretastatin-like Chalcones as Inhibitors of Microtubule Polymerization

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ARTICLE HISTORY

Received: July 18, 2018
Revised: December 05, 2018
Accepted: December 17, 2018

DOI:
10.2174/1573409915666181221114107

Abstract: ***Background*:** Microtubules are dynamic filamentous cytoskeletal structures which play several key roles in cell proliferation and trafficking. They are supposed to contribute in the development of important therapeutic targeting tumor cells. Chalcones are important group of natural compounds abundantly found in fruits & vegetables that are known to possess anticancer activity. We have used QSAR and docking studies to understand the structural requirement of chalcones for understanding the mechanism of microtubule polymerization inhibition.

***Methods*:** Three dimensional (3D) QSAR (CoMFA and CoMSIA), pharmacophore mapping and molecular docking studies were performed for the generation of structure activity relationship of combretastatin-like chalcones through statistical models and contour maps.

***Results*:** Structure activity relationship revealed that substitution of electrostatic, steric and donor groups may enhance the biological activity of compounds as inhibitors of microtubule polymerization. From the docking study, it was clear that compounds bind at the active site of tubulin protein.

***Conclusion*:** The given strategies of modelling could be an encouraging way for designing more potent compounds as well as for the elucidation of protein-ligand interaction.

Keywords: Chalcones, 3D QSAR, docking.

1. INTRODUCTION

Chalcones, or 1, 3-diaryl-2-propen-1-ones, which belong to flavonoid family constitute an important group of natural compounds that are especially abundant in fruits, vegetables, various plants and spices. Chemically they are open-chain in which two aromatic rings are joined by three-carbon α, β-unsaturated carbonyl system (Fig. 1). Chalcones present in the fruits and vegetables possess positive effect in cancer chemoprevention and carcinogenesis [1-6]. Various reports revealed that chalcones inhibit different steps of carcinogenesis from the very early stage to late stages.

In the process of drug discovery and development, Computer-Aided Drug Design (CADD) is a key component as it offers great promise to drastically reduce cost and time requirements. To assist the design of new molecule and explore the ligand-protein interaction mechanism today quantitative structure-activity relationship (QSAR) methods have been successfully employed. The two most widely used 3D QSAR methodologies involve comparative molecular field analysis (CoMFA) and comparative molecular similarity indices analysis (CoMSIA). In CoMFA to calculate the energies of steric and electrostatic interactions between the compound and the probe atom, two functions are introduced *viz.* Lennard-Jones and Coulomb potential. However, in CoMSIA to avoid some inherent deficiencies caused by Lennard-Jones and Coulomb, potential functions Gaussian function is used to calculate the energies of interactions between the compound and the probe atom, and the obtained coefficient contour maps can show how steric fields, electrostatic fields, hydrophobic fields, Hydrogen Bond Donor (HBD) and hydrogen bond acceptor (HBA) influence the activity [7-9].

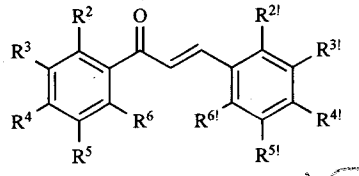

Fig. (1). Structure of chalcone.

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1573-4099/19 $58.00+.00

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Environ. Eng. Res. 2020; 25(4): 561-570
https://doi.org/10.4491/eer.2019.224

pISSN 1226-1025
eISSN 2005-968X

Molecular identification of dye degrading bacterial isolates and FT-IR analysis of degraded products

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ABSTRACT

In the present study, dye decolorizing bacteria were isolated from water and soil samples, collected from textile industries in Jodhpur province, India. Two bacterial species namely, *Bacillus pumilis* and *Pseudomonas stutzeri* were screened and identified based on biochemical characterization. The degradation efficiency of these two microorganisms was compared through optimization at pH, incubation time, initial dye concentration and inoculum size. *B. pumilis* and *P. stutzeri* were able to degrade 61% and 67% Red HE3B, 81% and 79% Orange P2R, 49.7% and 44.2% Yellow MB4GL and 61.6% and 50.9% Blue RC CT dyes at 400mg/l concentration respectively. The optimum pH and time were found to be 8 within 24 hours. The FT-IR analysis confirmed that microorganisms were able to degrade toxic azo dyes into a non-toxic product as proved through structural modifications in analyze chemical functions in materials by detecting the vibrations that characterize chemical bonds. It is based on the absorption of infrared radiation by the microbial product. Therefore, *Bacillus pumilis* and *Pseudomonas stutzeri* are a promising tool for decolorization of dyes due to its potential in effectively decolorize higher azo dye concentrations (10-400 mg/L) and can be exploited for bioremediation.

Keywords: Bioremediation, Characterization, Decolorization, Dyes, FT-IR

1. Introduction

Nowadays industrial pollution is at an alarming stage due to increased anthropogenic activities. Textiles are among the basic needs of the human beings. The expansion of a textile industry contributes directly to the economic growth of any country [1]. Currently, the major anthropogenic source is textile industries. In textile industries, the main environmental concern is colored water, which originated from the dyeing process [2, 3]. Jodhpur and Balotra cities in western Rajasthan are the big clusters of textiles, dyeing and printing industries. Since dyes are formulated to be chemically and photolytically stable, they are highly persistent in natural environments [3-6]. They are chemically diverse in nature and can be divided into classes such as reactive, triphenylmethane, heterocyclic and polymeric dyes [3, 7]. Azo dyes are one of the most widely used dyes and can account for 70% of the total dye production [3, 4]. In the Jodhpur region, textile industries release untreated effluents through drainage channels into the Jojari River. While in Balotra, small scale industries generate a huge quantity of wastewater which passes into the Luni River directly.

Serious concern about textile dyes and intermediate compounds was first raised due to its toxicity and carcinogenicity which can cause damage to the environment [8]. This highlights the need for treating textile dye-containing effluent before discharging it into water bodies [3, 7]. A wide range of biological, chemical and physical methods have been used to treat textile dye effluents [2, 9]. But as these processes are much expensive and generate amine residues containing sludge after degradation, regular consumption of such untreated toxic wastes shows carcinogenesis in humans [3].

As an efficient alternative, biological treatment methods using aerobic or anaerobic microorganisms have received increasing interest owing to their high effectiveness and ecofriendly nature [8, 10]. Bioremediation is the microbial clean up approach, microbes can acclimatize themselves to toxic wastes and new resistant strains develop naturally, which can transform various toxic chemicals to less harmful forms [11]. Microbial processes can substantially contribute to efficient and reliable degradation of actual textile waste water [12]. Use of microorganisms for remediation proposes it thus a possible solution for environmental pollution since it

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Received May 20, 2019 Accepted August 08, 2019

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06/12/2021
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Journal of Experimental Biology and Agricultural Sciences

ISSN No. 2320 – 8694

EFFECT OF TEXTILE WASTEWATER IRRIGATION ON SOIL PROPERTIES IN WESTERN RAJASTHAN

[redacted]*

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Received – August 16, 2019; Revised – October 01, 2019; Accepted – October 04, 2019
Available Online – October 15, 2019

DOI: http://dx.doi.org/10.18006/2019.7(5).491.498

KEYWORDS

Physico-chemical properties

Textile industries

Agriculture

Effluents

Soil

ABSTRACT

The current research is focused on the evaluation of physico-chemical properties of soil. Textile industries of Sedhpur and Balotra areas of Western Rajasthan discharge plenty of pollutants that get mixed up with water bodies. These water bodies are basically the parts of Jojari and Luni Rivers. The soil sites near to the soil pieces or nearby parts of these rivers become polluted due to mixing of industrial effluents coming from textile industries located nearby these rivers. When these wastewater is used for irrigation it adversely affects the soil properties. Thus the analysis of soil becomes an apparent need for best agriculture practices. Results of current study analyses revealed significant variances in the values of the parameters like pH, EC, CEC and OC from the range of standard values set by IS: 2490-1982 for industries. The N (275.8-387 mg/100gk), P (51.3-115.4 kg/ha) and K (378-716 kg/ha) amount was also found very high in soil samples compared with IS values. Hence, it can be concluded that the concentration of effluents affects the soil quality. Therefore, monitoring of physico-chemical properties of soil are required for better crop production.

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Peer review under responsibility of Journal of Experimental Biology and Agricultural Sciences.

Production and Hosting by Horizon Publisher India [HPI]
(http://www.horizonpublishers.in/)
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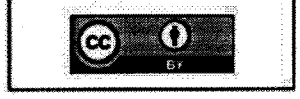

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Comparative physico-chemical analysis of industrial dye effluents at different sites of Rajasthan, India.

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Journal article : Annals of Biology 2020 Vol.36 No.1 pp.38-42 ref.18

Abstract : The disposal of industrial waste is one of the burning issues faced by the world today. The present study reveals the detailed analysis of industrial dye effluent at different sites of Jodhpur and Balotra. The research area focused around Sangariya and Salawas in the Jodhpur and industrial area of Balotra. The industrial waste of industries in these areas was directly discharged into nallah which was then carried to Jojari and Luni rivers, respectively. The various physico-chemical parameters estimated in wastewater samples remarkably differed with the change of location of sites. The results obtained exceeded the maximum permissible limits set by Indian standards devised by W. H. O. The results of the physico-chemical analysis of sample from different locations obtained were in the following ranges pH (> 8.2 <), conductivity (4930- 11900 µS/cm), TDS (2647-7650 mg/l) and total hardness (30-1875 mg/l), sulphate (96-720 mg/l), chloride (1064-4432 mg/l), SAR (13.25-83.98 meq/l) and RSC (0-21.6 meq/l). BOD and COD of the collected effluent samples were determined, which ranged from 400 and 1200 mg/l. A tentative correlation between prevailing water-borne diseases and excessive chloride, sulphate, dissolved solids in the water of Jodhpur district areas were also obtained.

ISSN : 0970-0153
Record Number : 20203226198
Publisher : Agri-Bio-Publishers
Location of publication : Hisar

06/12/2024
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Original Article | Published: 17 May 2020

Identification, genetic diversity and recombination analysis of *Watermelon Mosaic Virus* isolates

Rakesh Kumar Verma, Megha Mishra, Avinash Marwal & R. K. Gaur

3 Biotech **10**, Article number: 257 (2020)

159 Accesses | **2** Citations | Metrics

Abstract

Watermelon mosaic virus (WMV) is an important virus causing adverse effects on cucurbits throughout the world. In this study, we recorded WMV infection in the watermelon (*Citrullus lanatus)*-growing area of Alwar and Sikar in districts of Rajasthan, India. The RT-PCR-based detection was performed to confirm the presence of WMV, by using potyvirus-degenerated coat protein primers. Further, the complete genome sequences of two WMV isolates were compared with previously reported genome sequences. The complete genome of each isolate was 10,030 nt long, excluding the poly-A tails. Phylogeny relationships of the WMV isolates in the present study revealed the presence of uneven evolutionary pressure among the different WMV viral genomic segments. The analysis revealed that all the WMV

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Genome Reports | Published: 16 March 2020

Identification of *Chilli leaf curl virus* and associated betasatellite infecting *Osteospermum fruticosum* in Rajasthan, India

Megha Mishra, Rakesh Kumar Verma & R. K. Gaur ✉

3 Biotech **10**, Article number: 169 (2020)

78 Accesses | **1** Citations | Metrics

Abstract

A monopartite begomovirus associated with betasatellite was identified from *Osteospermum fruticosum* (Cape Daisy) showing severe yellowing vein net symptoms in Rajasthan, India through molecular characterization. The DNA-A shared the highest nucleotide (96.61%) identity to *Chilli leaf curl Ahmedabad virus* (KM880103), while the betasatellite depicted the highest sequence similarity (99.28%) to *Chilli leaf curl betasatellite* (JF706231, 99.28%). Based on the sequence identity with other begomoviruses known to date, they were recognized as *Chilli leaf curl virus* (CDI, MH355641) and *Chilli leaf curl betasatellite* (CDB1, MH355642), respectively. Phylogenetic analysis showed that DNA-A (CD1) clustered with ChiLCV Goa (KP235539), whereas the betasatellite (CDB1) clustered with

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Proc. Natl. Acad. Sci., India, Sect. A Phys. Sci.
https://doi.org/10.1007/s40010-020-00672-2

RESEARCH ARTICLE

Time-Fractional Nonlinear Dispersive Type of the Zakharov–Kuznetsov Equation via HAFSTM

Hradyesh Kumar Mishra[1] · **Rishi Kumar Pandey**[2]

Received: 25 February 2019 / Revised: 8 February 2020 / Accepted: 12 February 2020
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Abstract In this paper, a semi-analytic solution of time-fractional nonlinear dispersive type of the Zakharov–Kuznetsov (ZK) equations is obtained by the means of homotopy analysis fractional Sumudu transform method. Several examples are evaluated and compared with exact solutions to show the effectiveness of arbitrary order of ZK equations. The results demonstrate that the method is highly reliable and convenient to apply and evaluate without restrictions like finite domain, finite discretization or perturbation of small and large physical parameters.

Keywords Caputo derivative · Fractional partial differential equation · Fractional Zakharov–Kuznetsov equations · Homotopy analysis fractional Sumudu transform method

Mathematics Subject Classification 26A33 · 34A08 · 60G22 · 65Gxx

1 Introduction

In the recent years, modeling using the fractional differential operators has played significant role in various fields of science and engineering due to its frequent appearance in several prominent phenomena such as electromagnetic, acoustics, viscoelasticity, electric circuit, biomathematics [1–13]. Therefore, researchers have paid immense interest to evaluate these types of differential equations. Most of the fractional differential equations of linear and nonlinear kinds have exact solutions. Numerical methods and semi-analytic methods are utilized to evaluate the fractional differential equations. Perturbation methods are mostly preferred for linear and nonlinear problems using small and large physical parameters. Physical parameters greatly affect the solutions in small change, which provide non-compatible solutions. The homotopy analysis method (HAM) was developed by Liao [14–16]. Further, many authors successfully applied the homotopy analysis method to evaluate the several linear and nonlinear problems occurring in physics and engineering [17–19]. In the recent years, many authors proposed the semi-analytic methods combined with Sumudu transform method for the solution of linear and nonlinear differential equations, along with the homotopy perturbation Sumudu transform method [20, 21] and Sumudu decomposition method [22, 23].

In this work, we consider the following Zakharov–Kuznetsov(ZK) equations (FZK (n, n, n)) [24–27]

$$U_t^{\alpha}(x,y,t) + a\,(U(x,y,t)^n)_x + b(U(x,y,t)^n)_{xxx} + c(U(x,y,t)^n)_{yyx} = 0, \quad a, b, c > 0;\ n \in \mathbb{Z}^+ \tag{1}$$

where α is arbitrary fractional-order parameters $(0 < \alpha \leq 1)$, a, b, and k are the arbitrary positive constants and n is the positive integers. The weakly nonlinear ion–acoustic waves in plasma comprising cold ions and hot isothermal electrons in the presence of a homogeneous magnetic field have been discussed by ZK equations [24, 25]. Few numerical methods were applied to solve time-fractional ZK

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Published online: 29 February 2020

06/12/2021
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Isadora as a Mother in Erica Jong's Fear of Flyin

Dr. Kiran Shekhawat et. al

Abstract

Fear of Flying is a novel that has changed lives of many people. Even after 44 years of its publication, it is read and appreciated. The novel deals with a significant number of problems related to women in the early1970's and which are still present in the society. One of the issues discussed in Fear of Flying is motherhood which was an imposition on women. This paper will focus on the social obligations of women regarding motherhood prevailing in 1960s. It was the time when women were not at all free but the protagonist of Fear of Flying Isadora Wing rejects to accept this. She wants to establish herself as a writer but her wishes are hindered because of the expectations of her family, society, culture and also her own apprehensions. In order to come out of all these apprehensions, the protagonist goes through an emotional journey in which she has an extra-marital affair and ends up in search of her peace of mind. This paper focuses on how a person in spite of all problems and so many social obligations achieve what one wants to, in this case being a writer.

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Studies in Indian Place Names
(UGC Care Journal)

ISSN: 2394-3114
Vol-40-Issue-60-March -2020

Self-Realization and Transformation of the Female Protagonist Nora in Henrik Ibsen's A Doll's House

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Abstract

Henrik Ibsen (1828-1906), one of the foremost celebrated playwrights and his best play *A Doll's House* (1879) shows the variations between the two genders throughout the late 1800's early 1900's and the way this difference affected people's lives. This play is all about the struggles of woman in establishing her identity in a society which is dominated by males. The play was written in a time when men and women were not considered socially or legally equal. Gender inequality can clearly be seen in the behaviour of the couple (Nora and Torvald Helmer) in the play. Torvald controls everything and everyone at home and he treats Nora as a *child*. He calls her his little *lark, spendthrift, squirrel* and so on. Ibsen acknowledges the actual fact behind such a behaviour, that in the 19th century life, women were limited only to their homes and performed only domestic duties.The target of this paper is to seek, find out and explain the kinds of women's issues that the protagonist faces in order to identify herself and describe the struggles of the protagonist in gaining independence in her life. The paper also shows the significant meanings behind the success of Nora's struggles and tries to bring out the ways through which women build individual forms of knowledge and self-expression, their expedition towards self-liberation in a very male dominated society.

Keywords: Henrik Ibsen, Identity, Women's Struggles, Self-worth, Self-realization.

Henrik Ibsen's *A Doll's House*expresses the theme of the rights of a woman and the rights of an individual person. Women have the lesser place in society than males. They have a position as wife and mother when they get married. They are expected to have children, do household things and nothing else. Furthermore, in salary, education and job, females are discriminated.The financial condition of women also relies on the males or their spouses. Women aren't free and equal; they can't get the jobs they want. The situation of women in the nineteenth century was in very poor shape. The society assumed strongly that "the situation of women was evident, she was always physically and intellectually inferior to man. This hypothesis leads females, politically and socially to become the subordinate class. Women were solely liable as a spouse and mother to their husband, baby and family. As a result, they

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Studies in Indian Place Names
(UGC Care Journal)

ISSN: 2394-3114
Vol-40-Issue-60-March -2020

Relationship between the Self and Society in Ralph Ellison's Invisible Man

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Abstract

The present paper explores the relationship between the Self and Society in Ralph Ellison's *Invisible Man*.The novel begins and ends in a small room, situated somewhere undergroundin a "border area". It is in this underground room that the namelessnarrator (nameless because he is depicted as invisible on the upper surface) organizes his memories, experiences and tries to construct his life.Ellison's basic concern is with Black experience, the life of the Black community, both educated and uneducated, and the relations between Blacks and Whites.The novel is an account of events but more than that and more importantly it is about what the consciousness of the narrator has managed to make of those events and how his consciousness has changed because of them.The major concern is working out the desirable relationships between the self and society and the whole problem of identity.

Keywords: Invisible Man, Self, Society, Relationship. American System, Identity.

The novel, *Invisible Man*begins and ends in a small room, situated somewhere underground in a "border area". It is in this underground room that the unnamed narrator (unnamed because he is depicted as invisible on the uppersurface) organizes his memories, experiences and tries to construct his life. The novel is an account of events but more than that and more importantly it is about what the consciousness of the narrator has managed to make of those events and how his consciousness has changed because of them.

*Invisible Man*examines the challenging relationship of the protagonist to the American system in which the protagonist thinks that life is not as we all take it as fiction or somesuper system, it is different and we encounter it once we come out of the social confinements. Then we realize that life is no superstructure but it is the natural reality created by man himself. The hero thinks he might simply step out of. He thinks that outside all systems and fictions, freedom and reality may be found. He yearns for freedom badly.

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JOURNAL OF CRITICAL REVIEWS

ISSN- 2394-5125 VOL 7, ISSUE 10, 2020

QUEST FOR IDENTITY AND INTELLECTUAL DEVELOPMENT OF THE NAMELESS BLACK PROTAGONIST IN RALPH ELLISON'S INVISIBLE MAN

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ABSTRACT:

This paper discusses the struggles faced by American Negroes trying to establish themselves in the white society at the time of World War II. It also portrays Negro's intellectual enthusiasm and subsequent disillusionment with the communist party and the realization that the world is controlled by white man and the black must follow the accommodation polices of the Founder. This paper also talks about the myth of the Negro sexuality through the hero's experience with women in the Brotherhood and with Sybil. Communism is just a pastime for the whites, while the poor are all very serious about it pinning all their hopes on it for an equal status in society or at least a comfortable future. The paper tracks the journey of the hero, how he claims and knows and acts as a perceiver of infinite possibilities and finally becomes an intellectual rationalist who hates and loves good and bad alike.

KEYWORDS: American Negro, intellectual enthusiasm, disillusionment, communism, equality.

Invisible Man examines the problematic relationship of the protagonist to the American system in which he finds himself and the fictions which surround him. The protagonist of the novel at one point of his personal growth tries to find 'self-fulfillment' in the impractical ideas of communism. In down to earth terms, he tries to realize his ambitious dreams of becoming leader in the society.

> Ellison has stated that in writing *Invisible Man,* he did not identify the Brotherhood with the communist Party. (*Invisible Man as History*, p.359)

Yet several elements in the novel strongly suggest that the Brotherhood does indeed represent the Communist Party. Jack, the leader of the Brotherhood, with his red hair and his habit of breaking into a foreign language when excited, indicates the Russian domination of the Brotherhood.

The third section of the novel is a portrayal of the Negro's intellectual enthusiasm and subsequent disillusionment with the party. Although the protagonist is at first cautious about the Brotherhood, his carefulness soon gives way to great enthusiasm: "For the first time I could glimpse the possibility of being more than a member of a race. It was no dream, the possibility existed. I had only to work and learn and survive in order to go to the top."(*Invisible Man*, p.287). But in this idealistic world too, there is the hierarchy of class and race. The whites dominate this world of "brothers" and the Negro is just a voice, which they use to keep themselves in power, and the blacks in their place. So the nameless hero is again in, his usual "sacrificial merry-go-round. Everywhere I've turned somebody has wanted to sacrifice me for my good only they were the ones who benefited." (*Invisible Man*, p.407). He receives an anonymous letter that informs him that the world is controlled by white man and suggests that he must follow the accommodation polices of the Founder.

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JOURNAL OF CRITICAL REVIEWS

ISSN- 2394-5125 VOL 7, ISSUE 8, 2020

SUBJUGATION OF WOMEN IN VICTORIAN SOCIETY WITH REFERENCE TO THOMAS HARDY'S *THE MAYOR OF CASTERBRIDGE*

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ABSTRACT

Discrimination and biasness in social, political, familial and economic life has been faced by women faced since time immemorial. The struggles for rights and freedom from social norms have been long and enduring ones. Women even in the most progressive societies of the world have experienced low status, exploitation, subjugation, and loss of freedom. Thomas Hardy's *The Mayor of Casterbridge* (1886) brings to light the harsh reality of treatment of women in Victorian society. This aspect of the novel may be illustrated by comparing present-day's conditions of women in the society with how Susan Henchard, Lucetta Templeman, and Elizabeth-Jane Newson are treated in the novel. In *The Mayor of Casterbridge*, Thomas Hardy attempted to make Victorian society more aware of its treatment and attitude towards women. This object can be realized through the chief female characters of the novel, as well as through such minor figures as Mrs. Goodenough (the furmity seller), Mother Cuxsom, Mrs. Stannidge and Nance Mockridge of the Three Mariners Inn. Whether of high or low estate, women are consistently revealed either as insignificant workers or as pawns in male power-games in this late Victorian novel. The condition of women even today in this so called modern and highly advanced world in no better than before and she is still treated like an object/commodity/puppet in the hands of this male dominated and pretentious society.

KEYWORDS: Subjugation, Discrimination, Exploitation, Struggles, Domination.

Thomas Hardy is considered one of the greatest novelists of the latter half of the nineteenth century. He had an important place among the later Victorian novelists. Hardy wrote all types of novels- tragedies, tragi-comedies and comedies. He expressed his own views in his novels. Hardy became as famous for his Wessex Novels as Sir Walter Scott had become famous for his Waverly Novels. He is a great master of characterization. He had the knowledge of human character intensively and extensively. He did not create a vast range of characters. His men and women lead a life reduced to basic elements. It is said that Hardy had only heroines and no heroes in his novels. However, his women were all country born. They were not guided by reason and they even lacked good sense. They were victims of whims and changing moods.

The Mayor of Casterbridge (1886) by Thomas Hardy speaks about the ruthless realities of that age i.e. the Victorian Age. Thomas Hardy was a writer of the age when women were treated as commodities and they suffered a lot. They lived in a patriarchal society where they were deprived of their rights. Women hardly expressed their wishes but deep in their heart they wanted to be recognized in their families and society. Women had to sacrifice their desires to fulfil their responsibilities towards their families. In the novels of Thomas Hardy, we find such women characters that are meek and submissive. They were not even free to choose their life-partners. They were simply puppets in a male dominated society. Victorian society followed double standards for male and female. Thomas Hardy has shown his concern for women subjectivity and this sis illustrated through the women characters-Susan Henchard, Lucetta Templeman and Elizabeth- Jane Newson in the novel.

The Mayor of Casterbridge begins with a dramatic scene that analyses female subjugation in Victorian Age as a result of male dominance. Michael Henchard- the protagonist of the novel sells his wife, Susan in an auction at the fair at Weydon-Priors as he was drunk. Henchard becomes restless till he finds a buyer for his wife for five guineas:

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Available online at **www.joac.info**

ISSN: 2278-1862

Journal of Applicable Chemistry

2019, 8 (4): 1711-1715

(International Peer Reviewed Journal)

Synthesis of *N*-Containing Energy Material Compounds

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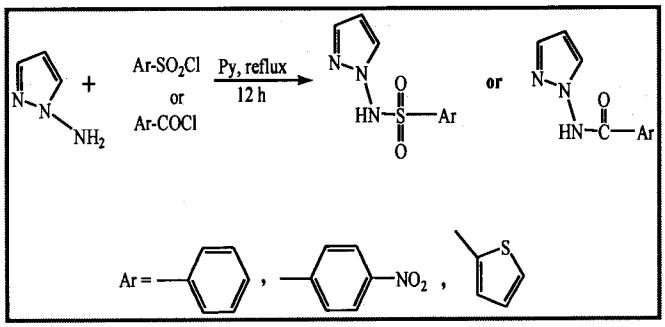
Accepted on 29th June, 2019

ABSTRACT

Pyrazole analogues are found in organic synthesis for designing of pharmaceutical, agrochemicals and high energy performance materials. In this paper, we designed synthesized and characterized thesulfonyl and acyl derivatives of N-aminopyrazole.

Graphical Abstract



Synthesis of sulfonated/acylated amides of 1-aminopyrazole.

Keywords: Pyrazole, Amino pyrazole, Energetic materials, Sulfonated amide.

INTRODUCTION

In last two decades, pyrazole derivatives have had tremendous impact in agrochemicals [**1**], dyes [**2**], pharmaceuticals with numerousranges of biological activities such as antimicrobial [**3**], antibacterial [**4**], antitumor [**5**], antinociceptive [**6**] and anti-inflammatory [**7**].

Due to increased demand of energetic materials in the past era, functionalization of pyrazole with energetic substituted groups has made progress [**8**]. Consequently; this has become a strong research area for the preparation of such materials in terms of excellent explosion properties, remarkably high

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OPEN ACCESS Freely available online

Journal of Nanomedicine & Nanotechnology

Review Article

The Uses of Various Nanoparticles in Organic Synthesis: A Review

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ABSTRACT

Nanoparticles have been widely applied in different areas including, medicine, sensor and catalysis. In our study we have concentrated our work towards the application of the metal nanoparticles in the field of catalysis. Several reports has been found on wide range of application of various supported metal nanoparticles in catalysis including Au, Ag, Pt, Cu, Cd, Ni etc. metals in the form of reduced metals and in compounds forms as heterogeneous catalysis. Nanoparticles have potential for improving the efficiency, selectivity and yield of catalytic processes. Higher selectivity of the nanoparticles towards reaction proceeds through less waste and fewer impurities which could lead to safer technique and reduced environmental impact. In this review we have focused on the developments in new types of green nanocatalysts as well as developments in green catalytic reactions.

Keywords: Nanoparticles; Nanocatalysts; Organic synthesis; Green Nanocatalysts; Green reactions; Nanotechnology.

INTRODUCTION

The last decade has witnessed enormous development in the field of nanoscience and nanotechnology. Several reports show the amazing level of the performance of nanoparticles as catalysts in terms of selectivity, reactivity and improved yields of products. In addition, the high surface-to-volume ratio of nanoparticles provides a larger number of active sites per unit area, in comparison with their heterogeneous counter sites [1,2]. In this review, we focus on green nanocatalysts as well as industrially important green reactions. This article has two parts. The first part involves green nanocatalysts and the second part involves green reactions.

SYNTHESIS OF VARIOUS NANOPARTICLES

Various nanoparticles are shown in Figure 1 and Schemes 1-53 in Tables 1-15.

Calcium oxide nanoparticles

Among various nanoparticles, calcium oxide nanoparticles have

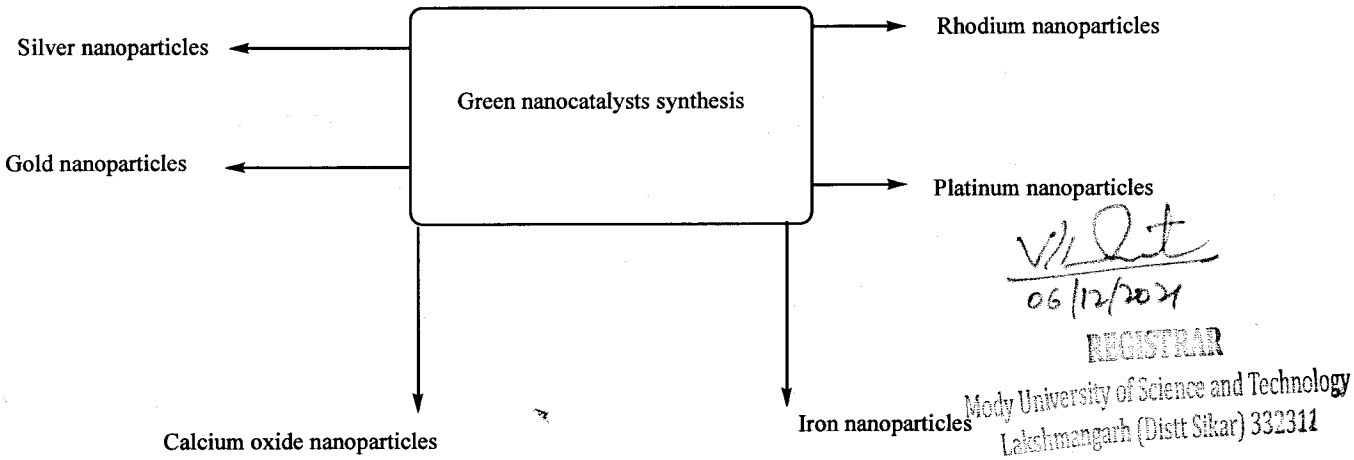

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Figure 1: Various Green Nanocatalysts.

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Received: February 10, 2020; Accepted: April 17, 2020; Published: April 24, 2020

Citation: Khaturia S, Chahar M, Sachdeva H, Sangeeta, Mahto CB (2020) The Uses of Various Nanoparticles in Organic Synthesis: A Review. J Nanomed Nanotech. 10:543. doi: 10.35248/2157-7439.20.10.543

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International Journal of Clinical and Diagnostic Pathology

A comparative study on variations in bloodstain patterns due to change in surface angles-using blood from four common animal species

Mayank Kumar Dubey, Dr. Krishna Kumar Patel and Dr. Ruchi Sharma

DOI: https://doi.org/10.33545/pathol.2019.v2i2c.101

Abstract

In crime scene investigations, particularly in cases of homicide, the pattern or the shape of bloodstains at the crime scene is of crucial importance. Bloodstain pattern defines the facts surrounding some Incident that is in question. The shape and size of the bloodstain pattern is helpful in ascertaining the area of convergence, point of origin, the direction of the blood droplet at the time of impact, the angle of impact, the nature of force involved, direction from which force was applied, the nature of the object used and the relative positions of the suspect, victim and other related objects during the crime. When the examination of bloodstains is done efficiently and correctly and if all aspects of the bloodstains, such as the shape, location and size of bloodstain can give important details about the circumstances of the crime. Keeping the importance of physical properties of blood in mind the present study was carried out with the aim to study the effect of various variations on the pattern formed by the blood of four commonly found animal species viz. Goat (*Capra aegagrus hircus*), Dog (*Canis lupus familiaris*), Rat (*Rattus rattus*) and chicken (*Gallus gallus*) and also to compare the bloodstain pattern of four common animal species when blood is allowed to fall from a height at various surface angles are demonstrated.

Keywords: Bloodstain pattern, impact, point of origin, area of convergence, angle of impact

1. Introduction

Blood is one of the most significant and frequently encountered physical evidence encountered in connection with forensic investigations of death and violent crimes. The circumstances and nature of violent crimes frequently produce a variety of blood stain patterns that when carefully studied and evaluated with respect to their geometry and distribution may provide information of considerable value to assist the investigator in the reconstruction of the crime scene (James, 1999). Blood can be characterized as a fluid tissue composed of plasma and formed elements. The plasma makes up 55% of blood and formed elements make up 45%. Plasma consists of 91% water, 8% protein, 1% organic acids and salts. The formed elements comprise erythrocytes (RBCs), leukocytes (WBCs) and thrombocytes (Bevel and Gardner, 2000). When force is applied to blood, it responds in a predictable response to the force. The distribution of blood by external force is termed as bloodstain spatter. The formation of spatter may provide important information regarding the manner of contact and dispersion of blood (Bevel, [illegible]). Significant differences are seen in size and distribution of blood droplets on the basis of angle of impact. The blood released with different velocities and at different angles of impact can be used to determine the point of convergence of the blood droplets. [illegible] is a common point in which all the individual bloodstains can be traced back when measured along [illegible] point of that surface [illegible] travel. For example [illegible]

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International Journal of Clinical and Diagnostic Pathology

A comparative study on variation in bloodstain patterns due to change in surface-using blood from four common animal species

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DOI: https://doi.org/10.33545/pathol.2019.v2.i2c.102

Abstract
Bloodstain pattern analysis is the collection, categorization and interpretation of the shape and distribution of bloodstains associated with heinous crimes involving bloodshed such as homicide and suicide. The interpretation of the information is aimed at supporting inferences relating to actions that took place during an event involving blood and corroborating witness statements, and identifying the participants. Bloodstain pattern analysis involves the application of scientific techniques to reconstruct events that resulted in a bloodstain pattern. Blood spatter patterns at the scene of a crime can indicate how the crime occurred. The shape of spots of blood can provide information which is helpful in reconstruction of sequence of events in the present study bloods of four common animal species human (*Homo sapiens sapiens*), buffalo (*Bubalus bubalis*), goat (*Capra hircus*) and chicken (*Gallus gallus*) was allowed to fall from various height of 1 feet on different surfaces. Twelve surface were chosen for the present study, including white chart paper, cotton cloth, polished shoe, skin, thermocol, plastic sheet, wood, leaves, iron sheet, tiles, glass and cement. Interspecies variation in shape and pattern of bloodstain pattern was observed.

Keywords: Interspecies variation, blood pattern, bloodstain pattern, [illegible]

1. Introduction

With any crime involving bloodshed there is potentially a [illegible] both whom such stains could have come from and much attention could have been [illegible]. Bloodstain pattern analysis involves the examination of [illegible] bloodstains at scenes involving bloodshed. A bloodstain pattern is a physical [illegible] image created when blood leaves the body and strikes a surface. The following [illegible] patterns can essentially be distinguished: dripped and spurted blood, projected blood, impact patterns, cast-off stains, expirated and transferred bloodstains.

Blood is a liquid and has all the properties of a fluid. Because of surface tension the blood [illegible] droplet assumes a spherical [illegible] droplet from rupture and it [illegible] play their part in how blood [illegible] million red blood cells [illegible] removed from the blood [illegible] When subjected to external [illegible] constituents and it behaves [illegible] Depending upon the gravity [illegible] three groups.

a. Low velocity impact [illegible]
free falling drops of blood [illegible]
b. Medium velocity impact [illegible]

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Annals of Arid Zone 59(1&2): 21-27, 2020

Quality Evaluation of Syrup Food Models Derived from *Prosopis cineraria* (L.) *Druce* Ripened Pods

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Received: December 2019

Abstract: Khejri (*Prosopis cineraria* (L.) *Druce*) is among the most endemic hardy plant species of semi-arid tropical regions of Thar Desert. Its ripened pods has considerable amount of natural sugars, minerals and importantly high amounts of proteins. The aim of the present work was to evaluate different food models by quality of syrups obtained from khejri pods (*Prosopis cineraria* (L.) *Druce*). The syrups were obtained through concentrated pod extract. Physicochemical parameters (protein content, moisture and specific gravity) were evaluated considering the quality parameters for syrups. The *in-vitro* digestibility tests for proteins and starch were conducted and estimated glycemic index were calculated through first order kinetics. *Prosopis* pod syrup food models presented quality parameters statistically different from the control (honey) used in this study for comparison. The values observed for honey match with range reported by other authors for food standards from several parts of the world. The syrups presented superior nutritional quality regarding their protein and mineral contents. The *Prosopis* syrup might be considered a good protein and mineral source for human nutrition.

Key words: *Prosopis cineraria,* Syrups, physicochemical properties, *in vitro* digestibility.

Khejri (*Prosopis cineraria* (L.) *Druce*) is among the most adaptable and nitrogen fixing trees in arid regions and traditionally became natural to semi arid tropical regions of Thar Desert (Khandelwal *et al.*, 2015). This tree has been regarded as valuable source of food and fodder. Sweet, fresh pods are commonly used as vegetables in indigenous cuisines (Khatri *et al.*, 2010) and immature pods were consumed raw by children and adults in rural areas (Mann and Saxena, 1980). However, with changing times more exotic and tropical fruits replaced this tradition and the ripened pods of this wonder tree are now almost forgotten. The pods generally get ripened in peak summers and get rotten after falling on ground.

The unripened green pods are used for making curry and pickle. These are consumed as vegetables and is considered as one of the best delicacies in western India. The flour of mature pods is used for cookies preparation and other local dishes. The leaves and dry pods are annually harvested for cattle and sheep feed (Sobhy Amin Afifi and Abu Al-rub, 2019). A resin occurring naturally on the tree, known as *Prosopis* gum, is also occasionally eaten by people and known for its medicinal use in traditional remedies (Siddiqui *et al.*, 2017).

These pods has considerable amounts of natural sugars, minerals and importantly high amounts of proteins (Sobhy Amin Afifi and Abu Al-rub, 2019). The similar pods from different species of same genus are used to make enriched syrups called 'algorrobina' made from *Prosopis pallida* in rural areas of northern Peru (Quispe *et al.*, 2014). The process of making this syrup is carried out on a household level in rural Peru using very simple kitchen equipment and the "algarrobina" produced is sold in reusable glass bottles (Guilherme *et al.*, 2009).

A good way for preserving fruit juices and plant extract is by concentration. It is a method of preserving foodstuff without the need of additives or the use of refrigerated systems. In this work, concentrated khejri pod extracts was processed to obtain syrups with medium sugar content. The quality properties of the final products were evaluated. Syrups rich in proteins and minerals and sugars obtained from plant extracts are suitable for food industry applications. In confectionary industries, plant syrups can be used to replace glucose syrups (caramels, toffees, gums and fudges), which are the most common syrups used in the

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Annals of Agri-Bio Research **25** (2) : 284-289, 2020

Nutritional Characteristics of Biscuits Prepared from Flour of Minor Millets and Pods of *Prosopis cineraria* (L.) Druce

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(Received : December 31, 2019; Accepted : February 20, 2020)

ABSTRACT

Composite flours using cereals, minor millets, *Prosopis cineraria* pod flour and dairy ingredients were used for preparing multi-nutrient biscuits. Biscuits were evaluated for proximate properties, *in vitro* digestibility and sensory evaluation and compared against control biscuits (without minor millet flours and *Prosopis* flour) and high-fibre commercial biscuits (EC). Predicted glycemic index was also calculated using first order kinetics in carbohydrate digestibility of biscuit food models. The highest protein digestibility of 67.13% was recorded for test model which was higher than control model. Test model biscuits had significantly (P≤0.05) lower glycemic index calculated compared to control (C). The resistant starch values of test model were significantly (P≤0.05) higher than C and EC, resulting in lower glycemic response. Nutrient content of test biscuits (with minor millet and *Prosopis* flours) were significantly (P≤0.05) higher than C biscuits. Sensory evaluation showed test model biscuits especially had similar acceptability and were equivalent to C models.

Key words : Multi-nutrient biscuits, nutrient content, sensory quality, *in vitro* digestibility

INTRODUCTION

Bakery foodstuffs are admired due to their expediency, unique taste and easy accessibility at practical cost. Among bakery products, biscuits/cookies and crackers are the most accepted and versatile snack foods (Nagi *et al.*, 2012) due to its low cost, varied taste, easy availability and longer shelf life. Refined wheat flour is commonly used for biscuit making owing to its high gluten content but is nutritionally very poor. Thus, there is a need to identify alternative flours which can substitute refined flour partially or completely in bakery products (Agrahar-Murugkar *et al.*, 2015). Wheat (*Triticum aestivum*) and rice (*Oryza sativa*) flours are staple cereals, while finger millet (*Eleusine coracana*) and pearl millet (*Pennisetum glaucum*) flours are from minor millets rich in polyphenols and minerals (Sharma *et al.*, 2016).

Innovations to turn the traditional recipes into super foods are creating new grounds in food science (Ray *et al.*, 2016). *Prosopis cineraria* (L.) Druce is a state tree of Rajasthan. The ripened pods of this tree are known for its nutraceutical properties (Malik *et al.*, 2013; Sharma and Kaur, 2017). In biscuit manufacturing, *Prosopis* flour addition can be innovative effort for improvement in nutritional content of these low-cost baked goodies. Its high sucrose content makes possible to decrease sugar requirements in traditional biscuit recipes (Bigne *et al.*, 2016). At present, no such study was reported on *P. cineraria* (L.) Druce. However, applications have been studied widely on mesquite (*P. pallid* and *P. laevigata*), sister species native from semi-arid region of American continent (Diaz-Batalla *et al.*, 2018).

The rheological behaviour of mesquite-wheat composite flours has been studied (Bigne *et al.*, 2016). Mesquite flour caused the dough resistance to decrease and the dough elasticity to increase (Cruz-Gracida *et al.*, 2019), which, from a practical point of view, resulted in softer but smaller pieces of leavened bread (Bigne *et al.*, 2019). Sweet bread with 5% (w/w) mesquite flour was good in texture and taste. A slightly bitter after taste has been reported in the

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06/12/2024
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International Journal of Applied Mathematics
& Statistical Sciences (IJAMSS)
ISSN (P): 2319-3972; ISSN (E): 2319-3980
Vol. 8, Issue 3, Apr - May 2019; 1-8
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STUDY OF AN ECONOMIC ORDER QUANTITY MODEL UNDER LINEAR DEMAND, CONSTANT DETERIORATION AND SHORTAGES ARE PERMITTED

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ABSTRACT

Economic Order Quantity (EOQ) model is developed to minimize the total Inventory cost. In this paper, an Economic Order Quantity (EOQ) model is developed for deteriorating items with linear demand pattern and constant deterioration rate. We permit shortages. The aim of this model is to check the convexity of the graph between total inventory cost and time and to calculate the sensitivity analysis of the optimal solution.

KEYWORDS: *Deterioration, Constant Deterioration Rate, Economic Order Quantity (EOQ), Demand, Linear Demand*

Article History

Received: 23 Apr 2019 | Revised: 30 Apr 2019 | Accepted: 10 May 2019

INTRODUCTION

Inventory is stocks of consuming goods. It is of two types

- Direct inventory – The items which play a direct role in the manufacturing and is the main part of complete goods is added indirect inventory.
- Indirect inventory – Materials which are necessary for the manufacturing of items but not a part of complete goods are included in the indirect inventory.

In many departmental stores, the manager has to maintain the stock which depends on many factors like time of order, demand, lead time, etc. So, they deal with problems like under-stocking and over-stocking. Inventory should be maintained for the smooth and efficient running of any business firms so that they can provide best services to customers immediately or at a short time span. In inventory, EOQ is the order quantity which maintains minimum total inventory cost. It involves costs like holding cost, shortage cost, deterioration cost and etc. This is known as the EOQ model because it gives the most economic size of the order to place. Witn in begun research on inventory and gave a theory about the deterioration of fashion items after a certain time of storage. Later, Ghare and Schrader started their study for the consumption of deteriorating items which was close to the negative exponential function of time. With the help of linear differential equation, they stated deterioration of inventory which included inventory level and demand rate as a function of time. Shah and Jaiswal considered the demand to be a function of time and presented an ordered level inventory model for deteriorating items. Their

06/12/2019
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International Journal of Mathematics and
Computer Applications Research (IJMCAR)
ISSN (P): 2249-6955; ISSN (E): 2249-8060
Vol. 9, Issue 1, Jun 2019, 37-44
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AN INVENTORY MODEL FOR TIME DEPENDENT DETERIORATE RATE AND VARIABLE HOLDING COST

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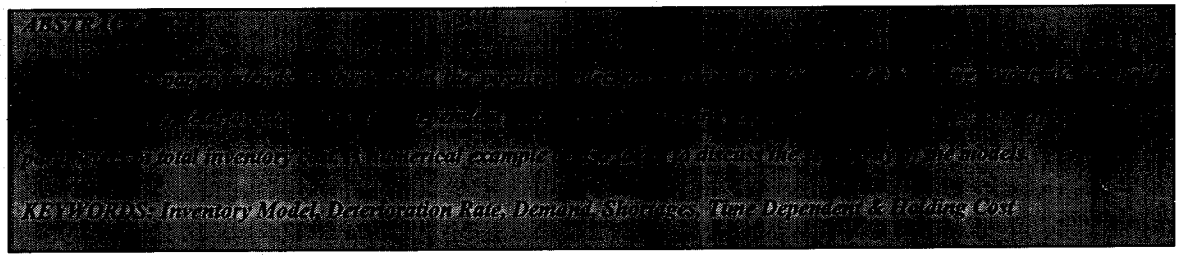

Received: Jan 28, 2019; **Accepted:** Feb 18, 2019; **Published:** Mar 01, 2019; **Paper Id.:** IJMCARJUN20196

1. INTRODUCTION

Inventory is described as stock of goods. It also described as the process to raise the business. It comprises all the features like storage of goods/products, controls the number of products in stock. Inventory is ideal for run the business successfully and effectively. If inventory not applicable, it may harm the business. It comprises various divergent conditions into models. This condition may comprises the deterministic demand, change in demand with time, deterioration etc.

In inventory models, deterioration may be taken as degeneracies loss of resources. The fact of controlling and maintaining inventory of deteriorating items become a challenging for decision making.

Demand plays very important role in inventory. In the classical inventory model the demand rate was assumed to be constant but it is not always possible. For example seasonal fruits, vegetables, other items etc.

Inventory models can be divided into two kinds of models. First is deterministic and another one is stochastic model. In deterministic model, demand for a time period is known. In stochastic model, the demand is a random variable having known probability distribution.

By using the deterioration of resources, Inventory for deteriorating goods was first studied by Whitin in 1952. Emmons's (1968), Azoury and Miller (1984), Azoury (1985) expanded the approach. In the present paper, we consider the model of Covert and Philip (1973) and extend it to include a time-quadratic demand rate, shortages in inventory and time dependent holding cost. Demand changing with time was expanded by Dave and Patel S.K. Ghosh and K.S. Chaudhary had considered quadratic demand in their inventory model. An inventory model of deteriorating items was developed by Hariya (1995) for time varying demand with shortages. Chang and Dye (1999) developed an inventory model with time varying demand. Uttam Kumar Khedelkar and Diwahar Shukla

06/12/2021
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Original Article

RJC

RASĀYAN *J. Chem.*
Vol. 13 | No. 3 |1959-1963| July - September | 2020
ISSN: 0974-1496 | e-ISSN: 0976-0083 | CODEN: RJCABP
http://www.rasayanjournal.com
http://www.rasayanjournal.co.in

SYNTHESIS OF NOVEL SUBSTITUTED PYRAZOLES AND ISOXAZOLES CONTAINING 1, 4-BENZODIOXANE SULFONYL MOIETY

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ABSTRACT

Synthesis of substituted pyrazole (2a-e) and substituted isoxazole (3a-e) by the reaction of (1a-e) with hydrazine hydrate in absolute C_2H_5OH/Hydroxylamine hydrochloride in pyridine. The elemental analysis and spectral studies. IR, ^1H NMR, and ^{13}C NMR were performed for various pyrazole derivatives (2a-e) and isoxazole derivative (3a-e).

Keywords: β-diketone, β-ketoester, Hydrazine hydrate, Hydroxylamine, Sulfonyl Group, Spectral Studies.

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INTRODUCTION

Heterocycles and its derivatives have immense importance in pharmaceutical sciences and other industrial utilization. Unquestionably, these deeds are representing a significant role in the development of human society. The chemistry of condensed heterocyclic compounds, especially those containing isoxazole and pyrazole moieties have received much attention and reported to have significant pharmacological properties.[1-4] Pyrazoles contain two nitrogen atoms at ortho position with maximum unsaturation whereas isoxazoles have the five-membered heterocycles having one oxygen and one nitrogen at ortho position with maximum unsaturation.The pyrazole and isoxazole core are greatly referred to as its medicinal importance, and numerous related compounds are known with show antibacterial[5,6], antiviral[7,8], antifungal[9], antiinflammatory[10,11], and antitumor[12,13] properties.

Synthesize compounds also contain 1, 4-benzodioxane moiety which exhibits various biological activity such as antimicrobial and antioxidant activity[14], anti-inflammatory[15], α-2-adrenoreceptor antagonists and potential antidepressants[16], α_{1D}-adrenoreceptor antagonists and cytotoxic agents[17]. Apart from this accumulating compound additionally contain sulfonyl group which has been a focal point of interest for a long time due to their diversified biological function in the drug industry.[18, 19]

The packaged drugs of isoxazole such as *Acetyl Sulfisoxazole, Cycloserine, Sulfisoxazole, Zonisamide* and pyrazole such as *Novalgin, Isofezolac, Ampyrone* have great medicinal utilities, Prompted those search for newer bioactive compounds with containing 1, 4-benzodioxane sulfonyl moiety as one of the group.

EXPERIMENTAL

The melting points of the compounds were determined by the capillary tube method and may not found to be fully corrected. IR Spectra of the compounds were also recorded on Nicolet-Megna FT-IR 550 spectrometer by using KBr Pellets. The ^1H NMR and ^{13}C NMR spectra were operated on the BRUKER AVANCE II 400 NMR Spectrometer at 400.13 and 100.61 MHz, respectively with $CDCl_3$. The micro estimations of the analytical samples were carried out using Perkin Elmer CHNS/O Analyser 2400. Impurities in the synthesized compounds were segregated by TLC using suitable solvents systems.

Preparation of Substituted Pyrazoles (2a-e)[20-21]

In a dry flask placed a mixture of β-diketone/β-ketoester[22-23] (1a-e) (0.01M), silica gel (0.5gm) and hydrazine hydrate (0.48g., 0.01M) and refluxed it in C_2H_5OH (5-10 ml) for approximately 8-11 hours on

http://dx.doi.org/10.31788/ RJC.2020.1335863

06/12/2021
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International J. of Math. Sci. & Engg. Appls. (IJMSEA)
ISSN 0973-9424, Vol. 12 No. II (December, 2018), pp. 29-34

PEBBLING ON UNDIRECTED BIPARTITE GRAPH

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Abstract

A pebbling step of a graph G is consist subtraction of two pebbles from one vertex and placing one to it's an adjacent vertex. The pebbling number of a graph G denoted by $f(G)$, is the least integer m which can move one pebble to target vertex with the help of sequence of pebbling steps. In this paper, we demonstrate the pebbling number of undirected bipartite graph $G = (U, V, E)$.

1. Introduction

A graph $G = (V, E)$ is collection of pair of elements, where V is non-empty set of vertices and E is a set of pairs of elements of V. The numbers of vertices are called order of a graph [1]. Chung was first to introduce pebbling in graphs. Consider a connected graph

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Key Words : *Undirected bipartite graph, Path graph, Pebbling number.*
2010 AMS Subject Classification : 05C30, 57M15, 68R10, and 94C15.

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IJCMS

International Journal of Computer & Mathematical Sciences
IJCMS
ISSN 2347 – 8527
Volume 7, Issue 2
February 2018

Modeling and Simulation for Certification of Probabilistic Finite Automaton Approach of Graph Isomorphism using Markovian Property

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Abstract. The graph isomorphism problem for undirected plane graphs is to find whether two given graphs (directed or undirected) are isomorphic or not. In the present paper, apply modeling and simulation for certification of probabilistic finite automaton approach of graph isomorphism using Markovian property and use probabilistic finite automaton approach for graph invariant [1,8] called the probability propagation matrix for isomorphism of undirected plane graphs having six vertices. It may be extended for - number of vertices where 'n' is a positive integer is.

***Keywords:** Graph isomorphism, graph invariant, finite automaton, modeling and simulation, probability propagation matrix.*

1 Introduction

The graph isomorphism problem is to find if there exists a bijection between the vertices of two graphs G_1 and G_2 that preserves the incidence relationship and adjacency of vertices. Two undirected plane graph $G_1 = (V_1, E_1)$ and graph $G_2 = (V_2, E_2)$ are isomorphic if there exists a one-one onto function π from V_1 and V_2 and $(x,y) \in E_1$ if and only if $(\pi(x), \pi(y)) \in E_2$. The problem of graph isomorphism arises many fields such as chemistry, switching theory, information retrieval, and linguistics [2, 3].

Theoretically, it is always possible to determine whether or not two undirected plane graphs G_1 and G_2 are isomorphic by keeping G_1 fixed and changed the order of vertices of G_2 to check if their adjacency matrices become same. This process may require all $(n)!$ rearranging and comparisons, 'n' being the cardinality of vertex set. Such an inefficient procedure, in which the running time grows factorially with 'n', is of limited use of practical problems [2].

In the present paper, apply modeling and simulation [4] for certification of probabilistic finite automaton approach of graph isomorphism using Markovian property, develop and use probabilistic finite approach by using graph invariant that is graph invariant which absorbs data as useful facts from degrees and adjacent conditions of vertices one by one. With the help of algebra on the matrix, this kind of inferences and useful facts about vertices is distributed to their adjacent vertices.

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International J. of Math. Sci. & Engg. Appls. (IJMSEA)
ISSN 0973-9424, Vol. 12 No. I (April, 2018), pp. 15-20

A 3-CONNECTED COMPONENT OF A CUBIC SUBGRAPH OF THE MIDDLE TWO LAYER'S GRAPH USING MODULAR MATCHINGS

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Abstract

Modular matchings were first studied by Duffus, Kierstead and Snevily in 1994 with the aim of using them to solve the middle two layers conjecture. The conjecture has now been proved by T. Mütze (2014). In 2005, Horák, Kaiser, Rosenfeld and Ryjáček used them to show that the middle two layers graph has a hamiltonian prism. They also showed that the graph formed by 3 consecutive modular matchings is connected. In this paper we show a stronger result that a component of two consecutive modular matchings and any other third modular matching is 3-connected.

1. Introduction

In 1971 Tutte made a conjecture that every 3-connected cubic bipartite graph is hamiltonian. Although this was refuted by Horton [3] in 1982 by constructing a 3-connected

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Key Words : *Modular matchings, Middle levels conjecture, Hamilton cycle, Cubic graphs.*

2010 AMS Subject Classification : 05C40.

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UGC approved journal (Sl No. 48305)

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Research Articles

Sleep Deprivation Enhances False Memory on the Deese-Roediger-McDermott (DRM) Task

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Abstract

False memories are memories that people report to be true with high confidence, even though they had never encountered the fact behind the memory in reality. Such memories possess strong semantic association with already existing encoded memories which hence appear to be familiar. Sleep is known to provide optimal conditions for the consolidation of long-term memories whereas the deprivation of sleep is known to hinder memory's consolidation process. The role of sleep in the formation and enhancement of false memories was tested. The Deese-Roediger-McDermott (DRM) task was used to induce false memory in thirty-nine male volunteers who either slept or remained awake following learning. Following a night of recovery sleep both groups returned for retrieval of memory. It was found that sleep deprivation in comparison to sleep led to higher false memory.

Keywords: sleep, deprivation, DRM, false memory, recognition memory

Psychological Thought, 2019, Vol. 12(1), 120–130, https://doi.org/10.5964/psyct.v12i1.339

Received: 2019-01-18. Accepted: 2019-03-26. Published (VoR): 2019-04-30.

Handling Editors: Marius Drugas, University of Oradea, Romania; Stanislava Stoyanova, South-West University "Neofit Rilski", Bulgaria

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The human memory is akin to a storehouse where all knowledge is stored. Humans use this knowledge to perform a variety of tasks. One downside of human memories is that they are not accurate and authentic. This happens because information stored in memory is a gist of the true events that happened in real time which is not the exact copy of the event itself. This happens because previously-stored knowledge representations in memory influence the storage of new knowledge (Bartlett, 1932). This is one primary reason why facts retrieved from memory vary vastly from facts initially stored in memory (Loftus, Feldman, & Dashiell, 1995). A good demonstration of this effect is the phenomenon of false memories where subjects claim to remember events and incidents they have never encountered in reality. False memories show high semantic association with real events previously encoded in memory (Roediger & McDermott, 1995; Toglia, 1999) where subjects by reporting their false memories show high confidence upon the accuracy of false memories. False memories are quite similar to true memories as they are thought to undergo similar processes of encoding - *where knowledge about events is learned*, consolidation – *where memory traces are reorganized and stabilized,* and retrieval - *the process which helps in accessing stored knowledge about events.* One aspect in which false memories deviate from true memories is authenticity.

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INTERNATIONAL JOURNAL OF PEST MANAGEMENT
https://doi.org/10.1080/09670874.2019.1575487

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Synthetic bis- and mono-chalcones with insecticide effects on *Spodoptera frugiperda* (Lepidoptera: Noctuidae)

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ABSTRACT

This is the first report on the antifeedant, toxic and nutritional effects produced by the synthetic chalcones on the lepidopteran *Spodoptera frugiperda* followed by structure-activity relationship. Bis (5a-c) and mono (8a-d) chalcones have been synthesized via Claisen-Schmidt condensation and have been purified and characterized. The mono chalcones 8b and 8d displayed toxic effects on early larval instars when incorporated to the larval diet at 100 µg per g of diet (40 and 60%, respectively) and low adults emergency with malformations leading to death. The remaining chalcones 8a, 8c, 5a, 5b and 5c do not displayed toxic effects at the same dose. The evaluation of nutritional indices indicated that 8a and 8c were the only tested chalcones to produce decrease in the growth rate and to reduce the efficiency with which larvae converted ingested food into biomass.

ARTICLE HISTORY
Received 16 November 2017
Accepted 21 January 2019

KEYWORDS
mono and bis-chalcones; *Spodoptera frugiperda*; Toxicity; Nutritional effects

Introduction

The chemistry of 1,3-diarylpropenones (chalcones) has been an interesting field of study for long time. Chalcones are α, β-unsaturated ketones consisting of two aromatic rings, (Figure 1(a,b)) having diverse array of substituents. The two rings are interconnected by a highly electrophilic three carbon α,β-unsaturated carbonyl system that assumes linear or nearly planar structure. Chalcones possess conjugated double bonds and a completely delocalized π-electron system on both benzene rings.

Chalcones represent an essential group of natural as well as synthetic products and some of them possess wide range of pharmacological activities such as antitubercular (Lin et al. 2002; Bogatcheva et al. 2006; Janin 2007), antimicrobial (Nowakowska et al. 2001; Tomar et al. 2007), anticancer (Mukherjee et al. 2001), antioxidant (Indyah et al. 2000), antimalarial (Chen et al. 1997) and antileshmanial (Nielsen et al. 1998). The presence of reactive α, β-unsaturated keto group in the 1,3-diarylpropenones is found to be responsible for their biological activities. Therefore, the chemistry of chalcones is considered to be one of the most dynamic and challenging area of chemistry embracing a vast spectrum of the advances of both theoretical and practical relevance (Dhar 1981; Ameta et al. 2011).

The prospective practical application of chalcones as eco-friendly plant growth regulators and defense agents in agriculture and plant production is of great relevance and worthy of discussion. Due to the numerous biological activities of these secondary metabolites, there are many possibilities for their use in agriculture. Regarding pest defense and weed control, the most interesting biological activities of chalcones are the bactericide, antifungal, antihelmintic, insecticidal, insect antifeedant, antiviral and phytotoxic activities. In the present research paper, some chalcones are established as new bioactive candidates for pest control. Synthetic mono-chalcones: **8a**, **8b**, **8c**, **8d** and bis-chalcones **5a**, **5b** and **5c** (Figure 2) were evaluated for their antifeedant and toxic effects on the polyphagous lepidopteran *Spodoptera frugiperda*. Additionally, consumption index (CI), growth (GR) and efficiency in the consumption index (ECI) were determined in order to assess nutritional effects (Álvarez Colom et al. 2007; Di Toto Blessing et al. 2010, 2015).

Materials and methods

Regarding the synthesis of chalcones, all reagents and solvents used in study are of analytical grade and procured locally. All melting points (m.ps.) were determined in open capillaries on Veego (VMP – PM) melting point apparatus and are uncorrected. The progress of the reaction is monitored by thin layer chromatography (TLC) and

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Letters in Organic Chemistry, 2019, *16*, 550-555

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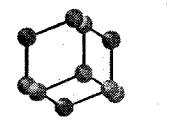
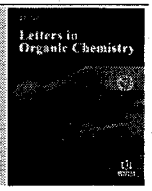


BENTHAM SCIENCE

Ionic Liquid Assisted Synthesis of Some 2-Aminobenzenethiols



Dinesh K. Jangid[1], Keshav L. Ameta[2*], Surbhi Dhadda[1], Anjali Guleria[1], Prakash G. Goswami[1] and Chandra L. Khandelwal[1]

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ARTICLE HISTORY

Received: March 24, 2018
Revised: September 29, 2018
Accepted: October 02, 2018

DOI:
10.2174/1570178615666181011114454

Abstract: Ionic Liquid assisted efficient synthesis of some 2-aminobenzenethiols has been reported using three different Ionic Liquids (ILs) namely methylimidazolium tetrafluoroborate $[MIM]^+[BF_4]^-$, methylimidazolium chloride $[MIM]^+[Cl]^-$ and methylimidazolium nitrate $[MIM]^+[NO_3]^-$. A comparative study has been carried out for the synthesis of target molecules in the presence and absence of IL, leading to conclusion that maximum yield has been observed with $[MIM]^+[BF_4]^-$.

Keywords: 2-Aminobenzenethiols, 2-aminobenzothiazole, ionic liquids, environmentally benign, anions, antioxidate.

1. INTRODUCTION

The substituted 2-aminobenzenethiols plays an important role in modern heterocyclic chemistry due to the wide applicability as synthetic precursor for potential biological, pharmacological and industrially useful agents and have been explored as tranquilizer [1], antiulcer [2], antibacterial [3], antifungal [4], antioxidant [5], antimicrobial [6], anticancer [7], antitumor [8], anti-tuberculosis [9], anti-proliferative [10], anti-analgesic agents [11] *etc.* A straight forward initiative has been made in the heterocyclic chemistry for the synthesis of 2-aminobenzenethiols as most profligate lead structure in the last few decades.

As it is known that eco-friendly approaches have opened new paths in the field of organic transformations, the most urgent need of today's period is to develop environment friendly methodologies in the chemical industry that will solve many challenges that arise in future [12].

2-aminobenzenethiols have been studied by various approaches but excessively exploited protocols were given by *Herz* [13] and Gupta and co-workers [14-17]. *Herz* protocol is less desirable among these protocols because it fails to synthesize desired product from anilines having free *para* position, whereas the method proposed by *Gupta* and *co-workers* overcome this problem and results in the formation of desired product.

Gupta *et al.* synthesized substituted 2-aminobenzenethiol in three steps by reacting substituted aniline with ammonium thiocyanate in the presence of hydrochloric acid to form phenylthiourea which in turn is followed by bromination and cyclization of phenylthiourea to produce 2-aminobenzothiazole, which on hydrolysis yielded desired product with more reaction time. Xiao and co-workers [18] explored ILs in the synthesis of cinnamoyl thiourea by the reaction of cinnamoyl isothiocynate and substituted aniline with good yields and time efficiency.

Thus concerning the above facts, the present study describes the environmentally benign synthesis of 2-aminobenzenethiols using IL with improved yield in lesser time. A comparative study has also been given by synthesizing target molecule using different ionic liquids. It is also investigated that on changing anionic part of the ionic liquids their effect for specific reaction also modifies.

2. RESULTS AND DISCUSSION

To optimize the reaction conditions of the synthesis of 2-aminobenzenethiols, we have first investigated the synthesis of 2-aminobenzenethiol using different ILs to monitor their effect by varying their anionic part (Table 1). It was observed that by changing anions of the ILs their effect on specific organic synthesis also alters. The activity of ILs is greatly affected by the bronsted acidity of anionic part of the ILs which can be seen in the form of yield of the products [19]. So here we have observed the excellent yield of products in $[MIM]^+[BF_4]^-$, while in the later two ILs $[MIM]^+[Cl]^-$ and $[MIM]^+[NO_3]^-$ the yields of product are moderate.

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1875-6255/19 $58.00+.00

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Letters in Organic Chemistry

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COMMUNICATION

A novel synthesis of *N*-hydroxy-3-aroylindoles and 3-aroylindoles†‡

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Cite this: *Org. Biomol. Chem.*, 2018, 16, 6853

Received 21st June 2018,
Accepted 24th July 2018

DOI: 10.1039/c8ob01471j

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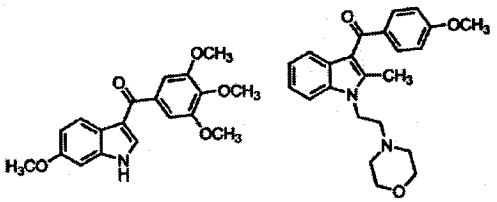
A straightforward indole synthesis *via* annulation of *C*-nitrosoaromatics with conjugated terminal alkynones was realised achieving a simple, highly regioselective, atom- and step economical access to 3-aroylindoles in moderate to good yields. Further functionalizations of indole scaffolds were investigated and an easy way to JWH-018, a synthetic cannabinoid, was achieved.

Indole compounds are deeply studied because of their biological activity and continue to capture the attention of synthetic organic chemists (Fig. 1). A large number of original indole ring syntheses and applications of known methods to new problems in indole chemistry have been reported so far.[1] Our general interest in the chemistry of indoles led us to introduce in the past years a synthetic approach to the formation of the indole ring by cycloaddition of nitro- and nitrosoarenes with alkynes.[2] Indoles, *N*-hydroxy- and *N*-alkoxyindoles were regioselectively produced in moderate to good yields. Ragaini's research groups reported a very efficient Pd-based catalyzed reaction with similar regioselectivities and high turn-over parameters using nitroaromatics as starting materials.[3] Recently Srivastava and coworkers developed a gold-[4a] and a copper-catalyzed[4b] analogue annulation affording indoles by reaction of nitrosoarenes with aromatic alkynes. Naturally occurring marine alkaloids like meridianins, commonly known as kinase inhibitors, were prepared through the annulation of nitrosoarenes with substituted ethynylpyrimidines.[5] Efficient synthetic protocols starting from arylhydroxylamines were introduced by some of us using the *in situ* generation of nitrosoaromatics by oxidation with Fe(Pc)(Iron phthalocyanines).[6]



BPR0L075 Pravadoline

Fig. 1 Synthetic bioactive indole compounds.

The ever growing interest in *N*-hydroxyindole derivatives was recently illustrated by the biological activities reported for some of these compounds that became interesting candidates in different therapies and as anti-cancer agents.[7] The 1-hydroxyindole nucleus was recently found in pigments from flower pot parasol *Leucocoprinus birnbaumii*[8] and has received ever growing attention by many research groups for its role in bioactive molecules.[9] The *N*-hydroxyindole unit, or of an analogue indoline nitrone, is a fundamental fragment of very interesting naturally occurring compounds such as nocathiacin I,[10] coproverdine[11] and stephacidin B, a highly complex dimeric prenylated *N*-hydroxyindole alkaloid that contains 15 rings and 9 stereogenic centers and exhibits potent activity against prostate carcinoma;[12] the corresponding monomeric compound, avrainvillamide was recently afforded by two different total syntheses by Myers[13a] and Baran[13b] and displayed antibiotic activity towards several Gram positive cocci.[14] Stability of *N*-hydroxyindoles has been a source of debate where they are frequently cited as unstable and elusive compounds that can be reduced to indoles or stabilized through alkylation or acylation to avoid their decomposition or dimerization.[15] Most of

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† In Loving Memory of our Friend and Colleague Andrea Dallari.

‡ Electronic supplementary information (ESI) available: X-ray crystal structure of 5; details of experimental procedures and spectroscopic data are available and are reported in ESI. CCDC 834062. For ESI and crystallographic data in CIF or other electronic format see DOI: 10.1039/c8ob01471j

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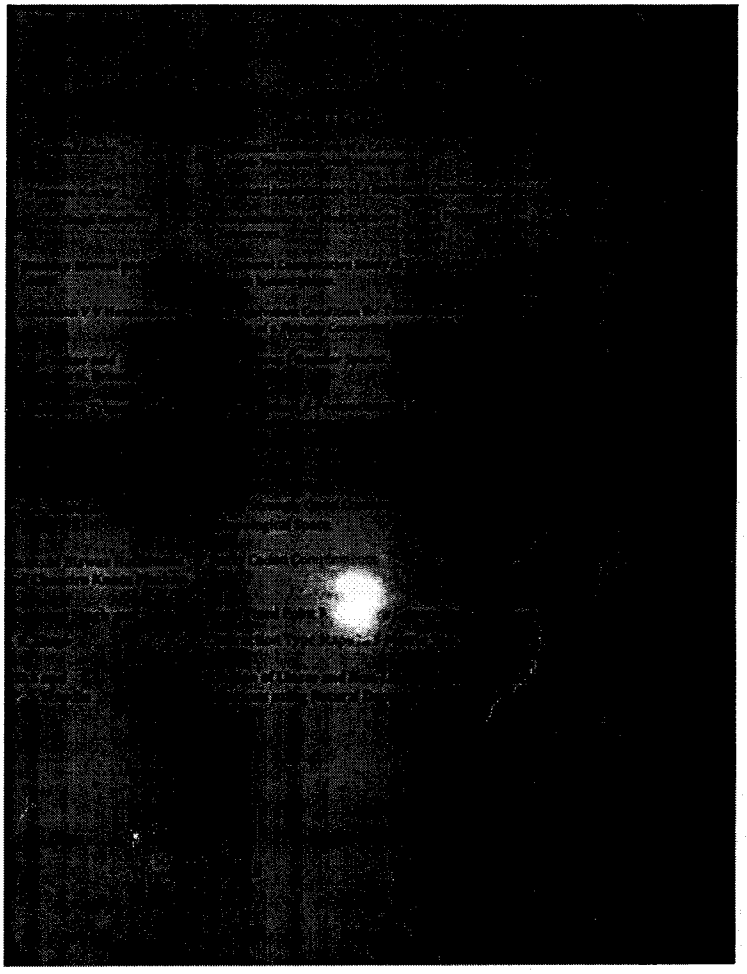

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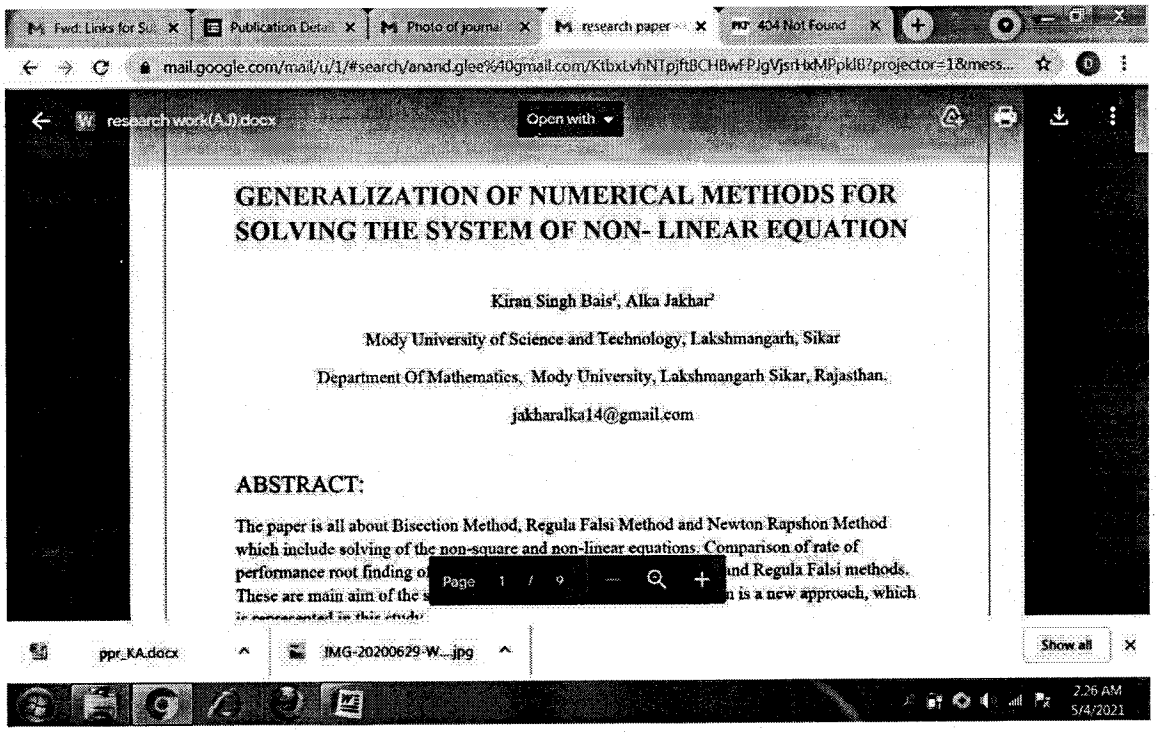

GENERALIZATION OF NUMERICAL METHODS FOR SOLVING THE SYSTEM OF NON- LINEAR EQUATION

Kiran Singh Bais[1], Alka Jakhar[2]

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ABSTRACT:

The paper is all about Bisection Method, Regula Falsi Method and Newton Rapshon Method which include solving of the non-square and non-linear equations. Comparison of rate of performance root finding o nd Regula Falsi methods. These are main aim of the s n is a new approach, which is represented in this study

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Physica E: Low-dimensional Systems and Nanostructures 104 (2018) 146–154

Contents lists available at ScienceDirect

Physica E: Low-dimensional Systems and Nanostructures

Journal homepage: www.elsevier.com/locate/physe

Raman induced soliton driven supercontinuum generation in highly birefringence photonic crystal fiber

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ARTICLE INFO

Keywords:
Photonic crystal fiber
Birefringence
Dispersion
Nonlinearity
Supercontinuum

ABSTRACT

This paper presents an elliptical core photonic crystal fiber which promises to yield very large birefringence 4.1×10^{-2}. The optical and nonlinear properties of the fiber is also investigated theoretically. The supercontinuum generation at the pumping wavelength 1064 nm with FWHM 50 fs pulse by using very low peak power of 1 kW in both vertical and horizontal polarized mode is investigated. Firstly, the influence of stimulated Raman scattering on soliton self-frequency shift is analysed in supercontinuum generation. A red shifting of generated Raman solitons and blue shifting of dispersive wave is observed.

1. Introduction

In the antecedingdecades, Photonic Science has been revolutionised with the emergence of Photonic crystal fibers (referred 'PCFs' hereafter). A multitudinous scientific research has been documented related to the PCFs [1–10]. The optical pulses dispersion as flat and low anomalous [1,5], propagation of pulses in single mode over a wide range of operating wavelengths [3,5,6], large birefringence [1–5], small walk off [3,5] and high nonlinearity [5,6] are some of the influential characteristics of PCFs. The applicability of high birefringence PCFs has been proved in the various engineering fields e.g. high bit data transmission, stress sensors, temperature sensors, displacement sensors and switching devices [5–12]. A birefringence can be illustrated by the alterations of symmetry in fiber core region. In this connection ample number of studies have been performed such as amendments in the core regions by omitting some air holes [3–5], increase of air holes diameter [4], using elliptical air holes and inclusion of extra air holes [1–5]. Aforementioned studies reflects the betterment of mode confinement which is an essential parameter for the emergence of high birefringence. In the several studies the second and third order birefringence have been achieved [Table 1]. It is worthwhile to note that to speed up the bit data transmission and sensing efficacy of the PCF, increased order of birefringence is required. In this view Sharma et al. [5] achieved a value of 3.3×10^{-2} for birefringence (documented as highest). In the present work birefringence value of 4.1×10^{-2} has been achievedby reduction in fiber core region and inclusion of extra air holes for increment of refractive index contrast between core and cladding. The proposed fiber could be fabricated without difficulty since several authors have demonstrated the fabrication of PCF with similar fiber parameters. For example, Francisco et al. [7] have fabricated a PCF with $\frac{d}{\Lambda} = 0.89$ and $\Lambda = 0.93\,\mu m$, and Magi et al. [8] have also demonstrated the fabrication of tapered PCFs with $\Lambda \sim 0.36\,\mu m$ adopting flame brushing technique [9,10].

Among nonlinear mediums the PCF exhibits its properties qualitatively in supercontinuum (SC) generation [5,6,11]. SC generation is a combination of several nonlinear processes which act together on the ultra-short pulse to acquire spectral broadening. The nonlinear phenomena responsible for SC generation are self-phase modulation (SPM) [5,6,11], cross phase modulation (XPM) [11], stimulated Raman scattering (SRS) [5,6,11,13–18] and four wave mixing (FWM) [11] etc. In the generation of SC especially using femtosecond pulse, implementation of an outside influence is decisive. SRS and higher order dispersion terms are mainly two external nonlinear processes which dominates the pumped pulse in anomalous dispersion regime [11,12]. The disintegration of fundamental solitons is broadly responsible for emergence of high order solitons in SC. The SRS is notably accountable for shifting of solitons towards longer wavelength which is known as soliton self-frequency shift (SFSS) [13–15]. During soliton fission process, dispersive wave (DW) generated due to the energy transformation from soliton to narrow-band resonance in the normal dispersion regime [11,16,19]. The frequency array of DW is determined by the nonlinear phase matching condition with soliton [18–20], which may generate either red shift when third order dispersion (TOD) is negative or blue shift when TOD is positive with respect to the pumping wavelength

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https://doi.org/10.1016/j.physe.2018.07.016
Received 16 March 2018; Received in revised form 8 June 2018; Accepted 15 July 2018
Available online 20 July 2018
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Photonic Crystal Fiber-Based Refractive Index Sensor for Early Detection of Cancer

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***Abstract*—This paper proposes a novel cancer sensor based on dual core photonic crystal fiber for the detection of cancer cells in cervical, breast, and basal parts. The samples are taken in fluid form and infiltrated into the formed cavity using selective infiltration method. Each fluid form has its own refractive index values which give the various responses in the transmission and loss spectrum. The spectral shift is obtained by inducing the coupling mechanism between silica core and cancer cell core for its launching input optical field which is investigated by finite element method. The proposed structure is also optimized with its structural dimensional property for enhancing the sensitivity. The sensing performances for the cervical cancer cell are obtained as high as 7916 nm/RIU for *x*-polarization and 10 625 nm/RIU for *y*-polarization with the detection limit of 0.024. The sensitivity to breast cancer cells for *x*- and *y*-polarization is 5714.28 and 7857.14 nm/RIU, respectively, with detection limit of 0.014. Similarly, the sensitivity to basal cells can also reach 4500 nm/RIU for *x*-polarization and 6000 nm/RIU for *y*-polarization. To the best of our knowledge, such sensitivities are the highest reported thus so far.**

***Index Terms*—Cancer cell cavity, coupling mechanism, birefringence, peak wavelength, sensitivity.**

I. Introduction

THE photonic crystal fiber (PCF) has demonstrated its great potential in the photonics sensing applications. In general, PCFs are made up of silica with microscopic air holes running along the fiber. Due to high design flexibility, PCFs offer numerous advantages over conventional fibers, such as endlessly single mode [1], large mode area [2], tunable dispersion [3], high birefringence [4], tunable large optical nonlinearity [5] and very low loss [6]. In addition, PCFs are highly responsible for analyte materials and external forces that govern the sensing property. It is used as sensing medium for strain [7], hydrostatic pressure [8], temperature [9], magnetic field and vibration [10]. Apart from them, some chemical and bio-sensor based on PCFs have also been developed for the sensing salinity [11], pH [12], DNA [13], cholesterol [14] and glucose [15]. Especially, PCFs have also been used for the detection, treatment and prevention of diseases and diagnosis for better health in the biomedical applications. Nowadays, cancer is one of the common diseases in the world, which has become a serious problem in human health. It is also a kind of virus called as oncovirus. The smaller in size of the virus and its divergence around the region of cell decide the impact of cancer presence. Increasing rate of cancer urgently demands the next generation of cancer testing equipment to sense the cancer cells as early as possible. In 1962, Clark, Jr., [16] demonstrated the first biosensor for the detection of glucose concentration in the blood. Various detection techniques like electrochemical methods [17], immunocytochemistry [18] and microfluidic devices [19] are reported for cancer cell detection. Later, with the help of Raman spectroscopy [20], the detection of breast cancer using spark fused taper for esophagus and the molecular level cancerous cells early identification [21] have been proposed and analyzed.

Further, the development of biosensor for different region of human is studied. For example, basal cell carcinomas by Yaroslavsky *et al.* [22], optical detection of specific protein (Estrogen Receptor(ER)) [23] in breast cancer cells using micro-structured fiber, detection of breast cancer using photo thermal effect on Nano composite [24] and cancer presence in body fluids such as urine, serum, blood and tumor cells [25], [26] were proposed. Recently, Sun *et al.* [27] experimentally demonstrated the label-free detection of breast cancer biomarkers (HER-2) using an in-line taper fiber optic interferometer with sensitivity of 2333 *nm/RIU* with low detection limit of 2 μg/ml. All the previous processes of cancer cell detection from basal, breast are relatively complex in implementing and processing level. In this paper, a dual core PCF based biosensor is proposed for the enhanced detection of cancer cells where the samples to be analyzed follows the liquid biopsy principle by which bio fluidic is brought into the cavity of the PCF. Recently, Bertucci *et al.* [28] and Khetani *et al.* [29] have demonstrated the mechanism of biofluidic detection using microstructure optical fiber. The proposed method promises for betterment results with optimized sensitivity for early detection of cancer. Since we have been involved in treating the nanometer size of cancer samples in the form blood or other fluid substance from the affected region, we directly measures the refractive index of cancer samples instead of virus treat in efficient way. Such that cancer cell samples in fluid form for breast cancer, cervical cancer and basal cancer are considered and infiltrated into the cancer cell cavity of silica substrate. As the cavity is infiltrated by fluid, the cell counting of each type of cancer cell is not required.

Manuscript received June 27, 2018; accepted July 2, 2018. Date of publication July 9, 2018; date of current version August 10, 2018. The work of G. T. Raja was supported by SERB, India, through the Extra Mural Research under Grant EMR/2016/005361. The associate editor coordinating the review of this paper and approving it for publication was Dr. Daniele Tosi. *(Corresponding author: G. Thavasi Raja.)*

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Digital Object Identifier 10.1109/JSEN.2018.2854375

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Research Paper

Inhibition of Aromatase and Cell Proliferation of Breast Cancer and Human Placenta Choriocarcinoma by *Prunus persica* Extracts

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Dhingra *et al.*: Aromatase inhibition by *Prunus persica* extract

Prunus persica **has been used as a source of traditional medicine in many countries for the treatment of different diseases in females. In the present study, cytotoxicity and reactive oxygen species scavenging effects of *Prunus persica* extract on human breast cancer and placenta choriocarcinoma cell lines were evaluated. Besides this, regulations of oestrogen synthesis and antiaromatase activity were observed on human placenta choriocarcinoma cells. Ethyl acetate and butanol fractions had the maximum cytotoxic activity among all the fractions. In comparison to butanol fraction, ethyl acetate fraction was found to scavenge maximum intracellular reactive oxygen species, which was correlated with its total phenolic and flavonoid contents. Ethyl acetate was found to reduce the aromatase activity by 50 % at the concentration of 200 µg/ml. This inhibitory effect on aromatase was accompanied by reduced 17β-estradiol levels in JEG-3 cells. It seemed that the ethyl acetate and n-butanol fractions of *Prunus persica* or its active compound appears to be acting through dual mechanisms, i.e. improvement of antioxidant system and by suppressing aromatase; it may potentially be used as therapeutic agent for the treatment of breast cancer. These findings suggested that *Prunus persica* extract could be an aromatase inhibitor for the treatment of oestrogen-sensitive breast cancer.**

Key words: ***Prunus persica*****, aromatase, oestrogen synthesis, ROS scavenging, breast cancer**

There is an overwhelming evidence that consumption of fruits and vegetables is related to their protective efficacy against several chronic diseases, including cancer. Yet nothing much has been studied in *Prunus* fruits. *Prunus persica* belongs to family Rosacea and has been known to exhibit various pharmacological activities such as inhibition of oxidative process, chemotherapy-induced acute nephrotoxicity, hepatotoxicity, fungal infection and allergic reaction[1]. The therapeutic role of its seed is well-known. It is used as a traditional medicine in Japan, China, and other Asian countries mainly for the treatment of different diseases in females, including premenstrual syndrome[2]. However, its role in the regulation of breast cancer was not well understood.

Oxidative stress is known to activate a variety of transcription factors including NF-κB, AP-1, p53, HIF-1α, PPAR-γ, β-catenin/Wnt and Nrf2, which lead to the expression of different genes, including those for growth factors, inflammatory cytokines, chemokines leading to transformation of a normal cell to tumor cell[3]. Polyphenols contribute significantly to the total antioxidant capacity of fruits. Therefore, it is believed that the cellular system can be protected from oxidative stress by these polyphenols[4] and polyphenol containing plant extracts might have potential as anticarcinogenic agents.

Oestrogen plays one of the major roles in breast cancer and aromatase enzyme, a member of cytochrome P450 superfamily, synthesizes oestrogen by converting androstenedione and testosterone to oestrone and oestradiol, respectively. It has also been reported that approximately 60 % of premenopausal and 75 % of postmenopausal patients have oestrogen-dependent carcinomas. But aromatase inhibition reduces the oestrogen levels and thus could be a viable therapeutic target for breast cancer patients. In fact, aromatase

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Accepted 21 August 2018
Revised 22 February 2018
Received 09 March 2017
Indian J Pharm Sci 2018;80(5):903-910

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06/12/2021
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THE JOURNAL OF HORTICULTURAL SCIENCE AND BIOTECHNOLOGY
https://doi.org/10.1080/14620316.2019.1570827

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Papaya yellow leaf curl virus: A newly identified begomovirus infecting *Carica papaya* L. from the Indian Subcontinent

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ABSTRACT

India is one of the world's largest producers of papaya. Viruses, mainly begomoviruses and potyviruses, cause a significant loss in papaya production. The study described here has identified a new species of begomovirus and a new species of betasatellite infecting *Carica papaya* in India. The sequences of the begomovirus and betasatellite show 90.03% nucleotide sequence identity to an isolate of *Radish leaf curl virus* and 92.25% identity to an isolate of *Tomato leaf curl betasatellite*, respectively. Maximum likelihood phylogenetic tree of begomovirus sequence of isolate DP2 (KX353622) showed distant relationships with previously characterised begomoviruses. Recombination analysis proposed six recombination breakpoints in begomovirus genome with other geographical begomovirus isolates.

ARTICLE HISTORY
Accepted 7 January 2019

KEYWORDS
Papaya yellow leaf curl virus; begomovirus; papaya; phylogeny; recombination

Introduction

Papaya is native to the tropical regions of the Americas, and is a major horticultural crop in India. The country produces an incredible 4.2 million metric tons, accounting for 35% of the world's production, according UN's Food and Agricultural Organisation (FAO) 2011 figures. Papaya fruit contains high amount of vitamin A, B1 and B2 as well as comprehends important proteolytic enzyme papain, which helps in digesting protein-rich food, with several pharmaceutical applications (Arvind, Bhowmik, Duraivel, & Harish, 2013). As with many tropical and subtropical crops, papaya is host to various pests and pathogens. Begomoviruses as one of the principal genus of the family *Geminiviridae*, encompasses more than 320 diverse species prevailing in the tropical and subtropical vicinity of the old and new world infects crops, ornamentals and weed plants; are transmitted by their chief carrier vector white-fly (*Bemisia tabaci*) (De Barro, Liu, Boykin, & Dinsdale, 2011; Marwal, Mishra, Sekhsaria, & Gaur, 2017; Prajapat, Marwal, & Gaur, 2013).

In India, the first study of papaya leaf curl disease was reported in 1998, is caused by the begomovirus *Papaya leaf curl virus* (PaLCV) (Saxena, Hallan, Singh, & Sane, 1998). Since then, several reports of begomoviruses infecting papaya, likewise, *Papaya leaf curl virus* (PaLCV), *Papaya leaf crumple virus* (PaLCrV), *Chilli leaf curl virus* (ChiLCuV) and *Tomato leaf curl New Delhi virus* (ToLCuNDV), and *Croton yellow vein mosaic virus* (CYVMV) (Chang, Lee, Su, & Hung, 2003; Singh-Pant, Pant, Mukherjee, & Mazumdar-Leighton, 2012) have been documented.

In India, numerous begomoviruses and potyviruses have been characterised from papaya. The roving surveys were carried out during March 2015 at several locations of Rajasthan province of India to evaluate the virus infections in papaya plant. In this study, we report a new begomovirus infecting *Carica papaya* L. according to ICTV species demarcation criteria for begomoviruses (<90% nucleotide sequence identity with other isolates) and named as *Papaya yellow leaf curl virus* along with the associated betasatellite.

Material and methods

The infected leaf samples exhibiting begomovirus like symptoms such as yellowing of leaves (Figure 1), and vein yellowing were collected from papaya plant in Lakshmangarh, Rajasthan province, India, Latitude: 27° 21′ 51.1272″ N and Longitude: 76° 51′ 31.0572″ E. To investigate the nature of infection we extracted the total genomic DNA and RNA using CTAB method and Trizol method, respectively from symptomatic and asymptomatic leaves (Sahu, Verma, Gaur, & Mishra, 2018; Verma et al., 2015) and subjected to PCR using separate pair of degenerate primers specific to coat protein gene of begomoviruses and potyviruses. The degenerate primer pair AC-1048F (5′GCCYATRTAYAGRAAGCCMAG3′) and AV-494R (5′GCCYATRTAYAGRAAGCCMAG3′) was used for begomoviruses identification (Marwal,

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06/12/2021
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The Role of Women Police in Settling Domestic Violence Cases through Counselling and the Need Ahead: The Empirical Evidence from Odisha

*Ramesh Chandra Nayak**

Abstract

Domestic violence is a civil war in our society, produced by the dehumanization of the perpetrators under the influence of masculinity driven power imbalance. Its silhouetting is getting worse, in spite of ascending governmental and civil society activism to address it. Now women are inducted into policing to deal with deviance involving women and children. In case of domestic violence, they handle the cases through counselling the victims and the perpetrators as well. For an unbeaten approach in this regard, we need to pragmatically emphasise the psychological and social responsibility aspects of police training.

Key Words: Domestic violence, women police, counselling, police training.

INTRODUCTION

Women have the innate ability for concerned understanding. They are brave to take ingenuities to bear and rear human race. Notwithstanding these qualities, they are the last to be considered for their virtues and the first to be fired for any vices only because they are women. They are preys of gender biased and based discrimination, exploitation, oppression and violence from the womb to tomb in the forms of foeticide, domestic violence, sexual harassment and many more. When we look at the Indian scenario, a recent G20 survey rated India as the nastiest place for women. According to the National Crimes Records Bureau (NCRB[1]) Report, 2005, 50 women are raped a day; 22 suffer dowry murder, 168 experience domestic violence; 120 face molestation and 426 crimes against them are reported[2]. The incidence of total number of crimes committed against women in India from 1992-2016 is presented here year wise. The number was 79037 in 1992; in 1993 it was 83964; 98948 in 1994; 106471 in 1995; 115723 in 1996; 121265 in 1997; 131338 in 1998; 135771 in 1999; 143795 in 2001; 147678 in 2002;

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[1]National Crime Records Bureau.
[2]The rate of reporting is less than comission.

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Happiness and Aging: A Comparative Study

Shreya Chaudhary & S.K. Srivastava
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The purpose of this study was to investigate happiness in elderly people residing with their families and those living in old age (retirement) homes. The sample of the study included 150 old aged people (senior citizens), 75 living with their families and 75 in old age (retirement) homes. Happiness was measured using the Oxford Happiness Questionnaire developed by Michael Argyle and Peter Hills (2002). The results of this study showed a significant difference in happiness between those seniors who reside with their families, and those who live in retirement homes. Suitable measures should be taken to increase happiness and mental health especially for those seniors living in retirement homes.

Introduction

Happiness is an emotional or affective state, characterized by feelings of enjoyment and satisfaction. As an emotional state and a subject, it has been pursued and extensively commented on throughout world history (Hasnain et al., 2014). Happiness declines with age for about two decades from early adulthood, up until roughly the middle-age years, and then increases with age (Graham and Pozuelo, 2016). Research shows that happiness is not the result of bouncing from one joy to the next; achieving happiness may typically involve times of considerable discomfort (Lay, 2017). Happiness is a state characterized by contentment, love, satisfaction, pleasure or joy (Veenhoven et al., 2010). It is the most valuable aim of human life. Happiness is measured in terms of long term feelings, not only occasional or daily feelings. Happiness is a major goal of life which cannot be built; rather, it is a journey one takes for life. Happiness varies with age. Most people imagine young adulthood to be the peak of happiness and later adulthood to be the time for things to decline. However, research reveals a different scenario. It turns out that happiness forms a U-shaped Curve (Freeman & Freeman, 2015).

Each person dreams of living a long life. With the headway achieved in modern medical science, a long life is no longer just a fantasy. These advancements mean that old age has become the most critical stage a person goes through. Old age is inevitable (Pande, 2016). It is the stage where man faces issues socially, physically, mentally and even economically. The stage of old age can be a time of self-fulfillment. Older people are the source of the truest form of wisdom. They have lived for a long time--from generation to generation. Old age is quite similar to childhood in numerous regards. Just as babies or children are unable to do any work on their own and are dependent on their parents every now and then, an old person is also dependent on others for getting their work accomplished when they are no longer physically fit. But here one should notice the irony. These old people are the same people who took care of their own children when they were small.

06/12/2024
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ZENITH International Journal of Multidisciplinary Research _____ISSN 2231-5780
Vol.9 (4), April (2019), pp. 184-189
Online available at zenithresearch.org.in

A STUDY OF DIFFERENTLY ABLED CHILD'S MOTHER IN RELATION TO QUALITY OF LIFE

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ABSTRACT

In recent era, the Quality of life arises as a major aspect related to life of an individual. It deals with various dimensions such as bodily state, self esteem, self psychological health, social support, spirituality etc. The purpose of study was to compare the quality of life between mothers of children with intellectual disability and mothers of normal children. 150 mothers whose children age range was 6-14 years participated in the research. Mothers were divided into two groups, 50 mothers of children with intellectual disability and 100 mothers of normal children were selected from Uttarakhand. For data collection, World Health Organization Quality of Life-Brief (WHOQOL-BREF) of Hindi version was filled by the mothers. The significant difference was found between both groups. The mothers of children with intellectual disability showed lower quality of life as compared to mothers of normal children. Various psychological and social programmes should be designed and implemented to improve the quality of life of mothers.

KEYWORDS: Quality Of Life (QOL), mothers of special children.

Quality of life is a multidimensional dynamic concept that has developed from the need to estimate the impact of diseases, which includes economic welfare, characteristics of community and environment, and health status. The term quality of life has become a bandwagon concept for all those human needs, which are often neglected in a society dominated by technology (Dadkhah et al, 2009).

06/12/2021
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International Journal of Social Science and Economic Research

ISSN

Volume ue I 9

YOGA AS AN EMERGING PSYCHOTHERAPY IN PRESENT SCENARIO

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ABSTRACT

This paper is an attempt to focus the light on the trendy field of yoga in respect to psychotherapy. The union of yoga and psychotherapy is considered natural. Yoga and psychology are interrelated disciplines. Both the disciplines focus on an individual's physical, spiritual, psychological dimensions. Yoga has an ability to deal simultaneously with body and mind. It was considered as ancient hidden knowledge which was only used by saints and sages but as time passes, it's worth is revealed in society and in present era, it is commonly practiced by people with multiple aims as per their choice which includes benefit to physical, psychological, spiritual and social level. The benefits of yoga to health and wellbeing are of increasing interest to psychologists, psychotherapist and counselors.

Keywords: Yoga, Psychotherapy

INTRODUCTION

Yoga in itself is a well developed system of psychology. Yoga psychotherapy plays a vital role in the successful treatment and management of physical, psychological and spiritual conditions. This combination provides holistic path, self healing and spiritual awakening. Yoga and psychotherapy are described as two therapeutic techniques which are beautifully complementary to one another. Though yoga is itself a science, still if we study Yoga at its basic level, it deals with the physical strength and flexibility of one's body by asanas whereas psychology can be defined as the science of individual's overt and covert behavior, scientific study of mind and mental processes.

YOGA

Yoga is an ancient science, art and philosophy. Yoga is a potent tool of mental health promotion (Singh, 1986). Yoga is an essentially a spiritual discipline based on an extremely subtle science which focus on bringing harmony between mind and body. Yoga is most common practice these

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06/12/2021

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Indian Journal of Social Research Vol. 60 (3) (May - June, 2019) (461-468)

Academic and Law Serials

ISSN : 0019-5626
e-ISSN : 2454-3624

JOB SATISFACTION AND WELLBEING OF STAFF NURSE WITH THEIR HOSPITAL TYPE

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Abstract

Nursing is considered as a noble profession which deals with devotion. Nurses dedicate time to provide health care to individuals who need to take care systematically. The purpose of the study is to compare job satisfaction and wellbeing of staff nurse from government and private hospitals. The 200 nurses divided as 100 nurses from government and 100 from private hospital were selected as sample. The Generic Job Satisfaction Scale (GJSS) which was developed by Macdonald & MacIntyre (1997) and the PGI General wellbeing scale, developed by Verma and Verma (1989), was used as research tools. The t-test was calculated to assess the difference. It is found that government hospital nurses have more satisfaction than the private hospital and nurses of government hospital found to have better wellbeing than nurses of private hospitals.

Key words: Job Satisfaction, Wellbeing, Nursing

06/12/2021

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Introduction

Nursing is a calling which blends the rich customs with the changing reality of present health care industry. Nursing is not just an arrangement of exceptional aptitudes and the nurse is not simply a human who is proficient in performing these special assignments. Nurses make up the largest group of healthcare providers working within healthcare services and they contribute significantly to the quality and delivery of patient care (Al-Aameri, 2000; Chan *et al.*, 2013). Investigations have attempted to explore the association of stress, negative affect and mental health among working population (Siu,

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AN EVALUATION OF SUB-SURFACE WATER QUALITY AROUND BHARUCH-SURAT INDUSTRIAL REGION, GUJARAT, INDIA

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ABSTRACT

Water is an important element in everyday life. The basic property of water (H_2O) is static but with the inclusion of different physico-chemical elements, its quality varies from time to time and place to place. The present paper is an attempt to evaluate the property of sub-surface water in Surat-Bharuch Industrial Region of Gujarat, India. 155 sites were selected for the analysis and spatial pattern of physico-chemical parameters like EC, pH, temperature, calcium, sodium, potassium, lithium, iron, fluoride, copper and cadmium were analysed. To understand the distribution pattern of data, measures of central tendency, dispersion and skewness were applied. High concentration of sodium was observed in the northern part of the region while the level of pH was normal in the region. Lithium concentration was high throughout the area except for the south-eastern region. Other physical parameters like EC and temperature and chemical parameters like potassium, fluoride and copper were found to be within the desirable range.

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IMPACT: International Journal of Research in Humanities, Arts and Literature (IMPACT: IJRHAL)
ISSN(P): 2347-4564; ISSN(E): 2321-8878
Vol. 5, Issue 6, Jun 2017, 21-36
© Impact Journals

DEMOCRATIC TRANSITION AND INSTITUTIONALIZATION OF PARTY SYSTEM IN ESTONIA, 1991-2001

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ABSTRACT

The concepts of democratic transition, political party, the party system and institutionalization of party system are contested aspects. There is no all agreed definition available regarding these concepts. Several authors have interpreted and conceptualized these concepts in various ways. They are relevant to understand democratic transition and the institutionalization of political parties in Estonia. Estonia regained its independence from the former Soviet Union in 1991. Since then, the country has undergone multiple transitions in the form of economic, political, cultural and social. Estonia began its nation-building and democratization based on the values and principles of western liberal democracy. Institutional structures such as constitution, president, parliament and political parties which are necessary for democracy were established. The literature on institutional analysis of political parties indicates that institutionalization of party system is a necessary condition for the effective functioning of democracy. Institutionalization of party system is conceptualized in various ways.

The constitution of Estonia was adopted on 28 June 1992; with this unicameral legislature *Riigikogu* consisting of 101 members was formed. The members of parliament are elected for a term of four years through secret ballot on the basis of proportional representation. The president is elected by the *Riigikogu* for a five-year term. The president nominates the prime minister for the approval by the *Riigikogu*. Political parties play a very important role in Estonia as in all representative democracies. A multi-party system was developed in Estonia after independence. Since political parties act as a link between society and state, competing political parties and institutionalization of party system are significant factors for successful functioning of representative democracy in Estonia. Hence, the proposed study intends to examine democratic transition, development of political parties and institutionalization of party system in Estonia.

KEYWORDS: Constitution, President, Parliament and Political Parties

A Theoretical Framework of Democratic Transition and Institutionalization of Party System

Huntington defines institutionalization as the "process by which organizations and procedures acquire value and stability". Mainwaring and Scully define institutionalization of the party system as "the process by which a practice or organization becomes well established and widely known, if not universally accepted. Andrey A. Meleshevich offers two important criteria to study institutionalization of party system in post-Soviet states: autonomy and stability. The three indicators which are employed for measuring *autonomy*: (1) the role of political parties in the recruitment in the legislative branch of government; (2) the role of political parties in the formation of the executive branch; and (3) the strength of the party and the uniformity of this strength in different regions across the country.

Impact Factor (JCC): 3.6586 - This article can be downloaded from www.impactjournals.us

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INTERNATIONAL RESEARCH JOURNAL OF MULTIDISCIPLINARY STUDIES

Vol. 3, Issue 6, June, 2017 | ISSN (Online): 2454-8499 | Impact Factor: 1.3599(GIF), 0.679(IIFS)

Democracy and Political Stability: A Comparative Study of Estonia and India, 1991-2015

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Abstract

The study intends to explore the relation between democracy and political stability in Estonia and India in a comparative perspective. Democracy and political stability are an indispensable aspect in both national as well as international politics. Political stability is a necessary pre-condition for nation-building. It plays an important role in strengthening social cohesion, integration and legitimacy within the state. Estonia was under Soviet occupation for nearly 50 years. India experienced the colonial rule of the British Empire for more than 200 years. After becoming independent the consolidation of a democratic political system and governance, providing constitutional guarantees of freedom, equality, justice, rights and ensure well being of citizens' are the nation building priorities in both post-Soviet Estonia and post-colonial India. Estonia's democracy has now crossed two and half decades, but lacking in content. India has established a full democracy in the past more than six decades of its existence showing political stability. Hence, comparing these two democracies help to understand the factors enabling political stability.

Introduction

The ideas of democracy in Estonia and India date back to the early years when the nationalist successfully appropriated liberal democratic principles from the west and infused them into the political context. Estonia and India faced several new challenges such as political instability, economic decline and chaotic social situation before emerging as a democratic sovereign state. In order to recover from the various kinds of instability, the democratic system has been adopted. As a result Estonia and India have been undergoing multidimensional transition. Institutional restructuring, democratization of political system and market-oriented economic reforms have assumed key roles in this process. The democracy and political stability in Estonia and India can be traced through various factors like constitution, political party, party system, electoral system and electoral laws, institutional structure, regime stability, stable government and administration, economic development etc. On the other hand frequent changes of the political system, the irregular transfer of leadership, internal war, violent political riots and consequent instability of the governments has led to political instability.

The post independent Estonia and India have undergone multiple transitions in the form of economic, political, cultural and societal. In 1991 Estonia and India transformed from a socialist state to a capitalist state. A major transformation came about on the economic policy front leading to liberalization, privatization and globalization. On the political front institutional structures such as constitution, president, parliament and political parties which are necessary for stable democracy were established. A multi-party system was developed in Estonia after

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ZENITH International Journal of Multidisciplinary Research _____ISSN 2231-5780
Vol.8 (5), MAY (2018), pp. 125-133
Online available at zenithresearch.org.in

AN APPROACH TO POSITIVE REFLECTANCE ON INVENTORY COST BY DEVELOPING EOQ MODEL WITH LINEAR DEMAND BY WEIBULL DISTRIBUTION DETERIORATING ITEMS AND PARTIAL BACKLOGGING

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ABSTRACT

This paper presents a deterministic inventory model with Weibull distribution for the variable Deteriorating items when the demand rate is considered as a linear function of time, in which shortages are acquiesce and partially backlogged. And backlogging rate is also considered as a variable parameter and it only depends upon the next replenishment. The model is then solved for optimal solution to minimize the total inventory cost. Also checked the convexity of the total cost function through the help of graph by using maple 15.A numerical sample is considered to find out the solution.

KEYWORDS: Demand, Deteriorating Products, Inventory, Linear Demand, Partial Backlogging and Shortages.

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Iranian Journal of Organic Chemistry Vol. 9, No. 4 (2017) 2215-2219

IranJOC
Iranian Journal of Organic Chemistry

Synthesis and biological activity of novel 3-(4-methylthio benzene sulfonyl)-2,4-dimethyl/2,4-diphenyl/4-methyl-2-phenyl/2-ethoxy-4-methyl/ 2, 4-diethoxy–1,5-benzothiazepines

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Received: August 2017; Revised: September 2017; October: 2017

Abstract: An efficient synthesis of novel 2,3,4-trisubstituted 1,5-benzothiazepines **5a-e** incorporating sulfonyl group is described. Compounds **5a-e** were synthesized by the reaction of 3-(4-methylthio benzene sulfonyl)-2,4-dimethyl/2,4-diphenyl/4-methyl-2-phenyl/2-ethoxy-4-methyl/2,4-diethoxy propane-1,3-dione **4a-e** with 2-aminobenzenethiol in acidic condition. Formation of compounds **4a-e** were achieved by the reaction of 4-methylthio benzene sulfonyl chloride (**2**) with 2,4-dimethyl/2,4-diphenyl/4-methyl-2-phenyl/2-ethoxy-4-methyl /2,4-diethoxy propane-1,3-dione **3a-e**. The structure of the compounds has been established by elemental, IR, ^{1}H NMR, ^{13}C NMR and Mass spectral analyses. The *in vitro* antibacterial and antifungal activities of the synthesized substituted 1,5-benzothiazepines were investigated against two bacterial strains, viz. *Staphylococcus aureus* and *Klebsiella pneumonie* and two fungal strains, viz. *Aspergillus niger* and *Candida albicans*. The compound 5c was found to more active against all tested microorganisms.

Keywords: Propane-1,3-dione; Substituted benzothiazepine; Sulfonyl compound; Biological activity.

Introduction

Heterocyclic compounds are having profound impact on our modern world coupled with its future. Indeed, the coverage of heterocyclic compounds is vast and constitute important domain for the society viz. energy, environment, biology, medicine, agribusiness and materials. Benzothiazepines have attracted attention as an important class of heterocyclic compounds in the field of drugs and pharmaceuticals [1]. The superiority of *diltiazem* over other conventional vasodilators has resulted in to discovery of other useful compounds in recent years.

The utility of 1,5-benzothiazepines and its derivatives as medicament is well explored. A literature survey reveals the enhanced bioactivity of annulated benzothiazepines, such as antimicrobial [2-8], antipsychotropic [9-11], antihypertensive [12-15], cardiovascular [16-18], antiasthma [19], anticancer [20,21], platelate aggregation inhibitor and Ca antagonist [22-25]. The research on the compounds containing sulfonyl group have been a focus of attention for a long time due to their diversified biological activities. Sulfones occupy a unique position in the drug industry with their antimalarial [26], bactericidal [27-29] and antitubercular activity [30-32]. The sulfone *Depsone* (sulfone) is well known antileprotic drug [33].

The introductions of an alkyl substituent at the desired position in heterocycles are often key intermediate in the synthesis of pharmaceutical drugs. Relatively large number of 1,5- benzothiazepine derivatives having various substituents at position-

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06/12/2017
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ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 9, Issue, 06, pp.51770-51771, June, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

FIXED POINT THEOREMS WITH BEST APPROXIMATION FLAVOR

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ARTICLE INFO

Article History:
Received 10th March, 2017
Received in revised form
13th April, 2017
Accepted 17th May, 2017
Published online 20th June, 2017

Key words:
Best approximation, fixed point, Topological vector space, 1991 Mathematics Subject Classification, Primary 47A15, Secondary 46A32, 47D20.

ABSTRACT

In this paper, we present some fixed point theorems with best approximation flavor. Our results generalize the results of (8) by relaxing the compactness condition of the set X. The original result in this direction was due to (1) for a continuous map defined on a compact convex set.

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Citation: Ravindra Parsai, Jitendra Binwal and Milan Joshi, 2017. "Fixed point theorems with best approximation flavor", *International Journal of Current Research*, 9, (06), 51770-51771

INTRODUCTION

Fixed point theorems are very important tools for providing evidence of the existence and uniqueness of solutions to various mathematical models. Fixed point theory focuses on the strategies for solving non-linear equations of the kind T x = x in which T is a self-mapping defined on a subset of a metric space, a normed linear space, a topological vector space or some pertinent framework. But when T is not a self-mapping, it is possible that T x = x has no solution. Subsequently, one targets to determine an element x that is in some sense close proximity to T x. In fact, best approximation theorems and best proximity point theorems are suitable to be explored in this direction. A well-known best approximation theorems, due to Fan (1969), ascertains that if K is a non-empty compact convex subset of a Hausdorff locally convex topological vector space E and T : K $\rightarrow$ E is a continuous non-self mapping , then there exists an element x in such a way that d(x, Tx) = d (Tx , K). Several authors, including Prolla (1982), Reich (1978) and Sehgal and Singh (1988, 1989), have accomplished extensions of this theorem in various directions. Moreover, a result that unifies all such best approximation theorems has been obtained by Vetrivel *et al.* (1992). Let E be a Linear Hausdorff topological vector space and E* the dual of E.

Let H, X be non-empty subsets of E, we put

$B_H X = \bar{X} \cap \overline{H \quad X}$ and $I_H X = X \cap (B_H X)^c$

where A is the closure of A⊂E and A^c is the compliment of A.$B_H X$ and $I_H X$ are boundary and interior respectively of X relative to H.

1991 Mathematics Subject Classification. Primary 47A15; Secondary 46A32, 47D20. **Key words and phrases.** Best approximation, fixed point, Topological vector space.

Main Results

Relaxing the compactness of X in Theorem 5 of Takahashi(8), we prove the following

Theorem 2.1 Let X be a non-empty weakly compact convex subset of a Linear Hausdorff topological vector space E and T be a continuous mapping of X into E. Then, either there exist $y_0 \in X$ such that y_0 and Ty_0 can not be separated by a continuous linear functional, or there exist $x_0 \in X$ and $g \in E$ such that

$$g(x_0 \quad Tx_0) < 0 \leq \inf_{y \in X} g(x_0 \quad y).$$

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Short Report

Influence of age and gender on the function of postganglionic sympathetic sudomotor axons

KEDAR MAL, HULEGAR A. ABHISHEKH, MAHAVIR PRASAD CHAWLA, TRICHUR R. RAJU, TALAKAD N. SATHYAPRABHA

ABSTRACT

Background. The quantitative sudomotor axon reflex test (QSART) is an autonomic function test to evaluate the function of postganglionic sympathetic sudomotor axons. The QSART is used for research and in clinical assessment of various neurological diseases, but few studies have assessed the influence of age, gender and reported a normative range. We assessed the influence of age and gender on QSART parameters.

Methods. We recruited 61 healthy volunteers (41 men and 20 women) after obtaining written informed consent. The QSART was recorded as per standard protocol after iontophoretic stimulation (using acetylcholine) for 5 minutes. We analysed the sweat response to obtain total sweat production, rate of sweat production and latency time from the start of stimulation to sweat response. We assessed these parameters in the right medial forearm, right proximal leg, right distal leg and right proximal foot.

Results. Men had significantly higher evoked sweat volume and sweat latency period compared to women. A positive correlation was observed between age and evoked total sweat volume. An inverse correlation was noted between age and evoked sweat latency period.

Conclusion. Postganglionic sudomotor function increased significantly with age. Men had significantly higher sweat volume suggesting sympathetic predominance. These results might help establish normative data for the Indian population.

Natl Med J India 2017;30:136–8

INTRODUCTION

The quantitative sudomotor axon reflex test (QSART) is an autonomic function test to evaluate the function of postganglionic sympathetic sudomotor axons.[1] It is characterized by the evoked sweat response which is based on iontophoresis of acetylcholine. Application of small amount of current helps acetylcholine in one compartment of the multicompartmental sweat cell/capsule (a component of Q-sweat apparatus) to stimulate postganglionic sudomotor fibres. Iontophoresed acetylcholine stimulates axonal nicotinic receptors and produces an axon reflex of sudomotor fibres. The neural impulse produced as a result of the activated axon terminal travels antidromically to a branch-point initially, and then travels orthodromically to other nerve terminals leading to release of acetylcholine. Acetylcholine released at the nerve terminals in the neuro-glandular junction binds to M_3 muscarinic receptor of the sweat glands and evokes sweat response.[2] Functional integrity of the postganglionic sympathetic sudomotor fibres results in evoked sweat response. This is modulated by the central neural drive for sweating.[3]

The QSART is used for research and clinical purposes. In particular, studies assessed the QSART in neuropathy,[4,5] diabetes mellitus,[6–8] postural tachycardia syndrome,[9] Parkinson disease[10–12] and familial dysautonomia.[13] However, few studies assessed the influence of age and gender, and reported a normative range.[14,15] Addressing normal physiological variations helps in better understanding of the aberrant values in the diseased state. We, therefore, assessed the influence of age and gender on QSART parameters.

METHODS

We did this study at the Autonomic Laboratory, Department of Neurophysiology, National Institute of Mental Health and Neurosciences (NIMHANS), Bengaluru. We recruited 61 healthy volunteers after obtaining written informed consent. Those with any medical or psychiatric illness, receiving any medication were excluded. They were asked to refrain from taking stimulants such as tea, coffee and smoking for 24 hours. General physical examination was done and anthropometric measurements were taken before the recording. The room temperature was maintained at 23 °C. Volunteers were advised to relax for 15 minutes in the supine position. Sudomotor function was evaluated by the QSART using Q-Sweat device (WR Medical Electronics). The skin surfaces of the recording sites were cleaned with absolute alcohol. Then, meridian electrodes were attached to four sites. These included the right medial forearm (75% distance from the ulnar epicondyle to the pisiform bone, innervated by ulnar nerve), right proximal leg (5 cm distal to the fibular head laterally, innervated by the peroneal nerve), right distal leg (5 cm proximal to the medial malleolus medially, innervated by the saphenous nerve) and right proximal foot (over the extensor digitorum brevis muscle, innervated by the sural nerve). Meridian electrodes were then filled with 10% acetylcholine solution. Then, the components were attached to constant current stimulator Iontophor II (Model 6111PM/DX). Ground electrodes were fixed to the skin at about 5 cm from the recording meridian electrodes.

Once all the components were assembled, the recording of QSART was done using WR Test Works software. The Q-Sweat device uses room air through a desiccant to pick up moisture from the skin. For measurement, this moisture is evaporated inside a capsule where it is transported by airflow to temperature and humidity sensors. Initially, resting sweat was recorded for 10 minutes until the baseline sweat response stabilized. Once

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Rev Argent Microbiol. 2017;49(3):282–288

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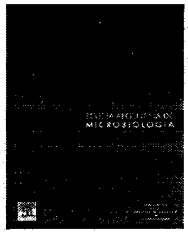

ORIGINAL ARTICLE

Squamocin, an annonaceous acetogenin, enhances naphthalene degradation mediated by *Bacillus atrophaeus* CN4

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Received 5 May 2016; accepted 20 March 2017
Available online 26 May 2017

KEYWORDS
Biofilm;
Gram-positive bacteria;
Squamocin;
Bacillus atrophaeus CN4;
Naphthalene degradation

Abstract Squamocin belongs to a group of compounds called annonaceous acetogenins. They are secondary products of *Annonaceae* metabolism and can be isolated from *Annona cherimolia* seeds. This paper deals with the stimulation of biofilm formation of *Bacillus atrophaeus* CN4 by employing low squamocin concentrations to increase naphthalene degradation. *Bacillus atrophaeus* CN4, isolated from contaminated soil, has the ability to degrade naphthalene as the only source of carbon and energy. In the absence of additional carbon sources, the strain removed 69% of the initial concentration of naphthalene (approx. 0.2 mmol/l) in the first 12 h of incubation. The addition of squamocin in LB medium stimulated *Bacillus atrophaeus* CN4 biofilm formation and enhanced naphthalene removal. Squamocin (2.5 μg/ml) does not affect planktonic growth and therefore, the observed increases are solely due to the stimulation of biofilm formation.

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06/12/2021
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http://dx.doi.org/10.1016/j.ram.2017.03.004
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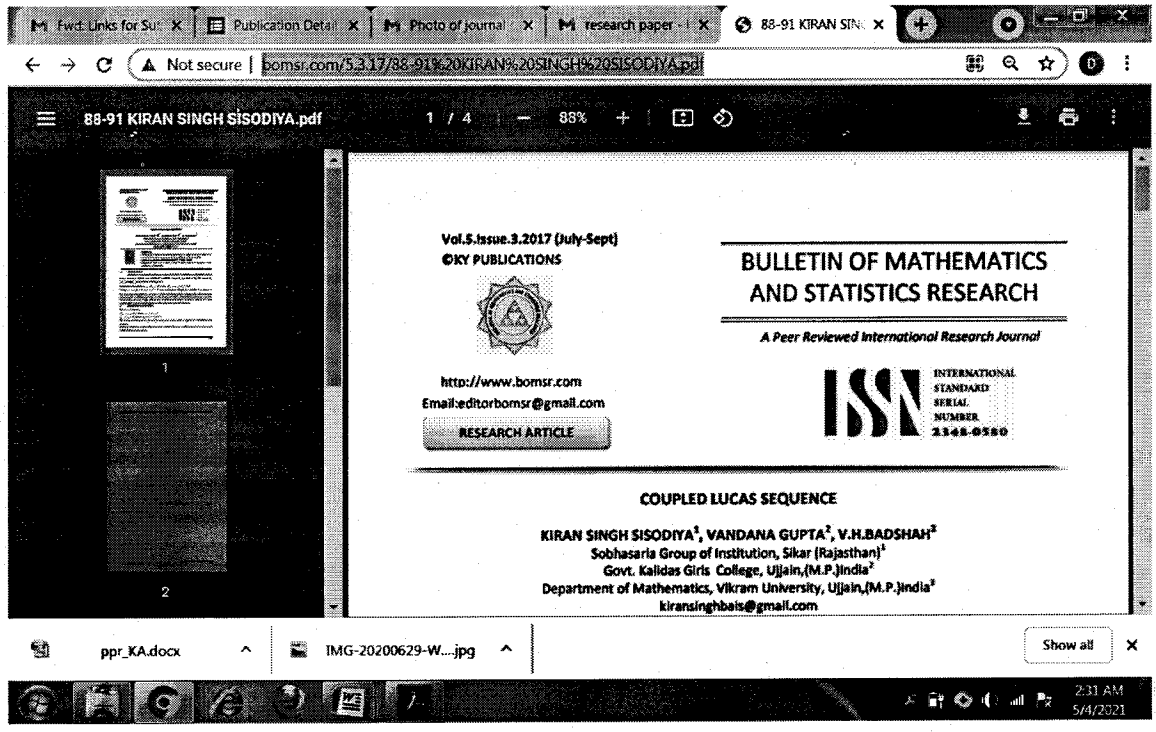

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Vol.5.Issue.3.2017 (July-Sept)
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Email:editorbomsr@gmail.com

RESEARCH ARTICLE

BULLETIN OF MATHEMATICS AND STATISTICS RESEARCH

A Peer Reviewed International Research Journal

ISSN INTERNATIONAL STANDARD SERIAL NUMBER 2348-0580

COUPLED LUCAS SEQUENCE

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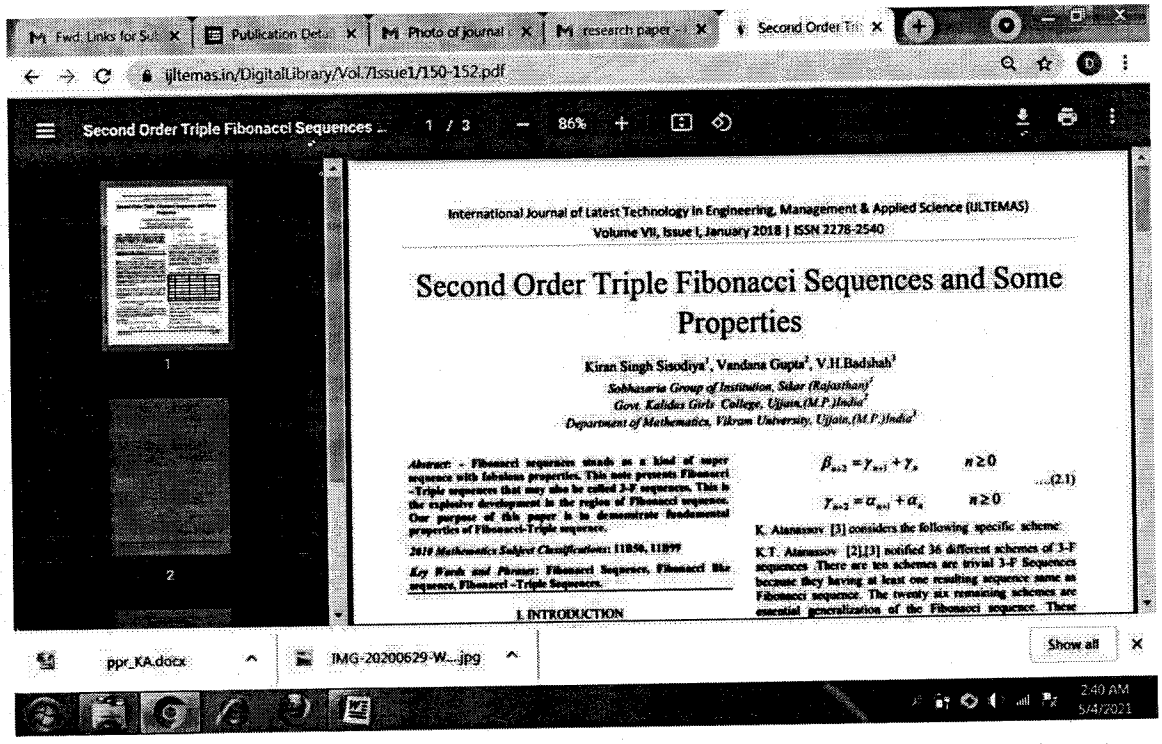

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International Journal of Latest Technology in Engineering, Management & Applied Science (IJLTEMAS)
Volume VII, Issue I, January 2018 | ISSN 2278-2540

Second Order Triple Fibonacci Sequences and Some Properties

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Abstract **- Fibonacci sequences stands as a kind of super sequence with fabulous properties. This note presents Fibonacci -Triple sequences that may also be called 3-F sequences. This is the explosive development in the region of Fibonacci sequences. Our purpose of this paper is to demonstrate fundamental properties of Fibonacci-Triple sequence.**

2010 Mathematics Subject Classification: **11B50, 11B99**

Key Words and Phrases: **Fibonacci Sequences, Fibonacci like sequence, Fibonacci -Triple Sequences.**

I. INTRODUCTION

$$\beta_{n+2} = \gamma_{n+1} + \gamma_n \qquad n \geq 0$$
$$\gamma_{n+2} = \alpha_{n+1} + \alpha_n \qquad n \geq 0 \qquad \ldots(2.1)$$

K. Alanassov [3] considers the following specific scheme:

K.T. Atanassov [2],[3] notified 36 different schemes of 3-F sequences. There are ten schemes are trivial 3-F Sequences because they having at least one resulting sequence same as Fibonacci sequence. The twenty six remaining schemes are essential generalization of the Fibonacci sequence. These

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Hydrostatic Pressure Sensor Using High Birefringence Photonic Crystal Fibers

N. Ayyanar, D. Vigneswaran, Mohit Sharma, M. Sumathi, M. S. Mani Rajan, and S. Konar

Abstract—This paper presents a novel hydrostatic pressure sensor using high birefringence photonic crystal fibers (PCFs), featuring an enhanced sensitivity with wide range of detection along the length of fiber. The proposed PCFs exhibit higher order of birefringence as $\sim 10^{-2}$, which is achieved by the introduction of two elliptical hollow channels stressed at major axis in the cladding region. The consequence of these two elliptical air holes is investigated to enhance the pressure sensitivity. This paper promises to yield very large pressure sensitivity of 87.5 pm/MPa through its transmission spectrum at a pitch constant of 1.5 μm with 0.468 μm of minor axis of elliptical cladding in a fiber length of 1 cm.

Index Terms—Photonic crystal fiber, elliptical air hole, birefringence, pressure sensor.

I. Introduction

IN 1996, Russell and his coworkers demonstrated fibers with air holes called as photonic crystal cladding and this idea was implemented for various sensing applications. In general, PCF's are made from a single material like silica with microscopic air holes running along the length of the fiber. Modification of several parameters such as periodic arrangement of air holes also called as hollow channel, pitch constant of air hole, air hole shape, refractive index of the fiber materials (glass, liquid, gas). All different application of desirable optical properties are studied such as birefringence, walk off [1]–[5], anomalous dispersion [5], [7], [8] and nonlinearity [7], [8] in earlier decades. In recent days, PCFs have also attracted and gained much importance in sensing application [9]–[13]. In that era, the most attractive features in sensing are brought by pressure sensor. Pressure measurements are required in various industrial applications within extremely harsh environments such as turbine engines, compressors, oil and gas exploitations, power plants and material processing systems. Conventional sensors are often difficult to apply due to the high temperatures, highly corrosive agents or electromagnetic interference that may be present in those exacting environments. Pressure sensors based on optical fiber have been proved themselves successful in such environments due to their high sensitivity [14]–[19]. The sensing mechanism of pressure can be implemented with help of both conventional fiber and PCFs. Due to having of much attraction in PCFs, on the other hand, light is trapped in the core providing much better wave guide to photons than standard fiber optics. It is also desired to give better sensitivity through various configurations. Even though various pressure sensors [20], [21] has been proposed and reported about its sensitivity such as using hollow core PCFs [22], Sagnac interferometer [10] but, it is not considered reliable promotion due to having of less structure compactness. So far, recent days, the lacking of structure compactness is further reduced by introducing dual-core photonic crystal fiber (DC-PCFs) which is considered as most significant candidate in sensing application as its having feasible compact structure for fiber cross section. In that generation, Initially (DC-PCFs) was reported about its sensitivity [23] as 3.475 *pm*/MPa and for side hole dual core PCFs [24] is reported as 32 *pm*/MPa. Then the sensing compactness is further improved by introducing mechanical asymmetry at the fiber cross section which can be made by introducing of asymmetry near to the core region. The change in the shape of the fiber elliptical core is done by implementing some external stress or by modification in the air holes which lies in the core area region and they are also called as high birefringence PCF (HB-PCF). With this structural technique, He *et al.* [25] has reported the sensitivity of asymmetrical elliptical air hole DC-PCFs as 50.6 *pm*/MPa but they didn't discuss about the effect of birefringence. Fiber birefringence is an important optical property, which has been exploited in coherent optical communications as well as in the fabrication of fiber optic sensors [26]–[30]. In the present article, HB-PCF by incorporating two elliptical hole cladding near to the core region is proposed. This rare combination of high birefringence with anomalous dispersion is best suitable for high bit data rate communication and sensing application. The fiber made up of with silica glass has more than two fold crystalized stable than that of other soft glass materials [31]. So, these types of fiber are mechanically strong enough to hold pressure upto 900 MPa [24], [29], [30]. This fact is motivated in many research works to investigate the pressure sensitivity upto 900MPa. The range of 100-900 MPa applied hydrostatic pressure is investigated, which are required in various industrial applications. The proposed PCFs can be

Manuscript received September 13, 2016; revised November 23, 2016; accepted December 1, 2016. Date of publication December 14, 2016; date of current version January 6, 2017. The associate editor coordinating the review of this paper and approving it for publication was Dr. Anna G. Mignani. (*Corresponding author: Mohit Sharma.*)

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Digital Object Identifier 10.1109/JSEN.2016.2636242

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JOURNAL OF OPTOELECTRONICS AND ADVANCED MATERIALS Vol. 19, No. 7 - 8, July – August 2017, p. 469 - 474

Modal analysis and cutoff condition of a double-clad archimedean spiral shaped lightguide

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A simple analytical approach, based on scalar wave approximation, is employed to study the modal propagation characteristics of a new type of double-clad optical waveguide with an Archimedean spiral shaped cross-section. By using the boundary conditions under the weak-guidance approximation in appropriate orthogonal coordinates, for the proposed structure, we obtain a modal eigen value equation. By solving the equation, we plot dispersion curves and comparing these curves, numerical results based on cutoff frequencies and the number of modes, are discussed. As we increase the inner cladding width, the cutoff V-value also increases and waveguide offers a single mode up to V=13.8. An attempt has been made to compare our results obtained for doubly clad optical waveguide with a single clad waveguide having the cross - section of the same shape under similar conditions. It is noted that the double-clad Archimedean spiral waveguide provides an additional degree of freedom to control the cutoff frequencies and monomode operation, where the inner cladding width can tailor the cutoff conditions within a certain limit.

(Received December 9, 2016; accepted August 9, 2017)

Keywords: Archimedean, Waveguide, Monomode, Dispersion

1. Introduction

Optical waveguides with different core-geometries have been analysed during the past decades, and unconventional waveguides have aroused great renewed interest in exploring a wide variety of such core cross-sections. One of the reasons of studying non-circular cross-section in a waveguide is to investigate the effect of distortion in the usual circular cross-section; however such distortion may not always be of symmetrical nature. In 1969, Marcatili [1] first analyzed the modal dispersion features of a rectangular core guiding structure with an analytical solution, whereas Goell [2] demonstrated dispersion characteristics of the rectangular waveguide using numerical and computer based calculations. Many no-circular waveguides with a variety of characteristics, having immense scope in integrated optics, have been analyzed [3-15].

The propagation characteristic of waveguide can be highly affected by introducing claddings of new materials [16-19]. Waveguides with more than one cladding layers, e.g. doubly clad M-profile and W-profile waveguides are found to be of great importance in research. Such double-clad waveguides [20-22] control their propagation characteristics offering some additional degree of freedom. Investigators have already proposed many optical waveguides with double layer or multilayered structures.

Although the unconventional core-geometries offer a number of applications, there are a few limitations for tailoring propagation characteristics dynamically in time that can be overcome by using smart materials like chiral, liquid crystal and plasma [22]. Among them single mode fibers [23-26] have great advantages in communication that can also be achieved by using double-clad waveguide with smart unconventional structures. The basic advantages of these type of waveguide is to have low dispersion over a wide wavelength range and also attractive for high-bit-rate light wave communication system [22].

Song and Leonhardt [27] have employed and demonstrated the ray-optics approach to calculate the single mode conditions of rectangular waveguides faster than those compared with the physical-optics. It offers visualized-oriented approach to analyze the propagation through three-dimensional waveguides, whose results are in a very good agreement with those obtained by the researchers with vectorial computer simulation techniques.

In recent, Grote and Bassett [28] have also suggested a waveguide design using negative high refractive-index substrates, where they propose that such geometry can be adapted for any high-index substrate material leading to offer platforms for nonlinear photonics. Kawakami *et al.* [29] determined the bending loss of a doubly clad slab waveguide in which the core has the largest refractive index, and the inner cladding has the lowest and demonstrated the drastic reduction in bending losses by inserting low-index inner claddings between the core and

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Journal of Science and Arts Year 17, No. 4(41), pp. 829-838, 2017

ORIGINAL PAPER

OPTICS OF SINGLE COLD PLASMA FOR PHOTONIC APPLICATIONS

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Manuscript received: 01.07.2017; Accepted paper: 22.09.2017; Published online: 30.12.2017.

Abstract. *In the present paper, we have discussed the optical properties of a single cold plasma layer with varying applied static magnetic field, here the electric permittivity of the cold plasma (intrinsic) is dependent on the applied magnetic field. The gyro frequency of such plasma is related to the applied magnetic field. The applied magnetic field affects the refractive index of the plasma for certain incident frequencies and we have obtained negative value of the real part of the permittivity (ε') when the value of imaginary part of the permittivity (ε") becomes maximum for a particular incident frequency. Our observations revealed that a single layer of the cold plasma may be used as a perfect reflector and transmitter for certain values of the applied magnetic field and frequency. It is found that the static magnetic field acts as a controlling factor for optical behaviour of the cold plasma layer and this analysis can be useful for several photonic applications, including optical mirrors, transmitters, and sensors.*

Keywords: *Single cold plasma, perfect reflector, perfect tunneling behavior, photonic applications.*

1. INTRODUCTION

The pioneer work of Yablonovitch and John in 1987 sparked a new idea in the field of photonic crystals (PCs)[1, 2]. The study of photonic crystals has become popular and continues to be more excited for the optical community till today. The essential physics of photonic crystals has unique property due to a band gap and such structures are called as photonic band structure (PBS). The PBS is analogous to the electronic band structure (EBS) in solids. Photonic crystals have received emerging attention in the field of solid state and optical physics due to exhibition of many unique features [2, 3]. The photonic band gap (PBG) prohibits the propagation of an electromagnetic wave of certain frequency through it or the periodic structures. Different periodic materials have been admitted to study and design tunable PBG materials.

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ISSN: 1844 – 9581 Physics Section

06/12/2024
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International Journal of Biology Research
ISSN: 2455-6548
Impact Factor: RJIF 5.22
www.biologyjournal.in
Volume 3; Issue 1; January 2018; Page No. 273-277

Effect of industrial effluents on morphological characters evaluated through green technology in edible vegetables

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Abstract
In the present work, the effect of heavy metals were observed on morphological changes in the green vegetables grown in the vicinity of field area near to discharge of dravyawati waste water. It was observed experimentally that there are adverse effects over the radish and brinjal vegetables. These attributes were studied in terms of morphological changes w.r.t. control plants including seed germination %, seed vigor index(SVI), Length of root/shoot (cm), ratio of R/S, Length of cotyledon(cm), Number of cotyledon (%),color of cotyledon, total length of seedling(cm), modified seedlings (twisted, stunted or seedlings with lateral roots).

Keywords: green vegetables, morphological changes, seedlings, waste water

Introduction
The control sites were Department of Botany, University of Rajasthan (Site-I) and Shikarpura, Sanganer (Site - II) and the polluted sites were Govindpura (Jotadawala), Sanganer (Site - III) and near Shikarpura Flyover, Sanganer (Site-IV) of Amanishah Nalla. The whole experiments were carried out during the period of May 2009 to May 2012. Water and soil samples from control and polluted sites were collected for performing water and soil analysis. Plant materials were collected from the plants raised both from control as well as polluted sites for various aspects namely seed germination, morphology of seedlings and mature plants; cytological, biochemical and heavy metal analysis. These experiments were performed on radish and brinjal separately by considering average values for different parameters. Each experiment consisted of 100 seeds per treatment. The plants were raised in randomized block designs. The space between two plants in a row as well as between rows was one feet. Detailed methodologies of different aspects were mentioned in their respective sections.

Materials and Methods
Seed germination was carried out through Roll-paper- towel method (Anonymous 1990). 100 certified seeds each of brinjal (S. melongena var. esculentum) and radish (R. sativus var. daikon, Japani white) per replicate were taken for the experiment. Seeds were soaked overnight in tap water and considered as control ones. Seeds were soaked overnight in industrial effluent polluted water of Nalla. 100 seeds per replicate and three replicates for each species were used. After soaking, they were placed on the blotter sheets for germination and data for seed germination % and seedling morphological characteristics were gathered after 6th day. Each experiment was carried out in three replicates. Seed germination % and seedling morphological characteristics include comparative study of parameters like number of days of initiation of germination, type of germination, day of maximum germination, germination percentage, length of root, length of shoot, root-shoot ratio, length of cotyledon, number of cotyledon, colour and nature of cotyledon, total length of seedling, seed vigour index and seedling abnormalities. These parameters were studied in both radish and brinjal after the treatments of tap water and Nalla water with industrial effluents. The data of comparative study of seedling morphological characters are summarized in Table. 1 and Table. 2.

Results and Discussion
Seedling Morphological characteristics in Brinjal
Germination of seeds began on 2nd day after seed wetting in all the types of seed treatments. Germination of seeds continued up to 8th day after the initiation of germination. Maximum germination occurred on 4th day after radicle emergence.
Germination percentage was found to be 92% at control site (site I) which becomes reduced at Nalla water treated sites (site III -75 % and site IV-63%. Seeds showed epigeal type of germination.
Seed Vigour Index (SVI) was found to be 603.60 in control site (site I), 520.75 in site III and 539.02 in site IV (Table - 1).
The average length of root in control seedlings at Site I was 5.19 cm. In Nalla water-treated seedlings, the length was 5.45 cm at site III and reduced (4.76 cm) at site IV (Fig. 1).
The average length of shoot of seedling was 3.87 cm at site III, 4.12 cm in control at site I and 2.87 cm at site IV (Fig. 1). In control seedlings at site I, root-shoot ratio was found to be 1:1.26; while at site III, it was 1:1.41 and 1:1.69at site IV.
The average length of cotyledons in control seedlings at site I was 0.83 cm, 0.61 cm at site III and 0.72 cm at site IV (Fig. 1). 4.2% of seedlings at site IV were found to be of monocotyledonous type. (Table 1) Generally seedlings were dicotyledonous and smooth in nature.

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International Journal of Advanced Science and Research
ISSN: 2455-4227
Impact Factor: RJIF 5.12
www.allsciencejournal.com
Volume 3; Issue 2; March 2018; Page No. 01-04

Bioremediation of heavy metals and organic pollutants through green technology

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Abstract
Human activities have increased pressure on the natural resources and become the source of a myriad of pollutants. Recent advancing in biotechnology, bioremediation has become one of the most rapidly developing fields of environmental restoration, utilizing microorganisms to reduce the concentration and toxicity of various chemical pollutants, such as organic and inorganic compounds, industrial solvents and pesticides etc. Currently, extensive research is being focused on finding an optimal microbial biomass that would be as cheap as possible for the removal of contaminating products from large volume of polluted area. Bioremediation is emerging as an effective and attractive management tool to treat and recover the environment, in an ecofriendly manner. Bioremediation has been used at a number of sites worldwide, with varying degrees of success. Bioremediation, both in situ and ex situ have also enjoyed strong scientific growth, in part due to the increased use of natural attenuation, since most natural attenuation is due to biodegradation. Bioremediation technology, which leads to degradation of pollutants, may be a lucrative as well as environmentally friendly alternative.

Keywords: pollutants, bioremediation, biodegradation, microbial biomass, ecofriendly

Introduction

Chemicals are part of our daily life. All living and inanimate matter is made up of chemicals and virtually every manufactured product involves the use of chemicals. Many chemicals can, when properly used, significantly contribute to the improvement of our quality of life, health and well-being. But other chemicals are highly hazardous and can negatively affect our health and environment when improperly managed. If the final product contains high heavy metals concentration it may be noxious to soil, plants and human health. Heavy metals uptake by plants and successive accumulation in human tissues and bio magnifications through the food chain causes both human health and environment concerns.

According to the Stockholm Convention on Persistent Organic Pollutants, 9 of the 12 persistent organic chemicals are pesticides. Classes of organic pesticides (consisting of organic molecules) include organochlorine, organophosphate, organometallic, pyrethroids, and carbamates among others (Stockholm, 2011) [12]. Most pesticides cause adverse effects when reaching organisms. The intensity of the toxic effect varies with time, dose, organism characteristics, environmental presence or pesticide characteristics. Their presence in environment determines the dose and time at which an organism is exposed and could represent a hazard for worldwide life due to their mobility. Hence, the persistence in the environment leads to a risk for life: the more persistent a pesticide is, the worse its environmental impact. Unlike organic pollutants, heavy metals do not decay and thus pose a different kind of challenge for remediation. Currently, plants or microorganisms are tentatively used to remove some heavy metals.

Bioremediation is a waste management technique that involves the use of organisms to remove or neutralize pollutants from a contaminated site. Technologies can be generally classified as in situ and ex situ. *In situ* bioremediation involves treating the contaminated material at the site, while *ex situ* involves the removal of the contaminated material to be treated elsewhere. Bioremediation looks at the whole system, the living soil communities and aims to restore the maximum health, diversity and life.

Research is underway at a number of facilities using exogenous, specialized microbes or genetically engineered microbes to optimize bioremediation (Hassan *et al*., 2003) [3].

The process of biodegradation is a well-established and powerful technique for treating domestic and industrial effluents. A microbial population has an amazing and extensive capacity to degrade a variety of organic compounds (Manogari *et al*., 2008) [9].

A successful, cost effective, microbial bioremediation program is dependent on hydro geologic conditions, the contaminant, microbial ecology and other spatial and temporal factors that vary widely. Microbiological assays are carried out to assess microbial growth conditions, population densities and presences of enzymes capable of destroying contaminants of concern and microbes studies to evaluate bioremediation potential under controlled conditions.

During implementation of microbial bioremediation programs, performance monitoring plays a key role in evaluating treatment. Properly executed, microbial bioremediation is cost effective and expeditiously destroy or immobilize contaminants in a manner that human health and environment requires (Gadd, 2000) [3].

Bioremediation is an innovative technology that frequently being chosen for the cleanup of polluted sites. Recent research expanding the capabilities of these technologies, along with it generally lower cost, has led to bioremediation becoming an

06/12/2021
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Research Article ISSN 2250-0480 VOL 8 / ISSUE 2 /APRIL 2018

International Journal of Life science & Pharma Research

COMPARATIVE BIOCHEMICAL PROFILE OF GREEN VEGETABLES

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ABSTRACT

The biochemical profile of the green vegetables is being compared which is grown in controlled and polluted water of Dravyawati river, Jaipur. These biochemical attributes were studied on the basis of quantification of Ascorbic acid, Lipid, Protein, Starch, Total soluble sugars, Chlorophyll, Carotenoids and Nucleic acids (DNA/RNA). Two economically important plants namely Radish (Raphanus sativus L. var. Daikon, "Japani white") and Brinjal (Solanum melongena L. var. esculentum, "PPL/PPR") Omaxe hybrid seeds commercially supplied by Raunak Seeds Limited, New Delhi were taken as experimental material. In this article, the toxic effects of industrial effluents on the growth and various biochemical characteristics on these vegetables were studied. The outcome of quantitative analysis of primary metabolites and other biochemical characteristics in whole plants as well as fruits grown in control and polluted water conditions have suggested that the water quality is not suitable for irrigation and increases the level of toxicity in vegetable crops.

KEYWORDS: *biochemical, quantification, industrial effluents, metabolites*

INTRODUCTION

The primary metabolites are the most significant characteristics to study the level of manipulated levels of toxicity in the agricultural field due to drainage of industrial effluents from water bodies. The polluted water contains various heavy metals that results in toxicity. The effect of lead on the phytochemistry of *Tithonia diversifolia* exposed to road side automotive pollution leads to detrimental toxicity in environment. The concentration of Pb in leaves and roots of plants from heavy traffic roadside was higher than of plants from light traffic site. The content of Cr, Al, Fe, Cu and Ni was also higher in leaves but not in root plants from the polluted site. Pb contaminated leaves and roots showed higher acid phosphatase activity while the foliar nitrate reductase activity and specific leaf mass were lower and an increase of leaf phenol concentration was observed[1]. The impact of sugar factory waste water on chlorophyll content disturbs carbohydrate and biomass production of *Triticum aestivum* var. Malvia-212. It was found that concentrated effluents reduced all these contents significantly and it was attributed to the reduced number of leaves and leaf area. The reduced growth and biomass was result of high concentration of soluble salts and heavy metals[2]. The influence of zinc on physiological and biochemical parameters was studied to elucidate the mechanism of Zn resistance in *Phragmites australis*. Zn concentrations in roots, stems and leaves increased with exogenous Zn concentration, while Zn content in roots was much higher than in shoots[3]. Accumulation of polycyclic aromatic hydrocarbons (PAHs) and heavy metals (HMs) reported in crop plants from contaminated soils were observed. A greenhouse pot experiment using lettuce (Lactuca sativa) as a representative vegetable was conducted to assess the concentrations of PAHs and HMs in vegetables grown in wastewater-contaminated soils. This study highlighted the potential health risks associated with cultivation and consumption of leafy vegetables on wastewater-contaminated soils[4]. The biochemical changes were investigated in isolated roots of *Phragmites australis* treated with industrial waste water. Phragmites australis is a plant that adapts well to oxidative stress generated by waste water from industrial sources resulted in high levels of proline (indicator parameter of stress). This stress caused the activation of detoxification involving the use of anti-oxidant

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ISSN: 2319-0596

07

History Writing in Manipur

Nopemcha Them Robin Singh

Introduction: Puyas as sources

Every society has a historical consciousness, which is not always visible and has to be probed from sources which tends to conceal it. In Meitei tradition too, there existed a body of writings especially devoted to religion, chronology, and history of the Meiteis from which much valuable and authentic information could be derived. These are the puyas. Puyas have not uniformly found recognition as an important branch of Meitei literature and source of Manipur history. In fact, it was the western scholars who started the early studies of the puyas. Puyas may be defined as written records handed down from generation to generation among the Meiteis.

The writing of the puyas was carried out by the palace malchous who were the 'official scribes'. In the loisang or 'Institution of scribes', Dr. Grierson preferred to call these malchous a 'guild' who presented their works to the Meitei kings who were originally their patrons. They are the records of generations that their forefathers were [illegible] important [illegible] preserved in the encyclopedic tradition [illegible]

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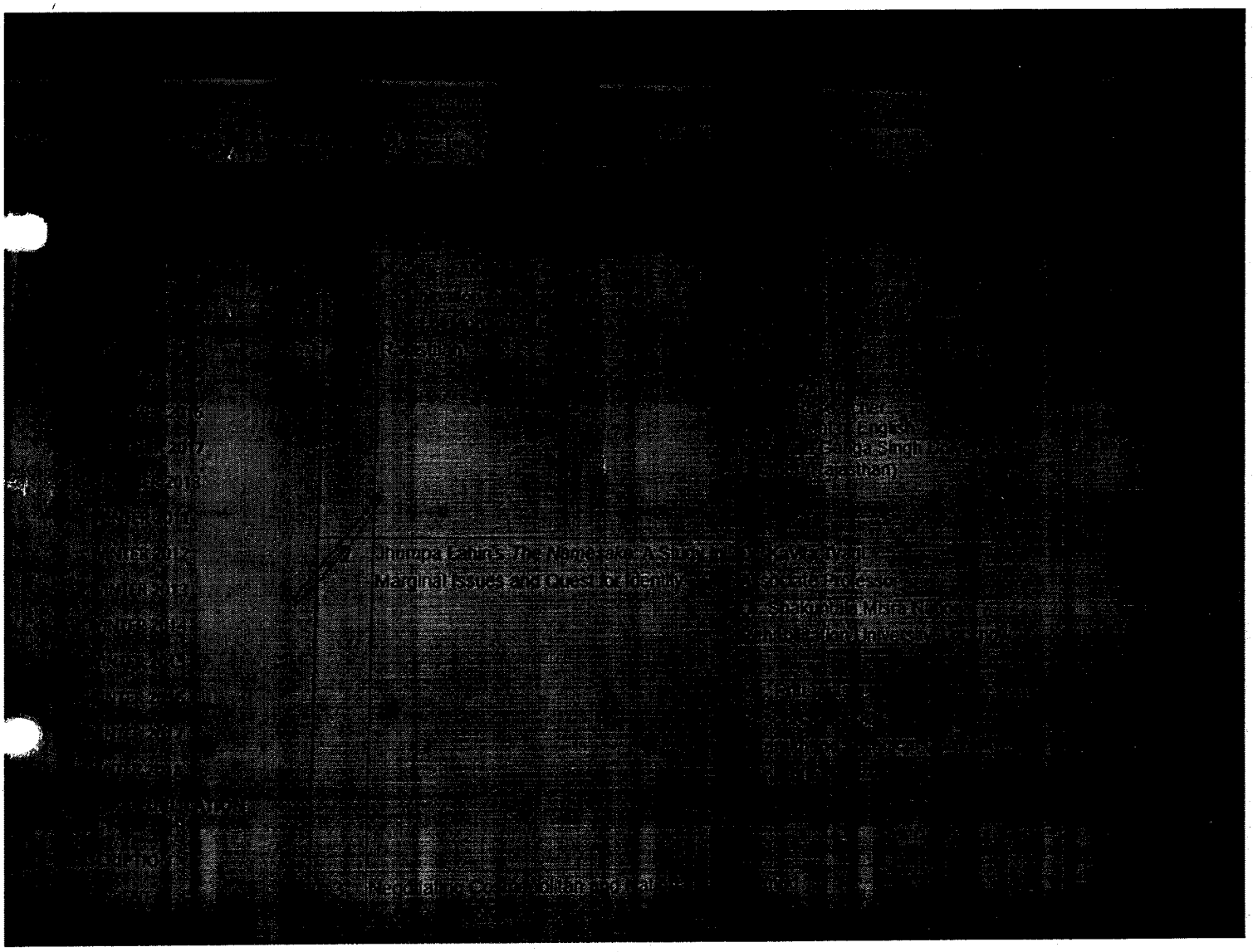

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ELT Voices- International Journal for Teachers of English
Volume (7), Issue (2), 22-27 (2017)
ISSN Number: 2230-9136
(http://www.eltvoices.in)

Developing Soft Skills among Indian Engineering Graduates: Problems and Solutions

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Abstract: The world has changed over the last century, so has the world of work, where employers are highly concerned with the skills of young labour market entrants as they are facing difficulties in filling vacant positions. Their difficulty in finding the skilled candidates stems from two sources: Skills Shortage (lack of appropriately skilled graduates at a particular level of education and in the right field of study) and the Skills Mismatch (Adequate number of graduates with requisite education but lacking in appropriate job skills). The employment market is becoming more and more competitive as greater numbers of students are undertaking higher education courses and, therefore, Skills Shortage is no longer a problem. The main problem is the Skills Mismatch as the employers are looking for the professionals who have more to offer than simply a good degree. The major setback here is that plagued with problems like curriculum, lack of qualified faculty, poor quality of content, and not-so-effective examination system, technical institutions do not provide signaling value in the job market, for a disparity exists in the types of skills taught at colleges and those that are demanded in industry and the gap exists mainly because there is a lack of clear understanding regarding industry skills requirements. Therefore, it is critical to identify specific bottlenecks in skills demanded by employers, and to provide detailed information and practical suggestions to overcome the skills shortage. An attempt has also been made here to probe the causes of skills gap by understanding the industry's workforce requirements and to provide an adequate and comprehensive coverage on the theoretical as well as practical domains in the field.

Index Terms: Skills Gap, Skills Mismatch, Bottlenecks, Skepticism, Industry Skills Requirement, Employment

In order to promote engineering graduates' employability within an increasingly competitive and global business environment, engineering institutes need to develop programmes in which undergraduates are actively encouraged to acquire and hone soft skills. But the problem is that a disparity exists in the types of skills taught at colleges and those that are demanded in industry and the gap exists mainly because there is a lack of clear understanding regarding industry skills requirements. Therefore, an attempt has been made here to identify specific bottlenecks in skills demanded by employers, and to provide detailed information and practical suggestions to overcome the skills shortage. This will enable institutions of higher learning to design new curriculum and to redesign the existing ones to be market-driven. It will also be helpful in providing inputs for all the necessary changes in the teaching techniques, considered necessary to prepare future business leader with the skills necessary for the 21st century workplace. This information will be invaluable in designing courses and facilitating placements. There is also an increasing demand for such information from teachers, administrators and pol-

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Open Phys. 2017; 15:74–86 DE GRUYTER OPEN

Research Article Open Access

Rishi Kumar Pandey and Hradyesh Kumar Mishra*

Semi- analytic numerical method for solution of time-space fractional heat and wave type equations with variable coefficients

DOI 10.1515/phys-2017-0009
Received September 14, 2016; accepted December 15, 2016

Abstract: The time and space fractional wave and heat type equations with variable coefficients are considered, and the variable order derivative in He's fractional derivative sense are taken. The utility of the homotopy analysis fractional sumudu transform method is shown in the form of a series solution for these generalized fractional order equations. Some discussion with examples are presented to explain the accuracy and ease of the method.

Keywords: He's fractional derivative, Fractional partial differential equation, Heat equations, Homotopy Analysis Fractional Sumudu Transform Method, Wave equation

PACS: 02.20.Sv, 47.15.–x, 44.40.+a, 44.10.+i

1 Introduction

The partial differential equations involving the variable order derivatives provide the more accurate results, instead of integer order conventional derivatives in many physical applied mathematical models. In the last two decades many mathematicians and scientist have shown great interest in the use of fractional derivatives in many senses like caputo [1, 2], Riemann–Liouville [1], Riesz derivative [3], Weyl derivative[4] etc. Some basics of fractional differential equations have been discussed in engineering and physics [1],[5–7].

Many fields are conventionally using the fractional partial differentiation and fractional integration, and few are in initial stage. Some applications can be found in image processing, plasma physics, nonlinear control theory, biological modelling, and astrophysics etc. [8–16].

Hu et al. [17] provide the fractal space-time scales observation based on a smaller threshold model in micro and nano scale with smoothness. The practical aspects of the model are discussed by Ji-Huan He in his fractional derivative.

A space and time fractional wave and heat equations are the linear integro partial equations arising mainly in conventional diffusion or wave equations using the fractional derivative of arbitrary order instead of the conventional derivative [18]. The result of the space–time fractional wave equations have many applications. For example, to investigate the Brownian diffusion, unification of diffusion and propagation phenomena of a wave, sub –diffusion systems, and random walk [19–22].

Some attempts are investigated to solve the multi–term space–time fractional derivatives by the Variational iteration method [23], Adomian decomposition method [24], Homotopy analysis method [25], and Homotopy perturbation method [26, 27].

The main purpose of the present manuscript is to apply the homotopy analysis fractional sumudu transform method (HAFSTM) [28–30] to evaluate the discussed problem and obtain the approximate converging series solution. In this discussion, we also evaluate the solution for both domains of space and time with lucid manner implementation, which was not previously discussed in the available literature, and also incorporating the balance of convergence of the fractional term presented by graphs in numerical experiments.

2 Preliminaries and Notations

This section contains the brief portrayal of the active possession of the idea of obtaining the solutions with adequate theory of fractional calculus, which facilitate us to obtain the solution of the problem specified in this manuscript. Basic definition of, Riemann –Liouville, Caputo, derivatives and sumudu integral transform and ex-

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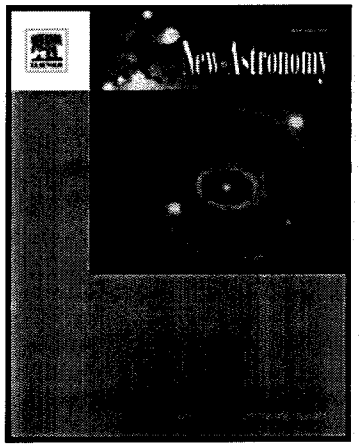

Numerical simulation for solution of space–time fractional telegraphs equations with local fractional derivatives via HAFSTM

Rishi Kumar Pandey, Hradyesh Kumar Mishra

PII: S1384-1076(17)30092-1
DOI: 10.1016/j.newast.2017.06.009
Reference: NEASPA 1109

To appear in: *New Astronomy*

Received date: 19 March 2017
Revised date: 4 June 2017
Accepted date: 26 June 2017

Please cite this article as: Rishi Kumar Pandey, Hradyesh Kumar Mishra, Numerical simulation for solution of space–time fractional telegraphs equations with local fractional derivatives via HAFSTM, *New Astronomy* (2017), doi: 10.1016/j.newast.2017.06.009

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The Criterion: An International Journal in English Vol. 8, Issue-IV, August 2017 ISSN: 0976-8165

Invention of New Paradigms for Women's Identity in Githa Hariharan's *The Thousand Faces of Night*

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Article History: Submitted-31/07/2017, Revised-31/08/2017, Accepted-04/09/2017, Published-10/09/2017.

Abstract:

The predicament of the new woman has become an important concern for Githa Hariharan. The new woman is not the contemporary woman or even the modern woman. The concept of modernity keeps changing from time to time and from one social milieu to another. Githa Hariharan presents today's intellectual woman who confronts loneliness and alienation. Modern woman makes all possible adjustments but does not compromise on her basic personality. This problem of adjustment is highlighted by Githa Hariharan's novel. She widens her field of vision to include the periods of Mahabharata and Ramayana so that the plane of her experience of woman's dilemma acquires a universality that goes beyond the time barrier and culture bo[illegible]ty to the issues heightened in her fiction. Balram Gup[illegible]iharan's novel draws upon feminine counter pull to dominant patriarchy. He comments: "Thousand fa[illegible]s symbolize the

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International Journal of Engineering Technology Science and Research
IJETSR
www.ijetsr.com
ISSN 2394 – 3386
Volume 4, Issue 7
July 2017

Abhorent Caste In Indian Fiction With Special Reference To Bhabani Bhattacharya's *He Who Rides A Tiger*

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Abstract: *This study highlights the novel as a hope of Ambedkar's goal of annihilation of caste from Indian society, a backlash against the age-old caste system. It contextualizes caste hierarchy prevailing in India. It deals with the issues of marginalization of lower caste people, their lack of voice and their subjectivity as reflected in the novel.*

This study has investigated that caste was not only in past but in present scenario also is a definitive aspect of Indian society. It is depiction of the human feelings and aspirations of the lower caste people, their attempts to create a new order, the dangers and difficulties which confront them in their task. Through this study we will try to understand casticism in India with a different perspective. It reveals that casticism will no longer remain a silent sage of human miseries and sufferings but will become a vocal protest. The selection is entirely subjective, offered as personal recommendations.

Index Terms: Caste, Annihilation, Contextualization, Marginalization.

Caste has been an integral part of Indian social system since ancient times. Over the centuries caste has continued to regulate the Hindu society. According to Louis Dumont in "Homo Hierarchicus"- Indian society was structured on a firm notion of hierarchy that was based on the relationship between the pure and the impure. It is more of a religious than political or economic notion. He also points out the prevalence of traditional hierarchy which was based on "varnas" or colours, whereby people were divided into four categories namely Brahmins, Kshatriyas, Vaishyas and Sudras; and untouchables are outside the classification.

There are numerous stories of injustice towards Dalits appearing on pages of newspapers, TV screens, social media, which make us aware of the atrocities, the impunity of perpetrators and the backlash of the sufferers. Literature is the oldest form of human activity. It expresses human emotions. The writer is the child of his environment. No writer can remain aloof to the things happening around him and Indian writers writing in English have not been an exception to this. In nineteenth century several books in Bengali and some in English, were written dealing with caste related sufferings and injustices. Books like "Rajmohan's Wife"," Anandmath"," Kapalkundala"," Durgeshnandini", "The Lake of Palms", "Kamala and Kamini", came into criticizing the custom-ridden society and the evils of caste system. Mulk Raj Anand and Raja Rao in more recent times dealt with social problems in their works. Mulk Raj Anand like Dickens and H. G.Wells, tried to bring about social reform. His "Untouchable" is a land mark in social novels. Bhabani Bhattacharya who was awarded the Sahitya Academy Award in 1967 portrayed burning problems of India in,"So Many Hungers" and "He who Rides a Tiger" and his other novels. Kamala Markandya, Probin Jhabwala, B. Rajan also focussed attention on alienation, poverty, and loss of values in society. Khushwant Singh, Manohar Malgaonkar brought out the terror and the bloodshed of the partition. Writers like Nayantara Sahgal, Anita Desai, Chaman Lal, examine the socio-political conditions of India. Arundhati Roy and Githa Hariharan have enriched Indian English fiction by their commitment and vitality. This study is deeply concerned with the suffering and pain of downtrodden. Caste is present here as one of the factors inspecting human relations and attitudes.

"An artist is a Dionysian ear where resound all the underground rumblings of the period, a super-sensitive seismograph which records the most secret movements stirring the world which surrounds him".(1) Like

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International Journal of Engineering Technology Science and Research
IJETSR
www.ijetsr.com
ISSN 2394 – 3386
Volume 4, Issue 7
July 2017

Reinvented Memoir in Arundhati Roy's *God of Small Things*

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Dr. Mamta Beniwal,

ABSTRACT: *Arundhati Roy's "The God of Small Things" is a major breakthrough in the Indian fiction in English to reveal the unjust universe. In the last decade of twentieth century Arundhati Roy is one of the remarkable writers in the Indian sub-continent who has come out with her works which are fired by the realization that tradition could but prove a dubious heritage for the oppressed mass of women. This paper tries to bring out fiercely reinvented memoir, an effort to escape from the traumatic memory of some past experience that has remained too vivid and haunting for her to forget, a novel written to overcome the anguish of a persistent memory by desperately facing it and blurting it out, and a fixation with an event that had happened long ago in the past. Roy exposes the ugliness of the society by bringing two children to react to it, since children are as yet uncorrupted and unwrapped by rigid social attitudes and can bring their unhampered response, however, pained to an issue or an event. The pain of these two children serves as a powerful plea for rejection of this system. This paper is an attempt to inform and lead into new places the flow of sympathetic consciousness.*

Index Terms: Memoir, Anguish, Consciousness, Social attitudes

"Art property so called is no recreation, it can't be learned at spare moments, nor pursued when we have nothing better to do. It is no handiwork for drawing room tables, no relief of the ennui of boudoirs; it must be understood and taken seriously or not at all." (1)

Arundhati Roy, the Booker Prize winning novelist is known to all not only for her new and original style but also for her social consciousness. Her book *The God of Small Things* (1997)which became instantly known in the world of literature, deals with, apart from many other things, pain and suffering of the individual in a setting of all round cruelty unchecked and unstopped, since the constraints fail so often that they may as well not exist. The novel deals with cruelty that spills out of established institutions of society like family and marriage, machinery for keeping law and enforcing justice, and the complicated system determining gender inequality in society. The injustice that the untouchables have to suffer, the insults and abuses women in society have to bear and the trials and tribulations, the defenseless have to undergo under brutalized machinery in a caste-ridden and hierarchical society, all of these become the subject matter of Arundhati Roy's book. Her other books *The End of Imagination(1998)* and *The Greater Common Good(1999),* bring out, respectively, the author's apocalyptic vision of the nuclear armed India and the world and her rage against the authorities who uproot men and women from their homes to build big dams in the country.

Arundhati Roy's novel *The God of Small Things* is full of autobiographical elements. It is set in a village in the state of Kerala. Roy herself grew up in Kerala's Syrian Christian community. She says: "Kerala is home to four of the world's great religions: Hinduism, Islam, Christianity, and Marxism."(2) Her categorizing Marxism as a religion throws a significant light on the working of Marxism in Kerala. For many years, during spells Kerala has had a Marxist-led government, though the party operates through a system of elections and democracy there. Arundhati Roy was born in Shilong, where her father was employed as a tea-planter; her early childhood was spent at village, Ayemenem, a few kilometers from Kottayam town in central Kerala. The plot of the novel also unfolds with Ayemenem as its locale. Just after a few years of her birth, her father, the tea-planter divorced his wife, and her mother brought her and her brother to Ayemenem. Her mother Mary Roy had broken the family tradition by marrying a Bengali and then divorcing him. She also made history by fighting the provisions of the Christian Succession Act and in this connection; she even went to the Supreme

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Arundhati Roy's The God of Small Things: An Indictment of Patriarchy, Caste System and Christianitynal

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Drama: Evolution, History and After Journey

Shweta Verma and Dr. Sangeeta Jhajharia

Abstract- Drama began in Greece with the observation of religious ceremonies in the forms of chorus. The term comes from a Greek word meaning "action". Drama is a specific mode which was represented in performance. Generally, considered as a genre of poetry. The two masks associated with the drama represents the generic division between tragedy and comedy, the two major forms of drama. The masks are the symbol of ancient Greek muses, Thalia, and Melpomene. Thalia represents the comedy, where Melpomene represents tragedy. The word "play" also refers to drama from the era of Shakespeare. Drama has its development from ancient time to Modern Age. It is combined with music, dance and dialogues between the characters of the play. Opera, Pantomime, Mime, Creative drama are also some other genres of drama in ancient and modern times. From the very beginning i.e. from the Age of Chaucer to the Modern Age, it passed through Renaissance, Age of Shakespeare, Age of Milton, Restoration drama, and from the Age of Interrogation and Anxiety to the Modern Era. The first movement of drama came when one member of the chorus separated himself from the rest, speaking lines to which the chorus collectively replied. Tragedy and Comedy also have their own emergence. Tragedy emerged out of religious observance whereas comedy has its emergence in the minds of people, who suffer from deep grief and pain and want to find some relaxation. Miracle plays and Morality plays have also contributed in the revival of drama, in the very form we find today in our literature. As far as the whole is concerned we can quote that "drama is not suddenly born out of something, it has its own long journey, the journey of evolution, the journey of decades, the journey with different forms".

Key Words: *- Renaissance, Restoration, Age of Interrogation and Anxiety, Chorus.*

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Depression and Quality of Life of Parents of Differently Abled Children

Shreya Chaudhary* and S.K. Srivastava**

Abstract

The present study was conducted on 140 parents (Mothers = 70, Fathers = 70) in Haridwar, Uttarakhand (India). The age group of parents varied from 25-50 years and for children it was 6-16 years. The aim of the present study was to compare the level of depression and quality of life among the parents of differently abled children. Beck Depression Inventory (BDI) and WHOQOL-BREF were used to assess depression and quality of life of parents. The study show that there is significant difference between mothers and fathers levels of depression and quality of life of differently abled children.

Keywords: Depression, quality of life (QOL), parents of differently abled children.

The birth of a new born is surrounded by expectations for parents, siblings and families and also for the friends and society. These expectations are usually optimistic, encompassing aspirations, hopes and dreams. The first realization of the presence of disability in the child is a major stressor which disturbs the family equilibrium. The term "differently abled", as it is applied to humans, refers to any condition that impedes the completion of daily tasks using traditional methods. WHO has said that 'differently abled is a person who has impairment that produces functional limitations/restrictions in activities or has social handicap' (WHO, 2014). Child disability is considered as a huge burden on the shoulder of their parents because there are some special needs and problems related to the child disability. Due to these problems they experience a high level of stress and strain (Bumin et al. 2009). Parents of differently abled children face the following emotional stages of disturbances after the diagnosis of their child's disability like mistrust, guiltiness, rejection, embarrassment, negative response and a sense of defenselessness and loneliness. Parents of such children experiences high level of emotional, financial and physical stress. It is also found that the parents of children with disabilities perceive more problems in themselves and their family. Parents of children with disabilities are often perceived to experience harmful psychological effects. Parents tend to view it as incurable disease and readily detect such defeatist attitudes and develop feelings of hopelessness.

Depression is one of the most common psychiatric disorders and lifetime prevalence of depression is very high among women in the world – approximately 12-25 percent. Depression is a normal and natural response to loss or grief, whether a death, separation from a loved one, job loss, loss of physical health, or relocation. Depression is one of the most prevalent psychological disorders caused by several factors including interpersonal relationships between individuals and the reactions and emotions of each individual expressed directly and indirectly to each other. Depressed patients may have feelings of sadness, depression, may experience a lack of interest and pleasure in daily activities, significant weight loss or gain, insomnia or excessive sleeping, lack of energy, inability to concentrate, feelings of worthlessness or excessive guilt and recurrent thoughts of death.

Quality of life is the perceived quality of an individual's daily life. It includes emotional, social and physical aspects of the individual's life. QOL may be defined as subjective well-being. Quality of life is the sum of a range of objectively measurable life conditions experienced by an individual which include physical health, personal circumstances, social relationships, functional activities and pursuits, and environmental and economic influences. Quality of life can be understood as a person's sense of well-being which is based on his/her satisfaction from the areas of life that are important for him/her. Quality of Life is all round development of person in terms of education, health and social life. Quality of life is generally taken as the standard of living or a realistic attitude of comfortable living state with the close relationship to the one's physical health perception, psychological health and ability of social functioning. (George et al. 2006). Quality of life is an individual's perception of his/her position in life in the context of the culture and value systems in which he/she lives, and in relation to his/her goals, expectations, standards and concerns. There is evidence of considerable physical and psychological morbidity like hypertension, anxiety and depression in parents of differently abled children which further reduces their work capacity with higher strain, increased burden and impaired quality of life. Hamdan and Hamdan (2012) assessed quality of life of parents having a child with disability. The results revealed that the Environmental domain had the highest QOL scores (mean = [illegible]) whereas the [illegible] domain had the lowest QOL scores (mean = [illegible]). [illegible] QOL [illegible] dependent on the type of the [illegible] parent having a child with [illegible] the highest QOL scores (mean = [illegible]).

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Original Research Article

Own a Pet – Stay well and Happy : an exploratory study

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ABSTRACT

Background: Pets seem like perfect companions providing unconditional love without any expectation from owner. Pets can be seen as stress reducer and being looked upon as companions and members of the family. The purpose of this study was to examine the effect of pet ownership on happiness, psychological well-being in pet owners and non-pet owners.
Methodology: Data was collected from 100 participants. Data was gathered by means of questionnaires that assessed happiness, psychological well-being. The Ryff scale of psychological well-being and subjective happiness scale have been employed. The data were analyzed by employing mean, SD and t- tests.
Results: Results of this study showed that there is significant difference in levels of happiness and psychological well-being experienced by pet owners and non-pet owners.

Keywords: happiness, psychological well-being, pets, wellness

(Paper received – 17th October 2017, Peer review completed – 23th November 2017)
(Accepted – 28th November 2017)

INTRODUCTION

Pets have always been a craze in western world but this trend has started recently in India. Companionship between animals and humans has been an intriguing phenomenon since prehistoric times. Pets are also considered as fashion accessories in celebrity culture. Pets are being looked upon as companions and members of the family. People have their own reason for keeping pets like to have loving companion, entertainment watchdogs, boost social life, trend etc. Career oriented women are marrying late and therefore, there exists a greater propensity among them to own pets for companionship. The one-child norm and trend of nuclear families has also leaded to more families keeping pets [1]. Keeping pets is an important part of many people's lives in this era. People no longer refer to themselves as pet owners, but they like to be called as 'proud pet parents'. And speaking of parenthood, many see pets as the first extension of their family, before having children. A leading newspaper daily reports that 70% of the Hindi film industry is known to own at least one dog. According to the National Pet Owners Survey, about two-thirds of U.S. households own at least one pet, which means 71 million homes provide shelter for at least one furry, feathery or scaly critter [2]. The pet population in India has grown from 7 million in 2006 to 10 million in 2014, on an average 600,000 pets are adopted every year. Cat ownership is increasing in India, presently there are 40 lacs cats in the country, out of these 20 lacs in urban India and 20 lacs in rural India [3].

In recent decades, positive psychology has tried to devote attention to humans' abilities. "This science is currently known as having done comprehensive studies for well-being and happiness in different

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Open with

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RJC

RASĀYAN *J. Chem.*
Vol. 10 | No. 2 |673 - 681 | April - June | 2017
ISSN: 0974-1496 | e-ISSN: 0976-0083 | CODEN: RJCABP
http://www.rasayanjournal.com
http://www.rasayanjournal.co.in

SPECTRAL, DFT AND ANTIBACTERIAL STUDIES OF TIN(II) COMPLEXES OF SCHIFF BASES DERIVED FROM AROMATIC ALDEHYDE AND AMINO ACIDS

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ABSTRACT

New tin(II) complexes of -amino acid Schiff bases (HL) derived from condensation of various -amino acids (tryptophan, phenylalanine, valine, isolecine, methionine, alanine, cysteine, serine, aspartic acid) and aromatic aldehyde were synthesized. The molar conductance low vales reveal that all the tin(II) complexes were non-electrolytes. The structure of complexes were proposed in light of analytical techniques, infra-red, multinuclear magnetic resonance (^{1}H, ^{13}C, ^{119}Sn), UV-Vis spectral data and theoretical studies. On the basis of these studies, complexes have distorted tetrahedral geometry. 3D structure of the newly synthesized compounds were studied by DFT/B3LYP method, also the theoretical parameters, HOMO, LUMO and dipole moments were calculated to confirm the geometry of the ligands and its tin(II) complexes. Few representative Schiff bases and its tin(II) complexes were screened for antibacterial activities. The tin(II) complexes have higher antibacterial activity than the free ligands.

Keywords: tin(II) compounds, 4-methoxybenzaldhyde, amino acids, Schiff base, spectral studies, theoretical calculations, antibacterial activities.

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INTRODUCTION

Extensive research of Schiff bases derived from -amino acids have been carried out due to their encouraging and significant properties, such as coordination ability, medicinal and pharmacological activities[1-6]. Recently, amino acid derivatives have been getting increased interest due to their remarkable applications in the field of industrial, medicinal and pharmaceutical fields[7-12]. Metal complexes of nitrogen and oxygen donor Schiff bases have been investigated because they play an important role not only in the development in coordination chemistry, but also in industrial chemistry, enzymatic reaction and molecular architectures[13,14] and show evidence of wide range of biological activities and industrial applications, they have been found to posses the medicinal and pharmacological activities such as antibacterial[15], antifungal[16], anti-malarial[17], anticancer[18], anti-tubercular[19] and anti-inflammatory[20].

In view of the above facts, we have synthesized and characterized some new tin(II) compounds with Schiff bases derived from 4-methoxybenzaldhyde and -amino acids (tryptophan, phenylalanine, valine, isolecine, methionine, alanine, cysteine, serine, aspartic acid). These compounds have been screened for antibacterial activities. The antibacterial activities of these tin compounds have been compared with the corresponding free Schiff bases.

EXPERIMENITAL

Material and Methods

Chemicals were obtained from Aldrich, sigma, Merck and used without purification. Solvents were dried and purified by standard methods. Melting points were determined on MPA 100 automatic melting point apparatus. The Schiff bases were synthesized by the condensation of 4-methoxybenzaldehyde with -amino acids as described earlier publication[21].

Rasayan J. Chem., 10(2), 673-681(2017)
http://dx.doi.org/10.7324/RJC.2017.1021668

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RJC

RASĀYAN *J. Chem.*
Vol. 9 | No. 4 |614 - 626 | October - December | 2016
ISSN: 0974-1496 | e-ISSN: 0976-0083 | CODEN: RJCABP
http://www.rasayanjournal.com
http://www.rasayanjournal.co.in

SYNTHESIS, SPECTROSCOPIC AND MOLECULAR STUDIES OF LEAD(II) COMPLEXES OF SCHIFF BASES DERIVED FROM 4-METHOXYBENZALDEHYDE AND AMINO ACIDS

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ABSTRACT

New lead(II) complexes have been synthesized with Schiff bases derived from 4-methoxybenzaldehyde and amino acids (tryptophan, phenylalanine, valine, isoleucine, methionine, histidine, alanine, cysteine, serine and aspartic acid). These ligands act as monobasic bidentate species and coordinate to the lead atom through the azomethine nitrogen and carboxylate oxygen atom. The synthesized complexes have been characterized by conductance measurements, elemental analysis and molecular weight determinations. The mode of bonding of the ligands and lead(II) complexes have been confirmed on the basis of infrared, UV-visible, and ^{1}H, and ^{13}C NMR spectroscopic studies, and probable structures have been assigned to these complexes. The optimized structural parameters such as bond length, bond angles, HOMO orbital, LUMO orbital, dipole movement, electronegativity, global softeness, electrophilicity index and mulliken atomic charges were calculated by the methods based B3LYP on the density functional theory (DFT). The ligands and their corresponding lead(II) complexes have also been screened for antibacterial activities.

Keywords: amino acids, lead(II) complexes, Schiff base, spectroscopic studies, DFT calculations, antibacterial activities.

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INTRODUCTION

Amino acids and their compounds with different metal ions play an important role in pharmaceutical, biological and industries.[1-5] While one of the most important fields in coordination chemistry, Schiff-base has been thoroughly studied, including related syntheses, characterizations and applications. But so far, it is still a challenge to synthesize new Schiff-base because of the complexity of Schiff-base condensation reactions between carbonyl compounds and amines. Schiff bases are well known due to their wide range of applications in medicinal, pharmaceutical, agricultural and industrial fields.[6-8] Metal complexes of Schiff bases have concerned a lot of interest due to their effective applications such as antifungal, antibacterial, anticancer and herbicidal activities.[9-15] These studies have shown that complexation of metals to Schiff base ligands improves the antifungal, antibacterial, anticancer and antituberculosis activities of the ligands.[16,17] There is great current research interest in the coordination chemistry of the metal complexes of Schiff bases due to the wide applications of these complexes in various fields.[18-20] Keeping in view the biological and medicinal importance of amino acids and the role of metal ions in biology, we herein report the synthesis of a new Schiff bases from the condensation reaction of 4-methoxybenzaldhyde with various amino acids. These synthesized Schiff bases were further used to react with lead(II) ions to form their respective lead(II) complexes. The antimicrobial activities of these lead compounds have been compared with the corresponding free Schiff bases and standard drugs.

EXPERIMENITAL

Chemicals and solvents used were dried and purified by standard methods and moisture was excluded from the glass apparatus using $CaCl_2$ drying tubes. Melting points were determined in open capillaries and are uncorrected.

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Available online at **www.joac.info**

ISSN: 2278-1862

Journal of Applicable Chemistry

2020, 9 (3): 387-397

(International Peer Reviewed Journal)

Synthesis, Spectroscopic and Theoretical Studies of Organotin(IV) and Organosilicon(IV) Complexes of Schiff bases Derived from Tryptophan and Phenylalanine

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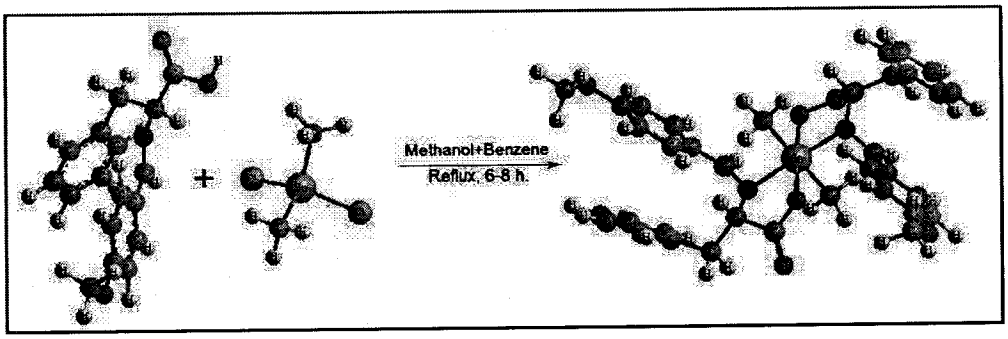
Accepted on 15th April, 2020

ABSTRACT

New organotin(IV) and organosilicon(IV) complexes have been synthesized with Schiff bases derived from tryptophan, phenylalanine alpha-amino acids. These ligands act as monobasic bidentate species and coordinate with the tin and silicon atom through the nitrogen and oxygen atom. The synthesized complexes have been characterized by various physic-chemical and spectroscopic techniques. The mode of bonding of the ligands and tin and silicon complexes have been confirmed on the basis of infrared, UV-visible, and ^{1}H, and ^{13}C NMR spectroscopic studies and probable structures have been assigned to these complexes. The optimized structural parameters such as bond length, bond angles, HOMO, LUMO orbital, electronegativity, global softness, and electrophilicity index were calculated by the methods based B3LYP on the density functional theory (DFT). The ligands and their corresponding complexes have also been screened for antibacterial activities.

Graphical Abstract



Keywords: Alpha aminoacids, Organotin(IV), Organosilicon(IV) complexes, Spectroscopic studies, Schiff base, DFT calculations, Antibacterial activities.

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Journal of the Association of Arab Universities for Basic and Applied Sciences (2017) 23, 1–9

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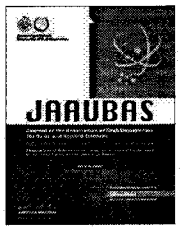

Synthesis and spectral, antibacterial, molecular studies of biologically active organosilicon(IV) complexes

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06/12/2016
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Received 17 February 2016; revised 28 April 2016; accepted 17 May 2016
Available online 11 June 2016

KEYWORDS
Thiosemicarbazone;
Semicarbazone;
Organosilicon(IV) complexes;
Spectroscopy;
Antimicrobial activity;
Density functional theory calculations

Abstract A series of new organosilicon(IV) complexes have general formulae R_3SiL and RSiLOEt with Schiff bases (R = Me and Ph). The Schiff bases (LH) have been derived from the condensation of (2-hydroxyphenyl)(pyrrolidin-1-yl)methanone with semicarbazide, thiosemicarbazide, and phenylthiosemicarbazide, respectively. The compounds have been characterized by the elemental analysis, molar conductance, and spectral (UV, IR, ^1H, ^{13}C, and ^{29}Si NMR) studies. These studies showed that the ligands coordinate with the silicon atom in a tridentate manner through phenolic oxygen, azomethine nitrogen and thiolic sulfur. Further applying experimental spectroscopic techniques, theoretical data calculated using density functional theory by B3LYP/6.31 + g(d,p) has also been used for structural determination. The resulting complexes have been proposed to have trigonal bipyramidal and distorted octahedral geometries. Few representative Schiff base and their silicon complexes have been screened for their in vitro antibacterial activity against Gram-positive and Gram-negative bacteria. The minimum inhibitory concentration (MIC) of selected compounds was determined. The screening results show that organosilicon(IV) complexes have better antibacterial activity than the free ligands.
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1. Introduction

The chemistry of complexes with hypercoordinated silicon atoms is attractive from many points of view such as reactivity, biological activity, and structural features as reported (Chuit et al., 1999; Devi et al., 2012) previously. Schiff base complex compounds have taken a wide place in coordination chemistry and have an important role in the development of bioinorganic chemistry and biochemistry (Ali et al., 2012; Mohamed et al., 2014; Kothari and Sharma, 2014; Savithiri et al., 2014; Singh, 2009). Metal complexes of the Schiff bases possess numerous applications including antibacterial, antifungal and other biological applications, as well as clinical, analytical and industrial in addition to their important roles in catalysis. Thiosemicarbazones and semicarbazones compound possessing varied significant biological activity have been reported, such as antifungal (Nath et al., 2000; Thanh et al., 2015; Reis et al., 2013), antibacterial (Kalaivani et al., 2012; Singh et al., 2014), antitumor

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Peer review under responsibility of University of Bahrain.

http://dx.doi.org/10.1016/j.jaubas.2016.05.003
1815-3852 © 2016 University of Bahrain. Publishing services by Elsevier B.V.
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JOURNAL OF COORDINATION CHEMISTRY, 2016
VOL. 69, NO. 2, 343–353
http://dx.doi.org/10.1080/00958972.2015.1115485

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Synthesis, spectral, DFT, and antimicrobial studies of tin(II) and lead(II) complexes with semicarbazone and thiosemicarbazones derived from (2-hydroxyphenyl)(pyrrolidin-1-yl)methanone

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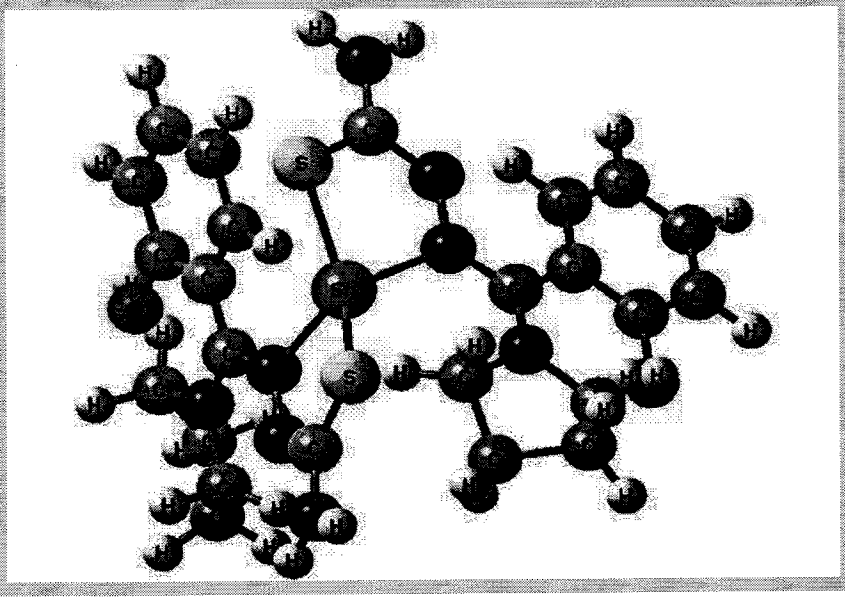
ABSTRACT

A new series of metal complexes $[M(L)_2]$ (where M = Sn(II), Pb(II), and HL = semicarbazone, thiosemicarbazone or phenylthiosemicarbazone) have been prepared and characterized by elemental analysis, conductance measurements, molecular weight determinations, UV–visible, infrared, and nuclear magnetic resonance (^{1}H-, ^{13}C-, and ^{119}Sn-NMR) spectral studies. Elemental analysis of the metal complexes suggested 1 : 2 (metal–ligand) stoichiometry. Infrared spectra of the complexes agree with coordination to the metal through the nitrogen of the azomethine (>C=N–) and the oxygen/sulfur of the ketonic/thiolic group. Electronic spectra suggest a distorted tetrahedral geometry for all Schiff base complexes. The bond lengths, bond angles, highest occupied molecular orbital, lowest unoccupied molecular orbital, Mulliken atomic charges, and the lowest energy model structure of the complexes have been determined with DFT calculations. Representative Schiff base and its metal chelates have been screened for their *in vitro* antibacterial activity against four bacteria, Gram-positive (*Bacillus cereus*, *Staphylococcus aureus*) and Gram-negative (*Escherichia coli*, *Klebsiella pneumoniae*) and four strains of fungus (*Penicillium chrysogenum*, *Aspergillus niger*, *Rhizopus nigricans*, and *Alternaria alternata*). The metal chelates possess higher antimicrobial activity than the free ligands.



ARTICLE HISTORY
Received 2 April 2015
Accepted 12 October 2015

KEYWORDS
Spectroscopic; Sn(II), Pb(II) complexes; Schiff base; antimicrobial studies; DFT calculations

06/12/2021
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Supplemental data for this article can be accessed http://dx.doi.org/10.1080/00958972.2015.1115485.

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International J. of Math. Sci. & Engg. Appls. (IJMSEA)
ISSN 0973-9424, Vol. 10 No. III (December, 2016), pp. 205-212

ISOMORPHISM OF UNIDIRECTED PLANE GRAPHS USING MARCOV CHAIN

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Abstract

The graph isomorphism problem for undirected plane graphs is to determine whether two given undirected plane graphs are isomorphic or not. The motivation behind the isomorphism of undirected plane graphs is Marcov chain. In this paper, develop and use probabilistic finite automaton approach for graph invariant [1, 4] called the probability propagation matrix for isomorphism of undirected plane graphs having six vertices by using the Marcov chain. It may be extended for 'n'-number of vertices where 'n' is a positive integer.

1. Introduction

The graph isomorphism problem is to determine if there exists a one-to-one correspondence between the vertices of two graphs G_1 and G_2 that preserves the adjacency of

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Key Words : *Graph isomorphism, Marco chain, Graph invariant, Finite automaton, Probability propagation matrix.*

2010 AMS Subject Classification : Combinatorics 05C10, 68R10, and 97K30.

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BIOCATALYSIS AND BIOTRANSFORMATION, 2017
VOL. 35, NO. 3, 177–184
http://dx.doi.org/10.1080/10242422.2017.1306740

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RESEARCH ARTICLE

Enzymatic synthesis of gallic acid from tannic acid with an inducible hydrolase of *Enterobacter* spp

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ABSTRACT

Gallic acid acts as a precursor molecule to synthesize various tannin molecules. These are plant polyphenols and were proved to be good anti-oxidant, anti-cancerous, anti-inflammatory, anti-microbial compounds. In order to fully exploit prominent biological activities of specific tannins and to develop tannin-based new medicines, it is necessary to obtain their pure preparations with an aim of high yield and specificity. In the present study, gallic acid is synthesized by the hydrolysis of tannic acid using a microbial based transformation process. The microorganism was isolated and identified. The ability of the isolated microorganism to covert tannic acid into gallic acid was determined by HPLC and enzyme production.

HIGHLIGHTS

The present investigation signifies the role of *Enterobacter* spp. in various processes:

- To synthesize gallic acid (a precursor for food oxidant such as propyl gallate) and a bacteriostatic antibiotic (trimethoprim).
- To protect the environment from tannery's discharge through the process of biodegradation.
- To reduce the toxicity of tannins in animal feed.

ARTICLE HISTORY
Received 5 October 2015
Revised 1 February 2017
Accepted 7 February 2017

KEYWORDS
Tannic acid; gallic acid; tannase; biotransformation; PCR; BLAST; HPLC

Introduction

Gallic acid (GA)-3,4,5-trihydroxybenzoic acid, and its derivatives are biologically active compounds (Kahkonen et al. 1999; Lee et al. 2000). These are widely present in plants for their defensive actions against herbivores and pathogens and collectively known as tannins. These are water soluble polyphenols of varying molecular weight and an important constituent of plant secondary metabolites. These are of two types: condensed and hydrolysable. Condensed tannins are composed of flavonoids (flavan 3-ol or flavan 3, 4-diol) and commonly known as proanthocyanidins (Aguilar et al. 2001). The hydrolysable tannins are polyesters of gallic acids (gallotannins) or egallic acid (ellagitannins) with simple sugars. Gallotannins are cross-linked structure of phenolic groups of GA residues with depside bond formation, while in ellagitannins, galloyl groups are linked but not through depside bonds.

Literature reveals that GA molecules and their esters are very important biological molecules. These are proved as strong natural antioxidants (Khan et al. 2000; Pulido et al. 2000; Zheng and Wang 2001; Metelitza et al. 2001) and very good anti-carcinogenic (Abu-Amsha Caccetta et al. 2001; Landrault et al. 2001) molecules. They have also shown potent antifungal (Kubo et al. 2001; Tao et al. 2009), antibacterial (Kubo et al. 2004; Bravo et al. 2005; Chanwitheesuk et al. 2007) and antiviral (Hurtado et al. 2008; Kratz et al. 2008; Choi et al. 2010) activities against a range of microorganisms. Besides the above GA based compounds were also found to be involved in prevention of atherosclerosis (Miura et al. 2001) and of inflammation (El-Saadany et al. 2008) based diseases. In industrial processes, GA is often incorporated into chemical syntheses to provide the trihydroxylated aromatic ring of biologically active molecules such as the antibiotic trimethoprim, the muscle relaxant gallamine triethiodide and the insecticide bendiocarb (Kambourakis et al. 2000).

In order to fully exploit prominent biological activities of specific gallate derivatives and to develop new pharmaceutical molecules, it is necessary to obtain

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Recent Advances in Psychology:
An International Journal
Peer Reviewed
2016, Vol. 3 (2), pp. 1-11

ISSN- 2395-5465
UGC Approved: No. 43276

Does Nap Differentially Modulate Object Specific Recognition Memory?

Kedarmal*, Suman Dhaka & Naveen Kashyap*****

Abstract

Daytime napping is a frequent habit of many individuals. Research findings suggest beneficial effect of nap on declarative memory consolidation in humans (Gujar et.al. 2010). The present study aims to investigate the role played by nap in object specific recognition memory. The objective of the present study is to evaluate the role played by nap in object specific retrieval of declarative memory. Ten healthy participants (22.5 years) divided into nap and control group volunteered for the study. On experimental day the participants arrive at laboratory at 12.00 h performed encoding (learning phase) of behavioral task followed by hnap/wakefulness retention interval of 60 minutes & subsequent retrieval phase. Repeated measure ANOVA [2 (condition nap, wake x 2 (stimuli : face, scene) revealed significant main effect for nap [F (1, 9) = 8.687, p = 0.018, μ2 = 0.52] and object [F (1, 9) = 8.51, p = 0.019, μ2 = 0.51]. sleep analysis of nap subjects reported 62.56% sleep efficiency with stage 2 and REM stage domination. Correlations between REM stage & memory accuracy (ρ = .65 scene and ρ = -.28 face) were reported. The findings suggest that recognition memory accuracy is enhanced by napping and scene as compared to face shown better performance.

Keywords: *Daytime Nap, Recognition memory*

Many behavioral studies demonstrate that a period of learning followed by sleep, as opposed to an equal time spent awake, benefits performance on a variety of tasks designed to measure different types of memories, such as implicit, procedural, or explicit, declarative memory (Gujar, McDonald, Nishida, & Walker, 2010; Tucker et al., 2006). Active processes occurring during sleep corresponding to different neurochemical states during each sleep stage aid in the strengthening of a new memory trace, stabilizing it and protecting it from interference (Gozes, Steingart, & Spier, 2004; Mednick, Cai, Kanady, & Drummond, 2008). Memory formation has been suggested to occur in two subsequent steps involving different brain structures with an initial encoding depending on the hippocampus and

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Iranian Journal of Organic Chemistry Vol. 8, No. 3 (2016) 1833-1844

IranJOC
Iranian Journal of Organic Chemistry

Montmorrilonite K10 catalyzed efficient synthesis of some 4'-nitrochalcones and their 1, 3, 5-triaryl-2-pyrazolines and *in vitro* antimicrobial evaluation

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Received: May 2016; Revised: June 2016; Accepted: July 2016

Abstract: An expeditious synthesis of some 4'-nitrochalcones **(3a-n)** and their subsequent facile one-pot transformation to 1, 3, 5-triaryl-2-pyrazolines **(4a-n)** has been carried out using montmorrilonite K10 via microwave mediated solvent free protocol. An emphasis is given to highlighting the greenness of the processes, and a fair comparison is also provided between different inorganic solid supports as catalysts. Both conventional as well as non-conventional approaches have been explored by comparing the reaction conditions and yields. The newly synthesized pyrazolines were studied for their *in vitro* antimicrobial evaluation against bacterial strains *Bacillus pumilus* and *Escherichia coli* and fungal strains *Aspergillus niger and Penicillium chrysogenum.* Findings of biological evaluation highlighted **4b**, **4e**, **4j** and **4m** as potential new leads in the search of new antimicrobial agents. The structures of newly synthesized compounds have been established on the basis of elemental analysis and spectroscopic studies.

Keywords: Chalcones, Pyrazolines, Montmorrilonite K10, Microwave, Antibacterial activity, Antifungal activity.

Introduction

Infectious diseases are one of the major causes of death worldwide [1]. During the past decades, new infectious disease has appeared and old ones previously throughout to be controlled to have reemerged and thus, despite many significant developments in the antimicrobial therapy, many problems remain to be solved for most of the antimicrobial drugs available [2]. Hence the discovery of new antimicrobial agents will be better pharmaceutical profile and is still highly desirable. In recent decades, the problems of multi-drug resistant microorganism have reached an alarming stage in many countries around the world.

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Infections caused by the microorganisms need for an effective therapy that has led to an escalating search for novel antimicrobial agents [3].

Small ring heterocycles containing nitrogen, sulphur and oxygen have been under investigation for a long time because of their pharmacological importance [4]. Chalcones possess a wide spectrum of biological activities [5-10] offers an unprecedented opportunity to synthetic chemists to design different bioactive heterocycles due to the presence of α, β-unsaturated carbonyl functionality. Nitrogen containing heterocycles like pyrazolines have received considerable attention in recent years due to their varied pharmacological activities such as antiviral [11], herbicidal [12], antimicrobial [13, 14], anti-inflammatory etc. [15]. On the other hand, non-conventional synthetic routes like inorganic solid supported microwave assisted organic reactions have

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Iranian Journal of Organic Chemistry Vol. 8, No. 4 (2016) 1887-1893

IranJOC
Iranian Journal of Organic Chemistry

Synthesis of Some Novel Fused Substituted 3-(4-substitutedphenyl)-6,6-diphenyl-3,3a dihydroimidazo[2',1':2,3][1,3] thiazolo[4,5-*c*][1,2] isoxazoles

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Received: August 2016; Revised: September 2016; Accepted: September 2016

Abstract: The present study describes the synthesis of some novel arylidene cyclic chalcones 2-(4-substituted benzylidene)-6,6-diphenylimidazo[2,1-*b*][1,3]thiazole-3,5-diones and their transformation to 3-(4-substitutedphenyl)-6,6-diphenyl-3,3a-dihydroimidazo[2',1':2,3][1,3]thiazolo[4,5-*c*][1,2]oxazol-7(6*H*)-ones via cyclization using hydroxylamine hydrochloride. The starting chalcones have been synthesized by the condensation of various aromatic aldehydes and methylene entity of synthesized imidazothiazole-3,5-diones which were obtained by the cyclization of 5,5-diphenyl-2-thioxoimidazolidin-4-ones and chloroacetic acid. The intermediate 5,5-diphenyl-2-thioxoimidazolidin-4-ones have been synthesized by the condensation of α-diketone (benzil) with thiourea in presence of ethanolic alkali followed by Pinacol-Pinacolone rearrangement. Structures of all the newly synthesized compounds were confirmed by chemical, analytical and spectral data.

Keywords: Chalcone, Diketone, Imidazole, Thiazole, Isoxazole.

Introduction

Nitrogen and sulphur containing heterocyles are an important class of organic compounds in medicinal chemistry, found in privileged structures (pharmacophores), thus the development of rapid synthetic routes toward focused libraries of such compounds is therefore of great importance to both medicinal and synthetic chemists. Structural frameworks have been described as privileged structures and in particular, N-containing polycyclic structures have been reported to be associated with a wide range of biological activity. Thus, fused heterocyclic derivatives with thiazole moiety are prospective objects in modern drug discovery.

Various biologically active synthetic compounds have five-membered nitrogen-containing heterocyclic ring in their core structures. In the field of five membered heterocyclic structures, imidazole nucleus shows versatile biological properties. The high therapeutic properties of the imidazole related drugs have encouraged the medicinal chemists to synthesize a large number of novel chemotherapeutic agents. Imidazole drugs have broadened scope in remedying various dispositions in clinical medicines. A lot of work on the synthesis and biological activities of the condensed imidazo [2, 1-*b*]-thiazoles has been reported. The imidazo [2, 1-*b*] [1, 3] thiazole skeleton has been used as antimicrobial agents [1] , anti-hypertensives, anti-inflammatories, immunosuppressive agents, herbicides, antitumor agents and cardiotonic agents [2-4]. The imidazo[2,1-b]thiazole derivative, was reported as a potential antitumor agent in patients with small tumor burdens [5]. In addition, numerous imidazo[2,1-b] thiazole derivatives were reported to possess antitumor activities[6-10]. Furthermore, it was found that the

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ORIENTAL JOURNAL OF CHEMISTRY
An International Open Free Access, Peer Reviewed Research Journal
www.orientjchem.org
Est. 1984
ISSN: 0970-020 X
CODEN: OJCHEG
2017, Vol. 33, No. (4):
Pg. 2016-2022

Use of Pure and N, S-Codoped Bimetallic Cerium Cadmium Oxide Nanoparticles as Photocatalyst for the Photodegradation of Fast Green

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http://dx.doi.org/10.13005/ojc/330449

(Received: May 01, 2017; Accepted: June 12, 2017)

ABSTRACT

Photocatalytic degradation of fast green using pure and N-S codoped bimetal nanoparticles $CeCdO_3$ has been studied. The $CeCdO_3$ nanoparticles were synthesized by wet precipitation method and characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and FTIR. The rate of photocatalytic reaction was examined spectrophotometrically using pure and N, S-codoped catalyst. The effect of variation in parameters like pH, concentration of dye, amount of nanoparticle, dopant percentage and light intensity on the photocatalytic degradation of dye was studied. A tentative mechanism for the photocatalytic degradation has been suggested.

Keywords: Fast green, N, S codoped cerium cadmium oxide, photodegradation.

INTRODUCTION

Historically speaking, evidence has been found that textile dyeing existed even during the Neolithic period. In areas as far as Far East (in china) dyeing was done in about 3000 BC and for this plants, barks and insects were used[1]. Various dyes are used in dyeing, paper and pulp, textile, plastics leather, cosmetics and food industries. Dyes are usually complex aromatic molecular structure and hence they are difficult to biodegrade[2]. A number of industries use dyes to provide color to their products. Traces of dyes are always present in waste water from such industries[3-6].

A number of methods are used for dye removal which include coagulation and flocculation, oxidation or ozonation and membrane separation[7]. For purifying and complete mineralizing of organic pollutants in industrial waste water and air, the heterogeneous photocatalytic process is one of the upcoming and fast growing research area[8]. Research has been carried out using 3-d transition metal ions for the preparation of ternary oxides so that these

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Asian Journal of Chemistry; Vol. 29, No. 11 (2017), 2475-2478

ASIAN JOURNAL OF CHEMISTRY

https://doi.org/10.14233/ajchem.2017.20778

N-S Codoped Cerium-Cobalt Oxide Bimetal Nanoparticles Catalyzed Photodegradation of Brilliant Green and Fast Green

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Received: 12 May 2017; *Accepted*: 17 August 2017; *Published online*: 29 September 2017; AJC-18575

Cerium-cobalt oxide bimetal nanoparticles were synthesized using wet precipitation method and characterized by X-ray diffraction (XRD) and scanning electron microscopy (SEM). The photocatalyzed degradation of brilliant green and fast green dyes were studied using $CeCoO_3$ bimetallic nanoparticles spectrophotometrically. Photocatalytic activity has been tested in the reaction of these dyes under visible irradiation. It was revealed that doping enhanced the photocatalytic activity at low doping levels but reduced the activity at high doping levels. Various parameters like amount of semiconductor, pH, light intensity, dye concentration, % of dopant were also studied. The rate of reaction followed pseudo-first order kinetics.

Keywords: Photodegradation, Cerium-Cobalt oxide, Nanoparticles, Brilliant green, Fast green.

INTRODUCTION

Discharge of effluents into the water bodies causes severe pollution of surface as well as ground water. Addition of water containing various dyes leads to loss of biodiversity in water bodies and it also leads to increased toxicity level of water studied by Khetan *et al.* [1,2]. The various methods for removal of synthetic dyes such as adsorption, microbiological de-coloration, activated sludge, pure cultures and microbe consortiums exist was suggested by Forgacs *et al.* [3]. Tang *et al.* concluded that among various methods photo degradation occupies a prominent method in dye removal. Generally, oxides and sulphides are being used as photocatalyst [4-6]. Photocatalytic studies on the degradation of methylene blue using TiO_2 and ZnO as photocatalyst under UV radiation was studied by Mohababsi and co-workers [7]. Ullah *et al.* explored Fe/ZnO/SiO_2 as catalyst and found 100 % degradation of methylene blue at pH 4, with in 30 min and 0.075 g/L catalyst loading [8]. Use of ZnO nanoparticles as photocatalyst for the treatment of trypan blue and hexavalent chromium with solar energy was studied by Banerjee *et al.* [9]. Saharan *et al.* reported photocatalytic degradation of Victoria blue R and Fast green FCF dyes using Y-Fe_2O_3 and Fe_3O_4 nanoparticles [10]. Simultaneous adsorption of Congo red, Phloxine, fast green onto CuS/ZnS nanocomposites which were loaded on activated carbon and their reaction was studied by Pooralhossini *et al.* spectrophotometrically [11]. Ameta *et al.* reported photodegradation of malachite green using cerium cadmium oxide as nanoparticles [12]. Photocatalytic activity on methylene blue of N-S Codoped TiO_2 nanotubes array films showed a better photocatalytic activity than undoped sample according to Goutian *et al.* [13]. Ag-doped TiO_2 photocatalyst for the degradation of tartrazine and chloramphenicol under UV light irradiation was studied by Dawery and observed that under similar condition photodegradation of tartrazine was faster than that of chloramphenicol [14]. Mo doped ZnO was synthesized and studied as photocatalyst in the bleaching of eosin yellow dye by Vaya and co-workers [15]. Tolia *et al.* synthesized Mn doped ZnS and undoped ZnS using mechanochemical method for the degradation of malachite green [16]. Ahmed *et al.* reported heterogeneous photocatalytic water purification process which has gained wide attention due to its effectiveness in degradation and mineralization of organic compounds and utilization of UV and visible light spectrum [17]. Comparative study of photo degradation of dyes using commercial and synthesized TiO_2 photocatalyst was successfullystudied by Mohammad and co-workers [18]. In continuation of our research programme, we herein report the photocatalytic degradation of fast green and brilliant green using N-S codoped cerium-cobalt oxide bimetal nanocomposites as photocatalysts.

EXPERIMENTAL

Synthesis of cerium-cobalt oxide: Aqueous solutions of 0.1 M of both $Ce(NO_3)_3 \cdot 6H_2O$ and $Co(NO_3)_2 \cdot 6H_2O$ was mixed with continuous stirring.The pH of the reaction mixture was adjusted at 11.0 pH by adding an aqueous solution of 1 M

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Scientific Research Publishing

Journal of Agricultural Chemistry and Environment, 2016, 5, 200-210
http://www.scirp.org/journal/jacen
ISSN Online: 2325-744X
ISSN Print: 2325-7458

Natural and Derivatized Acetogenins Promising for the Control of *Spodoptera frugiperda* Smith

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How to cite this paper: Ruiz Hidalgo, J., Parellada, E.A., Di Toto Blessing, L., Bardón, A., Ameta, K.L., Vera, N. and Neske, A. (2016) Natural and Derivatized Acetogenins Promising for the Control of *Spodoptera frugiperda* Smith. *Journal of Agricultural Chemistry and Environment*, 5, 200-210.
http://dx.doi.org/10.4236/jacen.2016.54021

Received: August 22, 2016
Accepted: October 31, 2016
Published: November 3, 2016

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Abstract

Annonaceous acetogenins (ACG), belonging to the family Annonaceae, represent a class of bioactive compounds whose toxic effects have been reported for several species of insects. Given their insecticidal properties, we first carried out the isolation of the ACG from a Brazilian collection of the seeds of *Annona squamosa* (Annonaceae) and prepared their methoxy methylated (MOM) and acetylated (OAc) derivatives by chemical methods. ACG analogues were semi-synthesized and characterized by spectroscopic techniques (^{1}H and ^{13}C-NMR). We isolated ten natural acetogenins: squamocin, molvizarin, motrilin, rolliniastatin-2, almuñequin, cherimolin-1, cherimolin-2, annonacin, squamocin D and asiminecin. The main objective of this study is to report the antifeedant, toxic and nutritional effects of three of those natural acetogenins and their acetylated and methoxy methylated derivatives on *Spodoptera frugiperda* Smith (Lepidoptera: Noctuidae). The natural ACGs squamocin and molvizarin killed 100% of *S. frugiperda* larvae, followed by motrilin (80%). Acetylated derivatives had less toxic and nutritional effects that led to pupal mortality and adult fatal malformations. The addition of MOM derivatives to the larval diet has not toxic effects on larvae, but significantly reduces growth rate and efficiency in conversion of ingested food into biomass, affecting adult survival.

Keywords

Acetogenin, *Annona squamosa*, *Spodoptera frugiperda*, Acetylated Acetogenin, Methoxy Methylated Acetogenin

DOI: 10.4236/jacen.2016.54021 November 3, 2016

06/12/2021
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Research

Eur. Phys. J. Plus (2018) 133: 250
DOI 10.1140/epjp/i2018-12073-3

THE EUROPEAN PHYSICAL JOURNAL PLUS

Regular Article

Tunable broadband reflector and narrowband filter of a dielectric and magnetized cold plasma photonic crystal

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Received: 1 March 2018 / Revised: 22 May 2018
Published online: 6 July 2018
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Abstract. The tunable broadband reflector and the narrowband filter of a periodic structure composed of dielectric and magnetized cold plasma materials have been studied. The optical properties are calculated theoretically using the well-known simple transfer matrix method (TMM). Dispersion relation and transmission spectra of the considered structure with right-hand polarization and left-hand polarization of the magnetized cold plasma materials are studied. The right-hand polarisation and the left-hand polarisation of the magnetized cold plasma are exhibited due to positive and negative values of the external magnetic field, respectively. The dispersion relation and transmission spectra of the considered periodic structure with the most valuable parameters, like external magnetic field, electron density, and effective collision frequency of the magnetized cold plasma, have been analyzed. The tunable narrow filter for right-hand polarization is obtained with a high value of the external magnetic field and a low value of the electron density. The broadband filter for the left-hand polarization is investigated with a low value of the external magnetic field and a high value of the electron density of the magnetized cold plasma. It is also noted that the impact of variation of effective collision frequency of the magnetised cold plasma is minute in both cases. These calculated results reveal an innovative idea for designing the tunable broadband reflector and narrowband filter.

1 Introduction

The spontaneous emission of an atom located in a periodic structure has a number of unique properties. When the atom is excited, the process can proceed in two ways: *i.e.*, either as emission of photons in the allowed band with low probability or as transition of the excited state with high probability, which is a relatively long-lived state [1]. For the system, identical dielectrics are composed of three-dimensional lattices and the secular equation of the energy of photons and diffraction of ultraviolet and visible light forms. This theory simulates void lattices in irradiated metals or ordered lattices with large lattice constants and hence the low frequency of the diffracted electromagnetic wave rises to the Bragg reflections having order of magnitude stronger in X-ray diffraction. Some characteristic aspects anticipated in low-energy photons, is discussed in relation to low-energy electron diffraction [2]. Photonic crystals (PCs) are homogeneous and inhomogeneous artificial, dielectric, periodic structures, in which the refractive index of the material changes periodically in space. In 1987, the photonic band gap was experimentally observed for the first time by Yablonovitch [3] and theoretically proposed by John [4]. Presently, photonic crystals attract interest due to various applications of the photonic bands of the materials. The photonic band gap has great applications in the search of engineered materials because it can be used to manipulate and control the flow of light. The photonic band gap is produced when an electromagnetic wave propagates through a periodic structure made of dielectric materials called photonic crystal. The propagation of electromagnetic waves inside the photonic crystal depends on the refractive index contrast, the refractive index of the material, the lattice parameter, the filling factor, the dimensionality of the material, etc. [4,5]. The simplest photonic crystal has a one-dimensional periodic multilayer structure, *i.e.*, a one-dimensional

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06/12/2021

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Optik 127 (2016) 5761–5769

Contents lists available at ScienceDirect

Optik

journal homepage: www.elsevier.de/ijleo

Modal propagation characteristics of a W-type plasma loaded cardioid waveguide

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ARTICLE INFO

Article history:
Received 14 October 2015
Received in revised form 16 March 2016
Accepted 30 March 2016

Keywords:
Cardioids
Plasma
Waveguide
Dispersion
Single mode

ABSTRACT

A modal analysis for W-type plasma loaded cardioid waveguide is presented, which has three regions, viz. the core with higher index, the inner cladding with plasma, and outer cladding with air. The dispersion curves are obtained by considering both small and very high dielectric steps with various plasma frequencies. It is noted that, as the width of plasma layer is increased, the cutoff frequency also increases considerably in all considered cases. If we increase the refractive index of the core region keeping all other parameters fixed, the number of sustained guided modes increases, which indicates that the fields are tightly bounded. Further, the obtained results are also compared with those already reported for similar waveguides that provides some new insights into the propagation mechanisms. It is demonstrated that such plasma loaded cardioid waveguide exhibits some new parameters to control the propagation characteristics and can be operated in single mode at comparatively larger cutoff frequencies.

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1. Introduction

Nowadays, the optical fiber technology with different kinds of waveguides that transmit information in the form of short optical pulses over long distances at exceptionally high speeds, has emerged as an integral part of human life and society in the modern age of information technology. These waveguides are utilized in wave phenomenon that traps the light locally and guides it in any direction besides their propagation lengths differ significantly. Several avenues can be pursued when attempting to improve waveguide's capabilities, including modification in the constitutive effective material parameters of the guide. For achieving this goal, many scientists and engineers continuously put forward some different types of optical fibers with new technological routes.

Also, various non-circular waveguides having conventional and unconventional shapes such as planar, elliptical, rectangular, triangular, pentagonal, annular, lens-shaped, spiral, cardioids and others have been studied by many researchers [1–21]. The concept of proposed waveguide stems from recent investigations in optical waveguides filled with plasma [22–27]. Shen et al. [22,23] investigated plasma waveguide having a cylindrical vacuum core surrounded by a plasma cladding. Singh and

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http://dx.doi.org/10.1016/j.ijleo.2016.03.084
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06/12/2021

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South African Journal of Botany 108 (2017) 184–192

Contents lists available at ScienceDirect

South African Journal of Botany

journal homepage: www.elsevier.com/locate/sajb

In-vitro antioxidative potential of different fractions from *Prunus dulcis* seeds: Vis a vis antiproliferative and antibacterial activities of active compounds

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ARTICLE INFO

Article history:
Received 1 September 2015
Received in revised form 25 August 2016
Accepted 9 October 2016
Available online 28 October 2016

Edited by LJ McGaw

Keywords:
Prunus dulcis
Isolated compounds
Antioxidant activities
DPPH
Antiproliferative activity
Antibacterial activity

ABSTRACT

In the present investigation, antioxidant activities of different fractions of *Prunus dulcis* seed extract were evaluated. The warring blender method was employed for extraction and total phenol and flavonoid contents were correlated with the diverse antioxidant activities of different fractions that showed significant correlation with the total flavonoid content. Maximum antioxidative activities were exhibited by its ethyl acetate fraction which was selected for isolation of different compounds. Six pure compounds were isolated which were further evaluated for antiradical, antiproliferative and antibacterial activities. Out of six compounds, gallic acid, pyrogallol, ethyl gallate and protocatechuic acid showed potent 2, 2-diphenyl-1-picrylhydrazyl (DPPH) scavenging activity. Gallic acid and pyrogallol were also found to be antiproliferative on two breast cancer cell lines (MCF-7 and MDA-MB-468). Further, most of the compounds exhibited an antibacterial activity similar to chloramphenicol. To the best of our knowledge this is the first report on the antioxidant activities of four different fractions of *P. dulcis* seed and also on the antiradical, antiproliferative and antibacterial activities of the isolated compounds.

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1. Introduction

Autoxidation of polyunsaturated fatty acids of cells is associated with ageing and different diseases including cancer (Yin and Porter, 2005; Ackerman and Simon, 2014). Synthetic antioxidants such as butylated hydroxyanisole (BHA) and butylated hydroxytoluene (BHT), widely used in the food industry are known to be carcinogenic in nature (Landete, 2013). Therefore, a great interest has been generated in supplementing them with natural antioxidants from plant sources. These are primarily polyphenols that commonly act as singlet oxygen quenchers and as reducing agents which can donate electron and can block the action of free radicals (Boeing et al., 2012).

It is believed that regular consumption of nuts, including almonds in moderate quantity lowers the risk of cardiovascular diseases (Chen and Blumberg, 2008; David et al., 2008). Nuts contain a good amount of phenolic compounds, terpenoids, pigments, and other natural antioxidants that are helpful in the protection from chronic diseases including cancer, primarily due to their secondary metabolites, fibre, vitamin E contents and some other compounds with antioxidant properties (Craig, 1997). Almond (*Prunus dulcis*) is one of the popular tree nuts that is a good source of phenolic compounds and different secondary metabolites that are considered useful for preventing oxidative stress (Halliwell et al., 1992; Halvorsen et al., 2002). It is further suggested that polyphenols from almond skin may serve as the source of potent antioxidants and as antibiotic against *Helicobacter pylori* (Shengmin et al., 2002; Carlo et al., 2013). In fact, bioactive phenolic and flavonoids have been previously isolated from almond skin (Maria et al., 2007) and antiproliferative terpenoids from almond hulls (Amico et al., 2006) which have been evaluated for their antioxidative properties. Oxidative stress induced by free radicals alters the structure of biological substrates, which was believed to be one of the leading causes of cancer. Antioxidative phytochemicals present in fruits and vegetables can have overlapping mechanisms of action, including modulation of detoxification of enzymes, scavenging of these free radicals etc. and thus could prevent cancer (Dhingra et al., 2014a). It has been reported that polyphenols and flavonoids possess strong binding ability with microbial protein and glycoproteins to form complex through hydrogen bonding and hydrophobic effects, as well as by covalent bond formation and thus could inactivate microbial adhesins, enzymes, cell envelope transport proteins, ion channels etc. One of the mechanisms behind the antibacterial activity of flavonoids is by reducing outer and inner layers of membranes fluidity of bacterial cells. Metabolic perturbation is reported to be one of the major causes for bactericidal effect of flavonoids (Havsteen, 2002; Wagner and Ulrich-Merzenich, 2009).

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http://dx.doi.org/10.1016/j.sajb.2016.10.013
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06/12/2021
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Exp Oncol 2016
38, 3, 158–168

Experimental ONCOLOGY

INSIGHTS INTO THE MECHANISM OF NATURAL TERPENOIDS AS NF-κB INHIBITORS: AN OVERVIEW ON THEIR ANTICANCER POTENTIAL

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The transcription factor, nuclear factor kappa B (NF-kB) is one of the principal inducible protein in mammals known to control the gene expression in many critical physiological responses such as oxidative stress, inflammation etc. and has been shown to play an important role in the pathogenesis of cancer. Terpenoids are major constituents present in nutritionally used fruits, vegetables and different spices which possess various pharmacological action including anticancer activity. Various terpenoids, *viz.* monoterpenoids, sesquiterpenoids, diterpenoids, sesterterpenoids, triterpenoids, tetraterpenoids and polyterpenoids inhibit NF-kB signaling pathway through IkB phosphorylation, DNA binding, p65 translocation etc. Keeping in mind these facts, the present review revealed the anti-cancer potential of naturally occurring terpenoids highlighting their mechanism of NF-kB inhibition. This review also focuses on some of the naturally occurring terpenoids belonging to various chemical categories with potential inhibitory effects on NF-kB and their role in the treatment of cancer.

Key Words: **Nuclear factor kappa B (NF-kB), terpenoids, cancer.**

Nuclear factor kappa B (NF-κB) is one of the most important transcription factors in mammals which is responsible for controlling gene expression linked with physiological responses, *viz.* oxidative stress, inflammation etc., and has been shown to play a pivotal role in the mechanism of cancer development. Therefore, the signaling pathway involving this transcriptional factor has opened a new way for pharmacologists, mainly in the field of oncology, where this pathway could prove to be of utmost importance in the treatment of cancer [1].

Naturally occurring plant components from traditional herbs are a significant source of potential therapeutic compounds for cancer treatment. Today several drugs used in clinics are discovered from natural sources. Safety and toxicity of modern drugs are very often questionable. Because of this apprehension, there is tremendous increase in the interest in natural medicines that are considered to be safe. Active constituents such as phenolic, flavonoids, glycosides and alkaloids of plants are well known for their medicinal values [2, 3]. Plant derived natural products provide a source for potent molecules to combat many diseases including cancer. Several promising molecules have been identified as anticancer agents, but there are still hurdles to overcome before they can be accepted as modern drugs [4].

Phenolic compounds and terpenoids are major constituents present in nutritionally used fruits, vegetables and different spices which possess various pharmacological activities including anticancer activity. Reports revealed that terpenoids that contain variable isoprene units have shown potential anticancer activity. Many of terpenoids which are extensively used for medical purpose have already been studied. Previous reports revealed that natural terpenoids were found to have cytotoxicity against variety of tumor cells. This observation strongly suggests that plant derived therapeutic ingredients modulate NF-κB signaling, which has a major role in the pathogenesis of cancer [5–8].

The present review focuses on the anticancer potential of natural terpenoids of varied categories, *viz.* monoterpenoids, sesquiterpenoids, diterpenoids, sesterterpenoids, triterpenoids, tetraterpenoids and polyterpenoids as NF-κB inhibitors. The review also deals with the activation and inhibition mechanism of NF-κB signaling pathways.

STRUCTURE, FUNCTION AND REGULATION OF NF-κB

NF-κB protein comprises of homodimers and heterodimers of different subunits. NF-κB is related through deoxyribonucleic acid (DNA) binding domain called as Rel homology domain. NF-κB proteins belonging to Rel family consists of five members which includes: p65 (RelA), RelB, cRel, p50/p105 (NF-κB 1) and p52/p100 (NF-κB 2). NF-κB 1 and NF-κB 2 are synthesized as precursor p100 and p105. Rel or NF-κB transcription factor binds to 9–10 base pair DNA sites known as kB sites. All vertebrate Rel proteins can form homodimers or heterodimers, except RelB that can form only heterodimers [9–11].

Rel or NF-κB proteins can be divided into two classes based on the sequence C-terminal to RH domain. Members of one class have long C-terminal which contains multiple copies of ankyrin repeats (33 residue protein structure) and has transrepression activity. This class includes NF-κB proteins p105, p100, and *Drosophila* Relish. The second class (the Rel proteins)

Submitted: July 21, 2016.
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Abbreviations used: DNA – deoxyribonucleic acid; ERK – extracellular signal regulated kinases; JNK – c-Jun N-terminal kinases; IKK – enzyme IκB kinase; LPS – lipopolysaccharide; NEMO – non-enzymatic protein NF-κB essential modulator; NF-κB – nuclear factor kappa B; NIK – NF-κB inducing kinase; TNF-α – tumor necrosis factor α.

06/12/2021
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ISSN: 0973-7049

The Bioscan 12(3): 1585-1588, 2017 www.thebioscan.com

BIOACCUMULATION OF HEAVY METALS ANALYSIS IN VEGETABLES GROWN BY IRRIGATED WASTE WATER OF DRAVYAVATI RIVER AT JAIPUR, INDIA

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KEYWORDS
Atomic Absorption Spectroscopy
Heavy Metals
Vegetables
WHO

Received on :
14.07.2017

Accepted on :
03.09.2017

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ABSTRACT

An investigation was conducted to analyze differential concentration of heavy metals viz. copper, zinc, iron and manganese in edible vegetables irrigated with industrial waste water of dravyavati river. Farmers usually do farming of various vegetable crops at different sites. Vegetable crops radish (Raphanus sativus) and Brinjal (Solanum melongena) were studied for these heavy metals analysis using AAS; suggesting different concentrations of heavy metals in waste water and soil samples used to irrigate these vegetable crops. The toxic effects of these heavy metals make these vegetables not suitable for human consumption. But due to ignorance and well polishing by vendors, public is very less concerned about heavy metal toxicity. The results from AAS depicted that vegetable sample values were well above the WHO critical toxic levels. From the study, the inference is drawn that heavy metals are accumulated in the edible vegetables.

INTRODUCTION

Concentrations of heavy metals in brinjal and radish crops were analyzed at different sites of Dravyavati River using AAS. Different heavy metals were differently bioaccumulated in these crops. Heavy metals play an important role in maintaining the healthy state of human body. They are required in effective concentration and to make healthy living tissues. Essential metals such as iron, copper and zinc are important for their biochemical role in the human metabolism. In biological systems iron is essential metal, i.e., hemoglobin in blood, which is the most important iron complex consisting of the globin protein with four heme units attached to it. Also, copper is found in enzymes capable of carrying oxygen as hemoglobin does, and it is actually required in the formation of this substance. Zinc, another essential element, is approximately 100 times as abundant as copper in the human body. It has the ability to occupy low symmetry sites in enzymes (Olivares et al., 1996; Ikeda et al., 1995; Corn: 1993). As far as non-essential elements are concerned, chromium is known to cause lung cancer. Lead accumulation results first in reduced functioning of kidney, liver and brain cells and later in complete breakdown of the tissues. Cadmium and its compounds are also toxic to humans. They produce acute and chronic symptoms varying in intensity from irritation to extensive metabolic disturbances (Hu et al., 1996; Mueller et al., 1994).The levels of toxic metals were determined in different vegetable food stuffs.Toxic heavy metals such as Copper, Zinc, Iron and Manganese pay a significant attribute to their uptake and indirectly consumption by human society. Heavy metals cause malfunction of organs and cause toxic effects. These metals are uptake by edible parts of agricultural and horticultural plants or stored products (Lester, 1997). The toxic elements get dissolved in water, migrated to soil and reaches to humans, thus cause dangerous effects. Heavy metal uptake in vegetables is toxic to human health. Human health may thus directly be affected by ingesting fruits and vegetables. The effect becomes fatal due to imbalance of macro-and micro-nutrients. The estimation of these nutrients in various vegetables depends on locality, material and source (Tahvonen et al., 1995; Cabrera et al., 1994; Wiersma et al., 1986; Takacs et al., 1997). Bioavailability of Cd, Cu, Zn and Mn in the human gastrointestinal tract from the edible part of vegetables using as in vitro gastrointestinal extraction technique was assessed by Intawongse (2006). Lettuce and radish were found to be more responsible than other vegetables for the accumulation of heavy metals in humans through the edible portion (Intawonges, 2006). Absorption capacity of heavy metals depends upon the nature of vegetables and some of them have a greater potential to accumulate higher concentrations of heavy metals than others. Lokeshwari et al. (2006) studied the extent of heavy metal contamination of vegetation due to irrigation with sewage-fed lake water on agricultural land. Samples of water, soil and crop plants have been analyzed for seven heavy metals, viz. Fe, Zn, Cu, Ni, Cr, Pb and Cd using

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Women's Development and Gender Justice: A Study on Tribal Women's Education in Odisha

Dr. Sibabrata Das* and Dr. Ramesh Chandra Nayak*

INTRODUCTION

Empowerment means self-strength, self-control, self-power, self-reliance, recognition of choice, life with dignity in accordance with one's values, capability to fight for rights, independence and awakening. It is an emancipation process in which the disadvantaged are capacitated to exercise their rights, obtain access to resources and participate actively in the process of shaping society and making decisions. Women's empowerment is all about ensuring women's leadership, gender equality, non-discrimination, health, safety, well-being and education. India has the second highest stock of tribal population in the world, just next to African Continent. It is more than the total population of France and Britain and four times that of Australia (Awais *et al.*, 2009). The tribal population (officially known as the Scheduled Tribes) represents one of the most socio-economically impoverished groups in India. In terms of education, they too lag behind other social categories such as the Scheduled Castes and Non-scheduled populations (Non-SC/ST).

Education is one of the most important means of empowering women as it provides the knowledge, skills and self-confidence necessary to participate fully in the development process. It is a weapon of great potency, as it provides exposure and access to new ideas and ways of thinking leading to higher productivity, efficiency and better socio-economic development. In the absence of education, women generally do not get access to formal sector jobs, make career advancement, participate in decision making at all levels. They are better equipped to extract the benefits from available services and existing opportunities and to generate alternative opportunities, roles and support structures if educated properly. These empowering effects of women's education are manifested in a variety of ways, including increased income earning potential, ability to bargain for resources within the household, decision making autonomy, control over their own sexuality and participation in public life. A woman's deprivation of education also has a negative impact on the health and well being of her children. National Family Health Survey-3 indicates that childhood mortality rate was inversely related to mother's educational level in India. In a nutshell, the positive impacts of women's education on individuals, family, society and the country at large, cannot be ruled out. Gendered educational opportunities in Indian population in general (Dreze and Sen, 2005) and tribal population in particular is a major issue of concern at present times. Education of tribal women is more concerned with ensuring them their right to livelihood, health, nutrition and survival.

To achieve the objective of equality in education with respect to caste and tribe, special provisions have been made in the Constitution of India. The Indian government's commitment to education is stated in its constitution with article-21 (A) promising free and compulsory education for all children until they complete the age of 14. Article 46 of the Constitution states that, "The State shall promote, with special care, the education and economic interests of the weaker sections of the people, and, in particular of the Scheduled Castes and Scheduled Tribes and shall protect them from social

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06/12/2021
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Adv Comput Math
DOI 10.1007/s10444-016-9489-5

Homotopy analysis Sumudu transform method for time—fractional third order dispersive partial differential equation

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Received: 3 May 2016 / Accepted: 4 October 2016
© Springer Science+Business Media New York 2016

Abstract In this article, we apply the newly introduced numerical method which is a combination of Sumudu transforms and Homotopy analysis method for the solution of time fractional third order dispersive type PDE equations. It is also discussed generalized algorithm, absolute convergence and analytic result of the finite number of independent variables including time variable.

Keywords Dispersive partial differential equation · Homotopy analysis method · Homotopy analysis Sumudu transform method · Linear and nonlinear partial differential equation

Mathematics Subject Classification (2010) 26A33 · 34A08 · 60G22 · 65Gxx

1 Introduction

The Fractional calculus is as old as classical calculus because importance of this theory was marked as soon as the ideas of the classical calculus were born from the discussion of half derivative in epistle of Leibniz and L'Hpital in the year 1695. Further, many mathematicians contributed on this theory and strengthened the notion

Communicated by: Helge Holden

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06/12/2021

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International Journal of Research in Social Sciences
Vol. 7 Issue 3, March 2017,
ISSN: 2249-2496 Impact Factor: 7.081
Journal Homepage: http://www.ijmra.us, Email: editorijmie@gmail.com
Double-Blind Peer Reviewed Refereed Open Access International Journal - Included in the International Serial Directories Indexed & Listed at: Ulrich's Periodicals Directory ©, U.S.A., Open J-Gage as well as in Cabell's Directories of Publishing Opportunities, U.S.A

STRESS IN RURAL AND URBAN ADOLESCENTS

Shreya Chaudhary*

S.K. Srivastava*

Abstract

Adults commonly tell young people that adolescence period is the 'best years of life' as picture is adolescents energetically involved at dance, part of various events or couple holding hands. The other part of picture is a painful tug of war filled with conflicting demands from parent, teacher, coaches, friends and oneself. The objective of the present study was to compare the stress levels in rural and urban adolescents. The sample of the study consisted of 200 respondents of whom 100 were male (50 rural and 50 urban) and 100 were female (50 rural and 50 urban). Their age levels were 13 - 19. They were selected purposively from different areas of Haridwar district of Uttarakhand. The obtained data were analyzed by using descriptive statistics, t-test. Overall findings indicated that there is significant difference between academic stress, emotional stress, social stress and overall stress of rural and urban adolescents.

Keywords:StressAdolescence

06/12/2021

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GNOSIS: Vol. 2, No. 4 July-2016
ISSN 2394-0131; pp. 137-145

Sea of Poppies: A Portrait of the Waves of Ecocriticism

Shruti Soni

Abstract: *Sea of Poppies* (2008) is the first novel of Amitav Ghosh's volume*Ibis Trilogy*. The novel begins with the historical event of First Opium War in 1838.The Opium production causes chaos in the lives of people of Ghazipur and are adversely affected by it and destroying the environment. Man is always taken the help of nature for his necessities and demands. But the excess exploitation of nature by man results into the deterioration of the ecology. This concern for ecology and what are the efforts we can make to save this earth from this imbalance – is the motto of "Ecocriticism". The present paper will be dealing *Sea of Poppies* from the ecocritical perspective.

Keywords: Ecocriticism, Ecology, Nature writing, Environmental Racism, Environmental concerns, Opium.

Introduction

"Ecocriticism" is creating a buzz in the literary world these days. Ecocriticism has emerged out as a new literary theory which connects two different disciplines i.e. ecology and literature in a thread. *The Environmental Imagination* (1995) by Lawrence Buell and *The Ecocriticism Reader* (1996) by Cheryll Glotfelty and Harold Fromm, are the two seminal publications which give an official pronouncement to the term- Ecocriticism. Cheryll defines "ecocriticism is the study of the relationship between literature and the physical environment" (xviii). If we elaborate the term then ecocriticism studies that how the environment including human and non-human worlds are presented in literature. It studies that how the human world is interconnected with the non-human world. Man is always taken the help of nature for his necessities and demands. But the excess exploitation of nature by man results into the deterioration of the surroundings and give us such an environment which is hazardous for every species and creates an imbalance in the ecology. This concern for ecology and what are the efforts we can make to save this earth from this imbalance – is the motto of ecocriticism.

Sea of Poppies (2008) is a novel by Amitav Ghosh, the first novel of the volume *Ibis Trilogy*. The novel is entangled with the complexities

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GNOSIS: Vol. 3, No. 1 October-2016
ISSN 2394-0131; pp. 120-129

Green Concerns and *The Glass Palace*

Shruti Soni

Abstract: In the literary texts, the poets and writers has treated Nature as a main concern. The physical environment and Man, both in art and literature, have been a continuous practice since long back. Though the approach of illustration of the physical environment has gone through the many changes in its style and exposure with the changing perceptions of human mind. Many writers and poets have depicted this amicable relationship in the literary texts. The worry for ecology and the danger that the unceasing exploitation of our environment poses on humanity, has only recently trapped the attention of the writers. This sense of concern has given rise to a new branch of literary theory, namely Ecocriticism. Ecocriticism is a swiftly mounting area of research which shelters wide range of texts and theories and studies the relationship between man and nature. There are very rare works in literature which actually focus on this term, though nature has been used as a setting against which the story runs. Colonialism has been a substantial reason in the devastation of environment globally. Because of this, the transformation in the social and cultural environment of the world has completely changed the representations of man's attitude towards nature in literary expressions. Among the Indian writers like Salman Rushdie, Vikram Seth, V. S. Naipaul, Kiran Desai and many more, there is one writer who has chosen fiction as a tool to mark a new pattern in writing novels with post-modern thoughts and emotions. Among his various themes, the attitude of mankind towards environment or nature attracts the readers' attention. The present paper will be dealing with this sensitive relationship of Man and Nature in the novel of Amitav Ghosh, *The Glass Palace*, published in 2000 which shows how the British intervention in the South Asia has caused the environmental damages which resulted into the destruction and dislocation triggered by it and the approach which deals with the study of representations of nature in literary works and of the relationship between literature and the environment termed as "Ecocriticism".

Keywords: Ecocriticism, Ecology, Colonialism, Relationship between human and non-human forms, Environmental Degradation and Green Concerns.

06/12/2021
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Model. Earth Syst. Environ. (2016) 2:153
DOI 10.1007/s40808-016-0208-5

ORIGINAL ARTICLE

Aquifer vulnerability assessment in the Bengal alluvial tract, India, using GIS based DRASTIC model

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Received: 20 June 2016 / Accepted: 29 July 2016 / Published online: 9 August 2016
© Springer International Publishing Switzerland 2016

Abstract In the present study, an attempt has been made to evaluate the aquifer vulnerability in the central part of Bengal alluvial tract, covering 5324 km^2 area by using DRASTIC model. Seven critical hydrogeological factors were taken into consideration. Initially, vulnerability index of individual factors were calculated on the basis of predefined weights and ratings. These indices were further combined to depict the actual vulnerability of the region. The model comprised of seven spatial parameters and their attributes and in handling of such diverse datasets, GIS played a significant role. For the depiction of the subsurface lithological characteristics, subsurface lotho-log data were used to generate 3 dimensional fence diagram of the entire region which was further helped in depicting the aquifer media condition. Entire eastern region of river Bhagirathi, a distributary of river Ganga, showed higher vulnerability index, which was about 29.65 % of the total study area, while the western portion had lesser vulnerability. Along with conventional modeling, map removal sensitivity analysis was also incorporated to examine the impact of different factors on the entire model. Depth to the water and impact of vadose zone were two important factors that contributed 46.93 % of the total variability of the model. Further, the generated model was incorporated with the locations of 156 groundwater samples, collected from the entire region and concentration of arsenic was determined to understand the probable relationship with the generated model through correlation coefficient. The model presented in the paper depicted recent hydrogeochemical condition of the aquifer which might help in further management of the region.

Keywords Bengal alluvial tract · DRASTIC · Vulnerability index · Single map removal technique · Aquifer

Introduction

Groundwater has great potential in terms of its utility throughout the world. After confirmation by World Health Organization (WHO) about its safety, the uses have amplified to a great extent (Ravenscroft et al. 2009). Drinking, domestic, agriculture and industrial activities are few areas, where groundwater is widely being used. Inspite of its great importance, it became a great threat because of its sensitivity to different contaminants. Thus, it is necessary to examine the water quality to ensure its safe usability. Groundwater is the function of number of physico-chemical responses, thus it is important to incorporate vital parameters in a model that can give meaningful and timely result so that proper management can be taken. Several models of aquifer vulnerability have been developed and proposed by different scholars. GOD model was developed by Foster (1987), where groundwater occurrence, overall aquifer class and depth table of the groundwater was taken into considerations. SINTACS model by Civita and De Maio (2004) was comprised of parameters like groundwater table depth, actual infiltration, self-depuration effect of unsaturated zone, overburden type, hydrogeological characteristics of the aquifer, hydraulic conductivity and topographical surface slope. AVI model proposed by Van Stempvoort et al.

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06/12/2021
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Understanding the dynamism of electricity consumption in India: an empirical investigation

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Abstract: The study intends to examine the impact of per capita GDP, financial sector development, capital formation, and urbanisation on electricity utilisation in India for the period of 1975 to 2015. The ARDL bounds test results reveal that the improved delivery of financial services, capital formation, per capita GDP, and urbanisation has a direct impact on electricity consumption in the long run. Further, the outcomes of the ARDL bounds and impulse response function confirm that after achieving a level of income, the electricity demand starts decreasing, as the adoption of electricity-efficient technology may reduce the marginal usage of electricity. Contrarily, even after achieving a threshold level of urbanisation the marginal impact of urbanisation on electricity usage has remained positive and significant. The association between urbanisation-electricity purposes that urban Indian populace takes a long time to inculcate the electricity-saving lifestyle. The study has also considered the possibility of the unknown series discontinuity.

Keywords: electricity; India; ARDL; impulse response function; urbanisation.

Reference to this paper should be made as follows: Sharma, R. and Kautish, P. (2020) 'Understanding the dynamism of electricity consumption in India: an empirical investigation', *Int. J. Economic Policy in Emerging Economies*, Vol. 13, No. 2, pp.107–127.

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06/12/2021

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www.emeraldinsight.com/1477-7835.htm

Do the international economic endeavors affect CO2 emissions in open economies of South Asia? An empirical examination under nonlinearity

Received 13 May 2019
Revised 30 July 2019
Accepted 11 September 2019

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Abstract

Purpose – The purpose of this paper to investigate whether trade liberalization and the financial crisis have contributed to altering the pollution level in selected open economies of South Asia in the long run.
Design/methodology/approach – The study has adopted the panel data framework where results are tested using the generalized method of moments (GMM). The data of five South Asian countries from 1980–2015 have been used for computing results.
Findings – Owing to the globalization endeavors, the scope of energy consumption and foreign direct investment (FDI) inflows has increased significantly. The outcomes of the study reveal that globalization has significantly intensified the level of carbon emissions in the selected countries. However, the impact of financial crisis on carbon emission is found insignificant in the long run. Therefore, the study reveals that the level of environmental pollution in South Asia economies is more sensitive to positive economic variations than negative.
Originality/value – Earlier studies have ignored the parallel effect of globalization and financial meltdown on carbon emissions in a country or region. Stating differently, the present study intends to capture the impact of positive (globalization) and negative (financial crisis) global economic movements on carbon emissions in the five open economies. The majority of studies in the past have focused on the relationship between positive economic endeavors and environmental pollution. Furthermore, the study recommends that while framing a trade policy, its possible impact on environmental pollution also needs to be considered.

Keywords FDI, CO2 emissions, Energy, Financial crisis, Globalization, GDP
Paper type Research paper

1. Introduction

The World Trade Organization (WTO) regime, which came into existence on January 1, 1995, has enlarged the scope for bilateral trade among the member countries. It can be perceived as one of the vital international events after the Second World War. In the post-WTO period, the developing regions like Asia have registered significant trade growth, as the WTO membership has allowed shifting from inward-trade to outward-trade practices (Anderson, 2002). For example, despite witnessing an international economic slowdown, the Asian region had maintained an annual growth of 6.9 percent in 1999, which further contributed to improving the growth endeavors in the region (Jackson, 2010). Notably, in 1995, the total export volume of the South Asian countries was mere $35.16bn, which increased to $328.8bn in 2015. Similarly, the import volume of the region in 2015 reached US$532.9 billion, which was $42.3bn in 1995 (WITS, 2019). In 1995, the inflows of FDI in India, Pakistan, Sri Lanka,

Management of Environmental Quality: An International Journal
Vol. 31 No. 1, 2020
pp. 89-110
© Emerald Publishing Limited
1477-7835
DOI 10.1108/MEQ-05-2019-0099

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Article

Linkages between Financial Development and Economic Growth in the Middle-Income Countries of South Asia: A Panel Data Investigation

Vision
24(2) 140–150, 2020
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in.sagepub.com/journals-permissions-india
DOI: 10.1177/0972262920923908
journals.sagepub.com/home/vis
SAGE

Rajesh Sharma[1] and Pradeep Kautish[2]

Abstract

The present study intends to investigate the impact of financial sector development on GDP growth in the four middle-income countries of South Asia over the period of 1990–2016. Using pooled mean group (PMG) estimation, this study tries to examine whether in these developing countries, GDP growth has been influenced by size of market capitalization and size of market turnover in the long run which are used as proxy for stock market development. Similarly, domestic credit to private sector is used as proxy for banking sector development while assessing its long-run impact on GDP growth. Furthermore, by incorporating a dummy variable for the global financial crisis (2007–2008), this study investigates whether these economies are vulnerable to external shocks or not. The outcomes of this study find that relatively, the impact of banking sector on GDP growth has remained low in the region. Nevertheless, the development in both sectors has positively influenced economic growth in the long run. The outcomes of this study suggest that both, i.e. stock market and banking sector, are vital determinants of long-run economic growth in the South Asian countries. Therefore, to achieve the sustainable growth, policymakers need to adopt the global approach which can be ensured by improving the quality and scope of financial services in these countries.

Key Words

Stock Market, Banking Sector Development, PMG, South Asian Countries, Financial Crisis, Economic Growth

Introduction

International linkages in the area of financial development and economic growth have acquired crucial importance in modern times. Due to the perfect mobility of capital across the world, the investors would try to invest in the asset in any country that yields the highest returns. This encourages the resource mobilization process, which may further lead to economic growth in the region. However, in the 1980s, especially in the middle-income countries of Asia, the situation was entirely different. Most of the Asian countries were struggling with the financial market imperfections such as illiquidity and other structural and institutional constraints (Claessens & Kose, 2013). The day-to-day working of stock markets in Asian countries was based on manual trading, which was guided by various kinds of stringent protections. In the same fashion, banking sector was suffering from the inadequacy of technological, transparency and governance issues. As a result, these countries were compelled to embrace the trade openness and encouraged the inflows of foreign investment to meet the investment requirements. After the Asian financial crisis of 1997–1998, financial sector consolidation was earmarked as thrust area for economic growth (Aghevli, 1999; Crockett, 1999; Le et al., 2015).

The revamping of stock markets and restructuring of banking sector have made the continent go to investment destination in the recent past. As a result, the stock markets of Asian countries have flooded with foreign investment. These financial sector reforms have changed the growth pattern of Asian countries within a span of 20 years (Krueger, 2006). However, while assessing the role of financial development, the contribution of stock markets has been underestimated across the region. Apparently, in a well-developed banking sector, stock markets have tendency to grow which may further lead to economic

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Examining the nonlinear impact of selected macroeconomic determinants on FDI inflows in India

Rajesh Sharma and Pradeep Kautish

Abstract

Purpose – *Over the years, India has witnessed irregular FDI inflows. Therefore, this study aims to explore the asymmetric impact of per capita income, final consumption expenditure, globalization index and exchange rate on FDI inflows in India.*

Design/methodology/approach – *Using the nonlinear autoregressive distributed lag bounds framework and unknown structural break, the study investigates the impacts of selected macroeconomic variables in driving FDI inflows in India during the study period (1979-2016).*

Findings – *The outcomes of the study confirm the asymmetric relationship between FDI inflows and its determinants during the study period. The results have confirmed that the improvement in per capita income, private consumption expenditure, globalization index and currency value appreciation play a crucial role in increasing FDI inflows in India. In contrast, the downside movements in the volume of consumption expenditure, globalization index and depreciation of the currency value in relation to the trade partners result in reducing the volume of FDI inflows in the long run.*

Originality/value – *For determining FDI inflows, previous studies have considered the overall impact of its potential determinants, which may provide partial information about the phenomenon. The adopted nonlinear approach highlights that both the types of fluctuations (i.e. upside and downside) in the independent variables may affect FDI inflows differently and substantially. The nonlinear association between FDI and selected determinants may be vital in formulating a long-term policy.*

Keywords *India, FDI, Nonlinear auto regressive distributed lag (NARDL), Globalization index*

Paper type *Research paper*

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1. Introduction

Owing to the financial and technological dispossession, the developing countries have perceived FDI to be an additional source for financing their growth programs (UNCTAD, 2013). Therefore, these countries have aligned their economic policies in favor of FDI inflows (Asongu, 2014). In the early 1990s, the Indian Government opened the economy for external investors and adopted a liberal trade policy to give an impetus to the economic growth programs. Owing to these initiatives, India has experienced significant growth in the economic front (Sharma *et al.*, 2018). For example, in 2011, the service sector's contribution to the gross domestic product (GDP) increased to 56 per cent, which was merely 38 per cent in the 1980s (Government of India, 2012). The empirical studies have revealed that the improvement of the service sector has immensely been influenced by FDI inflows in India (UNCTAD, 2005; Dash and Parida, 2013). By considering the need for foreign investment, the government has eased the process of FDI contracts (Bedi and Kharbanda, 2014), which has turned India from sluggish to ready-to-invest destination for the potential investors (Sharma *et al.*, 2018).

Received 23 October 2019
Revised 28 January 2020
11 March 2020
Accepted 18 March 2020

DOI 10.1108/JABS-10-2019-0316

© Emerald Publishing Limited, ISSN 1558-7894

06/12/2021

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The Electricity Journal 33 (2020) 106775

Contents lists available at ScienceDirect

The Electricity Journal

journal homepage: www.elsevier.com/locate/tej

Examining the nonlinear impact of coal and oil-based electricity production on CO_2 emissions in India

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ARTICLE INFO

Keywords:
CO_2
Coal electricity
Oil electricity
India
GDP
NARDL

ABSTRACT

Building upon the present growth paradigm of India, the authors of this paper examined the impact of coal-fired and oil-fired electrical power generation on CO_2 emissions in India for the period of 1976 – 2016. The simulation results confirmed that the upside shocks in coal-fired electricity will contribute considerably to increase the pollution level in the long run. Contrarily, the impact of downside variations was found to be negative and significant.

1. Introduction

Sustainable development goals (SDGs) proposed by the United Nations Development Program (UNDP) committee has highlighted the need for environmental consciousness (UNDP, 2019). In this regard, the SDG-12 proposes that while considering the development programs, governments need to consider their environmental viability. Furthermore, the SDG-7 highlights the need for cleaner energy resources, as the present energy resources have done considerable damage to air quality. Nevertheless, to pursue their long-term economic objectives, the governments have ignored the need for environmental conservation in the long run. The failure of the Kyoto Protocol (KP) supports this argument, as most of the countries have ignored the stipulated norms laid down by KP (Rosen, 2015). In the preceding decades, regions like South Asia have exhibited an exemplary growth pattern, which has contributed to improving the living standard of the people (Munir and Javed, 2018). However, the quest for economic growth has led to the over-utilization of natural resources (Lampert, 2019). Besides, the level of carbon emissions in these developing countries has reached an alarming level (Raitzer et al., 2015). The failure of KP and the increasing intensity of global pollution have again invoked the need for environmental conservation. Therefore, the Paris Agreement-2016 (PA) has been accepted by 196 countries, which encourages to reduce the greenhouse gas discharges (Streck et al., 2016). However, it is too early to talk about the success of the PA. In this global scenario, one target is commonly followed by all the countries, i.e. to improve the per capita income or GDP growth.

In terms of GDP growth, India has set an exemplary growth pattern. In 1991, the per capita income and FDI inflows to India were mere $575.5 and $0.73billion, respectively. However, in 2018, both have reached $1987.4 and $39.9 billion, respectively. Besides, in terms of per head energy consumption and generation, the country has witnessed an increasing trend (World Bank, 2019). Despite that, India has continuously been importing crude oil to meet its energy demand. This is evident from the fact that the in 2017 – 18, the country has spent $87.79 billion on energy import (PTI, 2018a). Considering the importance of endogenous energy resources, in June 2003, the government of Indian had passed the Electricity Act. Later on, in 2007 and 2010, the Act has been amended. These Acts have proposed to inculcate energy-efficiency at micro and macro levels (Sharma and Kautish, 2019a). Owing to the efforts of government, the production and utilization of electricity have increased manifold, which is evident from Fig. 1.

In the preceding two decades, India has significantly improved its electricity production, which is evident from the fact that the country's power consumption has increased at a rate of 4.8 % in the preceding decade (Seetharaman, 2019). In 2019, the installed capacity of power generation of the country has reached to 0.361 million MW. Nevertheless, in terms of electricity production, the dominance of coal-ignited electricity is visible, as 54.3 % of electricity is generated by coal-ignited plants, whereas the share of oil and gas in electricity generation is found to be merely 7.2 %.[1] In comparison to other sources, the supply of coal is large and costs involved are less. That is why; more than 50 %

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https://doi.org/10.1016/j.tej.2020.106775

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06/12/2021
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Environmental Science and Pollution Research
https://doi.org/10.1007/s11356-020-09659-3

RESEARCH ARTICLE

Examining the impacts of economic and demographic aspects on the ecological footprint in South and Southeast Asian countries

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Received: 19 March 2020 / Accepted: 8 June 2020
© Springer-Verlag GmbH Germany, part of Springer Nature 2020

Abstract

The re-examination of the existing economic and environmental policies in the South and Southeast Asian countries seems to be necessary, as these countries are struggling to achieve the goals of sustainable development. For designing a long-term environmental policy, we intended to examine whether the selected economic and demographic indicators have influenced the ecological footprint in the eight developing countries of Asia from 1990 to 2015. The use of pooled mean group (PMG) approach allowed driving the long-run common coefficients, which may facilitate us to develop a common policy framework for fortifying the environmental quality. The computed results confirmed that the selected variables are cointegrated in the long run, and the variables, i.e., per capita income, nonrenewable energy usage, urbanization, fertility rate, and population density are observed as the significant drivers of the environmental pollution. Moreover, the consumption of renewable energy restored the environmental quality in these countries. Based on the results, we recommended the need for the diversification of the energy-basket for enhancement of the use of renewable energy resources. Further, through sensitization of the necessity of environmental conservation, the governments should promote less carbon-intense economic and demographic practices across the industries and sectors.

Keywords Ecological footprint · South and Southeast Asia · Energy · Urbanization

JEL classification Q56 · C31 · D12 · O13

Introduction

Many studies have established the fact that economic growth endeavors have damaged environmental quality across different regions (Birdsall 1992; Holtz-Eakin and Selden 1995; Wackernagel and Rees 1996). Considering the need for environmental conservation, the Kyoto protocol and later the Paris Agreement have been initiated. The philosophy of both the agreements is to control environmental degradation and to achieve sustainable economic growth. The United Nations Development Committee has recognized the need for sustainable economic growth, which is evident from the recommendations of the sustainable development goals (SDGs) (UNDP 2019). In this regard, despite registering the phenomenal GDP growth rate, the emerging economies of Asia have preferred economic interests over environmental purification, which is evident from the increasing social-cost bill caused by the increasing pollution level in the region (Yorifuji 2015). According to the report of the World Bank, the social cost of 4% per annum in terms of GDP growth is borne by

Responsible Editor: Philippe Garrigues

Electronic supplementary material The online version of this article (https://doi.org/10.1007/s11356-020-09659-3) contains supplementary material, which is available to authorized users.

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Published online: 23 June 2020

06/12/2021
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The current issue and full text archive of this journal is available on Emerald Insight at:
https://www.emerald.com/insight/1477-7835.htm

Impact of economic and financial development on carbon emissions: evidence from emerging Asian economies

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Received 14 March 2020
Revised 13 May 2020
4 June 2020
Accepted 13 June 2020

Abstract

Purpose – This paper not only aims to validate the environment Kuznets curve concerning five Asian economies but also attempts to analyze the impact of some additional factors like financial development, energy consumption and foreign direct investment (FDI) on carbon emissions.

Design/methodology/approach – This paper applies pooled mean group approach on the variables of a panel of five Asian economies namely India, Pakistan, Bangladesh, Sri Lanka and Malaysia for a period of 35 years from 1980 to 2014.

Findings – This study finds that while moderate economic growth as well as moderate financial development increase carbon emissions, accelerated or exponential economic growth as well as exponential financial development eventually reduce the level of carbon emissions. Energy consumption was found to have a direct and significant relationship with carbon emissions. FDI inflows when analyzed on a stand-alone basis were observed to have an inverse relationship with carbon emissions, while FDI inflows when clubbed with financial development were observed to have a direct relationship with carbon emissions.

Practical implications – The findings of this study, which validate the environmental Kuznets curve, suggest striving for higher economic growth, even if it causes increased carbon emissions to begin with, as the effects on carbon emissions would eventually get reversed when the economic growth accelerates at a higher rate. This study also suggests the appropriate routing of FDI through a mature and developed financial sector to leverage its impact on the environment in a positive way.

Originality/value – To the best of the knowledge of the authors of this paper, there has not been any research carried out so far, which has analyzed the impact of the combination of variables selected for this study concerning the five Asian economies covered in this paper.

Keywords Carbon emissions, Environmental Kuznets curve, Pooled mean group

Paper type Research paper

1. Introduction

Increasing population, depleting resources and continuous degradation of the environment have brought us to an alarming situation, wherein the importance of protecting the environment and sustainable development are being felt like never before. While it is important to find the solution to this problem, what is equally important is to first understand the gravity of the problem and the factors responsible for the same.

Figure 1 portrays the latest available data of five leading global economies namely the USA, China, India, Japan and Germany contributing around 44% of the world population and around 57% of global carbon emissions (Ritchie, 2018), while their contribution as a percentage of world's gross domestic product on purchasing power basis being around 49% (World Bank, 2018). A visual glance of the figure reveals that except for China all of the remaining four countries have their share in global carbon emissions more closely aligned

Funding: The authors did not receive any funding or financial support for this research, authorship and/or publication of this research paper.

Management of Environmental Quality: An International Journal
© Emerald Publishing Limited
1477-7835
DOI 10.1108/MEQ-03-2020-0043

06/12/2021
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The current issue and full text archive of this journal is available on Emerald Insight at:
https://www.emerald.com/insight/0263-4503.htm

Values, sustainability consciousness and intentions for SDG endorsement

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Received 30 September 2019
Revised 22 January 2020
25 February 2020
29 March 2020
Accepted 3 April 2020

Abstract

Purpose – The purpose of this study is to examine the relationships between value orientation, i.e. terminal and instrumental values, consumer sustainability consciousness and behavioral intentions toward environmental-friendly products and its influence on the sustainable development goals (SDGs) endorsement.
Design/methodology/approach – Structured questionnaires were administered on 410 respondents from northwestern India. The two-step approach proposed by Anderson and Gerbing (1988) was employed to assess the measurement and structural models.
Findings – Terminal and instrumental values influenced consumer sustainability consciousness. Sustainability consciousness influenced behavioral intentions which endorsed consumers' SDG. Instrumental value had a greater impact on consumer sustainability consciousness and behavioral intentions than terminal value. Consumer sustainability consciousness partially mediated the relationship between terminal/instrumental value and behavioral intentions for SDG endorsement.
Research limitations/implications – The findings will help marketers to endorse SDG promotion by linking them with values and develop an understanding of consumers' sustainability consciousness for SDG implementation.
Practical implications – Green marketers, policymakers and SDG promoters should develop messages to communicate and emphasize the importance of purchasing environmental-friendly products. From a functional perspective, it affects instrumentality orientation and societal responsibility toward the implementation of SDG.
Social implications – The current study proposed an action-oriented, integrated, aspirational and universally applicable SDG framework. The findings may pioneer the way forward for sustainability-oriented consumption.
Originality/value – This research is the first of its kind that examined the relationships between value orientations (Rokeach, 1973) and their effect on consumer sustainability consciousness and behavioral intentions in SDG milieu.

Keywords Sustainability, Consciousness, Green products, SDG, Human values, Environmental marketing
Paper type Research paper

Introduction

On September 25, 2015, United Nations Summit adopted Sustainability Development Goals (SDGs) consisting of 17 goals and 169 targets. These focused on economic growth, social inclusion and environmental protection (United Nations, 2015) and were recognized as a strategic initiative for commercial enterprises and society (Bansal, 2005; Elliott, 2006). The United Nations General Assembly recognized the importance of peoples' sustainability

Marketing Intelligence & Planning
© Emerald Publishing Limited
0263-4503
DOI 10.1108/MIP-09-2019-0490

06/12/2021

REGISTRAR
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Lakshmangarh (Distt Sikar) 332311

Energy Policy 148 (2021) 111965

Contents lists available at ScienceDirect

Energy Policy

journal homepage: http://www.elsevier.com/locate/enpol

Analyzing nonlinear impact of economic growth drivers on CO2 emissions: Designing an SDG framework for India

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ARTICLE INFO

JEL classification:
P18
K32
O44
F63

Keywords:
CO_2
Energy
India
NARDL
Oil prices
SDG

ABSTRACT

Several Asian countries are facing challenges regarding the accomplishment of the objectives of Sustainable Development Goals (SDGs), and India is facing a similar situation. Following this, this study talks about designing an SDG framework for India, which can be used as a benchmark for other Asian countries. In this pursuit, this study looks into whether per capita income, energy use, trade openness, and oil price have any impact on CO_2 emissions between 1980 and 2019. The nonlinear autoregressive distributed lag approach proves that the fluctuations in independent variables have an asymmetric long-term impact on CO_2 emissions. The results reveal that the prevailing economic growth pattern in India is environmentally unsustainable, because of its dependence on fossil fuel-based energy consumption and imported crude oil. Import substitution has been identified as one of the first stepping stones to address this issue, and accordingly, a multipronged SDG framework has been designed based on the direct and extended version of the study outcomes. While the Central policy framework shows a way to address SDG 7, SDG 8, SDG 12, and SDG 13, the Tangential policy framework shows the way to sustain the Central policy framework by addressing SDG 4.

1. Introduction

The latest Sustainable Development Goals (SDG) progress report (UNESCAP, 2019) on Asia and the Pacific countries shows the inefficiency of these nations in handling the issue of rising emissions. While the developed economies are making significant progress in achieving a secure energy future with the betterment of environmental quality, these nations are experiencing the rise in emissions, along with encountering the issue of energy security. Prevailing fossil fuel-based economic growth pattern in these nations has been considered as one of the major reasons behind these issues. This persistence in the reliance on fossil fuel solutions is forcing these nations to take a departure from attaining the objectives of SDG 13, i.e. climate action. As these nations are largely emerging in nature, hence attaining economic growth has been given a higher priority over sustaining environmental quality. By analyzing the economic growth patterns of these nations, SDG Progress Report 2019 (United Nations, 2019) revealed that the countries pertaining to the South and South-West regions of Asia are the laggards in achieving the objectives of SDG 13. While these nations have made an incremental progress in attaining the objectives of SDG 8, i.e. decent work and economic growth, this growth pattern has been speculated to be unsustainable in nature. This issue has been emphasized in the recent report on SDG achievement by the United Nations (2019), while discussing about the inclination of these nations to invest on fossil fuels, rather than investing in climate activities

As these nations are more inclined towards achieving economic growth even at the cost of environmental quality, it can be assumed that these nations will be inclined towards embarking on fossil fuel solutions. In order to sustain the production process, these nations continue depleting natural resources. Taking a cue from the "*Limits to Growth*" discourse, it can be assumed that the continued depletion of natural resources might have a detrimental consequence on economic growth pattern (Meadows et al., 1972). This characteristic policy-level myopia prevailing in these nations might create a predicament in attaining the

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https://doi.org/10.1016/j.enpol.2020.111965
Received 3 May 2020; Received in revised form 22 September 2020; Accepted 9 October 2020
Available online 22 October 2020
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06/12/2024
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Environmental Science and Pollution Research
https://doi.org/10.1007/s11356-020-11295-w

RESEARCH ARTICLE

Does financial development reinforce environmental footprints? Evidence from emerging Asian countries

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Received: 16 September 2020 / Accepted: 18 October 2020
© Springer-Verlag GmbH Germany, part of Springer Nature 2020

Abstract

In the preceding two decades, the expansion of financial services has played a vital role in pursuing economic growth agendas in the developing Asian nations. However, its harmful effect on environmental quality cannot be denied. In this backdrop, in the present study, we investigated whether the financial sector development moderated the ecological footprint, carbon footprint, and land footprint in the eight developing nations of South and Southeast Asia from 1990 to 2015. In doing so, we included the per capita income, energy solutions, and trade expansions as determinants of the ecological indicators. The results of the second-generation unit root tests and Westerlund's cointegration test reported the long-run stability and cointegration, respectively. To navigate the possible cross-country dependency, we employed the cross-sectional augmented autoregressive distributed lag approach (CS-ARDL). The results confirmed that per capita income, energy solutions, trade expansion, and financial sector development invigorated the ecological footprint, carbon footprint, and land footprint in the long run. Further, it is reported that the development in the financial sector has a significant moderating impact on the nexus between energy and environmental footprints. In other words, the financial sector development drove the association between the overall environmental quality and energy solutions in the long run. Similarly, we observed that the financial sector development worked as a significant mediator between environmental proxies and trade expansion. By including the ecological footprint, carbon footprint, and land footprint as environmental proxies, the study provides the wider environmental spectrum. Based on the outcomes of the study, we proposed a novel scheme, which may help to address the harmful environmental impacts of the financial sector development in the selected developing nations.

Keywords Ecological footprint · Carbon footprint · Land footprint · South Asian countries · Southeast Asian countries · Per capita income · Energy

JEL Classification Q56 · C31 · D12 · O13

Responsible Editor: Nicholas Apergis

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Published online: 30 October 2020

06/12/2021
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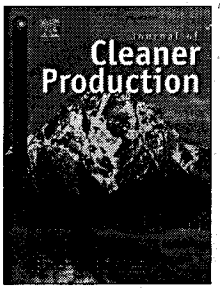
Introduction

The literature suggests that the liberal trade policies (Shahbaz et al. 2013) and financial sector development (Sharma and Kautish 2020b) have strengthened the economic growth process in the developing countries of South and Southeast. In support of this notion, the OECD (2018), in its report, ascertained that the emerging Southeast Asian economies have witnessed an annual per capita growth of 7.1% during 2012–2016, and in the coming 5 years, it is expected to grow at an annual rate of 6.3%. Similarly, the IMF (2017) in its report mentioned that the South Asian countries have recorded a GDP growth of 6.7%, whereas the overall economic growth of the world was merely 3.2% in the same year. Due to the profound population base and growing convergence between

Journal Pre-proof



Does renewable energy consumption reduce ecological footprint? Evidence from eight developing countries of Asia

Rajesh Sharma, Avik Sinha, Pradeep Kautish

PII: S0959-6526(20)34911-8

DOI: https://doi.org/10.1016/j.jclepro.2020.124867

Reference: JCLP 124867

To appear in: *Journal of Cleaner Production*

Received Date: 11 August 2020

Revised Date: 24 September 2020

Accepted Date: 26 October 2020

Please cite this article as: Sharma R, Sinha A, Kautish P, Does renewable energy consumption reduce ecological footprint? Evidence from eight developing countries of Asia, *Journal of Cleaner Production*, https://doi.org/10.1016/j.jclepro.2020.124867.

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06/12/2020

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International Journal of Management (IJM)
Volume 11, Issue 12, December 2020, pp.1332-1363, Article ID: IJM_11_12_122
Available online at http://www.iaeme.com/IJM/issues.asp?JType=IJM&VType=11&IType=12
ISSN Print: 0976-6502 and ISSN Online: 0976-6510
DOI: 10.34218/IJM.11.12.2020.122

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RESEARCH PAPER ON EXPLORING TALENT MANAGEMENT PRACTICES: ANTECEDENTS AND CONSEQUENCES

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ABSTRACT

Talent management (TM) has received lots of attention of academicians, practitioners, researchers, scholars, and competitive firms in recent years, but there are many gaps left for further theoretical and empirical development. One of gap is lack of clarity of definition of TM, and the ongoing debate about whether it is merely repackaging of already existing human resource management (HRM) practices or a new concept. In this context, this paper concludes that TM practices are distinct from the traditional HRM practices. The researcher has consolidated the existing literature on TM for designing an integrated model of TM including its antecedents and consequences. The study calls future research to empirically test the derived propositions. The paper includes various theoretical, economic, managerial, and future research implications.

Key words: Talent management practices; strategic philosophy; business strategy; management commitment; employer branding; employee engagement.

Cite this Article: Meenakshi Sharma and B.S. Rathore, Research Paper on Exploring Talent Management Practices: Antecedents and Consequences, *International Journal of Management*, 11(12), 2020, pp. 1332-1363.
http://www.iaeme.com/IJM/issues.asp?JType=IJM&VType=11&IType=12

1. INTRODUCTION

Business organizations work hard to achieve sustainable competitive advantage, but there is still a wide gap between the desired and actual success. If this gap arises due to the performance and management of employees, then effective practices (such as strategic HR management) must be undertaken to attain the desired success. Strategic management of talented and committed people, motivate other employees to exhibit their potential capabilities for the growth of the organization as a whole (Cappelli, 2008a), which enables the organization to

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Journal of Retailing and Consumer Services
Volume 59, March 2021, 102393
ELSEVIER

The effect of assortment and fulfillment on shopping assistance and efficiency: An e-tail servicescape perspective

Pradeep Kautish [a], Justin Paul [b], Rajesh Sharma [c]

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https://doi.org/10.1016/j.jretconser.2020.102393

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Article

Performance Evaluation of Banks Sponsored Mutual Funds: An Analytical Study

Paradigm
1–22
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in.sagepub.com/journals-permissions-india
DOI: 10.1177/0971890719859941
journals.sagepub.com/home/par
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Meena Sharma[1]
Manish Didwania[1]
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Abstract

This research paper inspects the comparative performance evaluation of banks sponsored Indian mutual funds using traditional measure. The data comprises 166 open-ended equity, debt, liquid and equity linked saving schemes (tax savings) schemes during the period of April 2006–March 2017. The evidence shows that all sample schemes are well diversified. Public sector banks sponsored get first ranked because good return, all positive and diversified schemes and efficient performance of portfolio management as compared to Private sector and UTI banks sponsored mutual funds.

Keywords

Banks sponsored mutual fund, open-ended mutual fund, performance evaluation, risk adjusted measure

Introduction

Indian Mutual fund Asset management Industry has grown immensely in size and does attract the academics, financial community and investors to invest in various securities. A mutual fund is the popular resources of Investment (Babbar & Sehgal, 2018). It is managed through the expertise and qualified professionals that pools the savings from various investors and invest in stocks, bonds, money market instruments and other securities. Compared to other investment vehicles mutual funds give their investors more benefits, such as diversification, plethora of schemes, transparency, low cost, liquidity, equity and debt market, Tax benefits etc. The Government of India started its first mutual fund asset management company, which is the Unit trust of India in 1963. After the establishment, UTI came with its first scheme US 64. In 1987 public sector, Life insurance companies and General Insurance Corporation entered in mutual funds. At the end of the year 1988, UTI net assets were 670,000 million. Private sector mutual funds originated in July 1993. At last of the year 1993, the mutual fund industry's Asset under management

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06/12/2021
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Article

Aid-Growth Association and Role of Economic Policies: New Evidence from South and Southeast Asian Countries

Global Business Review
22(3) 735–752, 2021
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in.sagepub.com/journals-permissions-india
DOI: 10.1177/0972150918822059
journals.sagepub.com/home/gbr
SAGE

Rajesh Sharma[1]
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Abstract

The present article aims to study the implications of foreign aid on GDP per capita in the seven middle-income countries of South and Southeast Asia from 1990 to 2016. The influence of foreign aid on GDP per capita is studied in a policy-driven environment, for which a policy index using government consumption expenditure, inflation and trade openness is constructed. The outcomes of the study confirm that aid–policy interaction has a significant and positive impact on economic growth in the region. The results are calculated using the two-stage least-squares model, as foreign aid is included as an endogenous variable in the study. This approach enables us to assess the indirect effect of monetary, fiscal and trade policies on GDP per capita, as the constructed policy index is used as an instrument for foreign aid. The results of the study ascertain that besides current aid–policy interaction, the preceding years' aid–policy interaction also has a positive and significant impact on GDP per capita in the region. The inclusion of a policy index in the analysis enables us to evaluate the effectiveness of economic policies while determining the level of GDP per capita in South and Southeast Asian countries. Therefore, the study proposes that while assessing the influence of aid-financed programmes on GDP growth of a country, the economic policies of recipient countries need to be considered. The bottom line is that foreign aid, economic policies and economic growth of aid-recipient countries are inextricably linked.

Keywords

Foreign aid, economic policy, economic growth, 2SLS, South and Southeast Asian countries

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www.emeraldinsight.com/0306-8293.htm

Dynamism between selected macroeconomic determinants and electricity consumption in India

An NARDL approach

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Received 12 November 2018
Revised 28 January 2019
6 April 2019
Accepted 7 April 2019

Abstract

Purpose – By disentangling the impact of positive and negative shocks of GDP, FDI and oil consumption on electricity consumption, the purpose of this paper is to investigate whether this bifurcation significantly determines the level of electricity consumption in the short run and long run.

Design/methodology/approach – Using the recently developed nonlinear autoregressive distributed lag (NARDL) bounds approach, the study investigates the changes in the level of electricity consumption over a period of 1980–2015. The inclusion of a dummy variable for the possible structural break makes the electricity demand function more reliable. After checking the stationarity of data series, the study has employed the bounds test, which confirms the existence of the long run stability in the system. Further, using the VECM, the causality among the comprised variables has also been examined.

Findings – The findings confirm that not only the positive shocks but also the negative shocks in GDP have a positive and significant impact on electricity consumption in the long run. Similarly, the increased FDI has widened the scope of electricity consumption in the region, whereas the negative shocks' impact is found negative in the long run. In comparison to GDP and FDI, the influence of the increased oil consumption on electricity demand is found negative and significant in India, which reveals that electricity acts as a significant substitute for oil consumption in the long run.

Originality/value – To the best of the literature evidences available, none of the studies in the past has examined electricity demand in an NARDL framework. The study may help in estimating the demand for electricity consumption comprehensively, as this approach captures the separate influence of favourable and unfavourable changes while determining the level of electricity consumption. This approach may be crucial for policy makers, especially in an energy importer country, such as India.

Keywords Electricity consumption, Economic growth, FDI, Oil, NARDL, VECM

Paper type Research paper

Introduction

In developing countries, such as India, the efficient and wider utilisation of electricity is desired, since 80 per cent of the total energy demand for country is fulfilled by imported energy. In the year 2016–2017, the Indian Government had spent a whopping $70.196bn on crude oil import, whereas in the year 2017–2018 the energy-import bill increased to $87.79bn. However, during this period, the domestic production of crude oil has remained stagnant (PTI, 2018) and persistent crude oil price fluctuations have imposed another set of challenges to the government. The literature suggests that the persistent increase in oil price may significantly influence other major macroeconomic indicators such as current account, inflation, and economic growth (Abdi, 2018). That is why, instead of relying on imported energy, the extensive use of electricity to meet the energy demand has been initiated across the world, as the supply of electricity is relatively more elastic and depends on endogenous resources (Ghosh, 2002). In 2003, the Indian Government passed an Act, which intends to

International Journal of Social Economics
Vol. 46 No. 6, 2019
pp. 805-821
© Emerald Publishing Limited
0306-8293
DOI 10.1108/IJSE-11-2018-0586

06/12/2021

REGISTRAR
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The Impact of External and Internal Market Forces on Inflation in India: An Empirical Investigation

Rajesh Sharma, Pradeep Kautish** and D Suresh Kumar****

The identification of external and internal determinants of inflation is a perplexing task. Moreover, the spillover impact of these determinants generates indecisiveness in measurement. Therefore, the present paper tries to identify the impact of external and internal determinants of inflation in India by using the time series data from 1978 to 2015. In order to assess the short-run and long-run impact of selected variables, an Autoregressive Distributed Lag (ARDL) bounds approach has been adopted. The ARDL bounds method allows investigating the impact of external and internal determinants on inflation in India and provides long-run stability in the system. The results of the study found that oil consumption has a direct impact on domestic prices. Similarly, due to the increase in employment, inflation tends to increase in the long run. Further, the relationship between deficit financing and the domestic price is found to be negative and significant, whereas the impact of Foreign Direct Investment (FDI) on domestic price is found to be inconclusive in the long run.

Introduction

After liberalization, privatization and globalization, the socioeconomic and international convergence made macroeconomic environment challenging for the policy makers in India. As a result, the country experienced persistent price volatility over the years. Besides, the exogenous factors such as oil price, exchange rate, international collaborations, etc. made the environment strangulated (Ghosh and Phillips, 1998). The cumulative impact of indigenous determinants such as interest rate, demand output gap, etc. contributed to increasing the prices (Maitra, 2016). Apparently, there is no unique explanation for this global phenomenon. However, Friedman and Schwartz (1963) in their seminal work perceived that inflation is a

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06/12/2021
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Journal of Cleaner Production 228 (2019) 1425–1436

Contents lists available at ScienceDirect

Journal of Cleaner Production

journal homepage: www.elsevier.com/locate/jclepro

The moderating influence of environmental consciousness and recycling intentions on green purchase behavior

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ARTICLE INFO

Article history:
Received 20 February 2019
Received in revised form
4 April 2019
Accepted 29 April 2019
Available online 30 April 2019

Keywords:
Green marketing
Consciousness
Recycling intentions
Environment
Sustainability
Emerging markets

ABSTRACT

This article examines the moderating influence of environmental consciousness and recycling intentions on green purchase behavior (GPB) in an emerging economy. Through this study, we attempt to significantly contribute to the existing body of knowledge on green marketing by ascertaining the role of those ethical constructs, on GPB. A hypo-deductive research design was adopted and a theoretical model was conceptualized by linking the moderating effects of environmental consciousness and recycling intentions to GPB. To collect the data for the study, a self-administered questionnaire was run with 312 consumers from India. The data were analyzed for assessment of the measurement and structural models via structural equation modeling. The findings indicate that environmental consciousness and recycling intentions significantly moderate the impact of perceived consumer effectiveness (PCE) and willingness to be environmentally friendly (WEF) on GPB. The study offers managerial insights for green marketers to operate in fast growing emerging markets. The present study is significant as it is the first of its kind which links the moderating effects of environmental consciousness and recycling intentions in light of the theory of planned behavior (TPB) on GPB in such a context.

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1. Introduction

The rapid proliferation of environmental concerns, sustainability challenges, and increased level of consumer awareness about environmental deterioration have positioned green consumption with social relevance (Barbarossa and De Pelsmacker, 2016; Johnstone and Tan, 2015; Patel et al., 2017; Seifi et al., 2012; Swim et al., 2012). Understanding green purchase behavior (GPB) and consumers' attitude toward environmentally friendly products can be useful for corporations exploring insights on sustainable marketing models for the business markets (Carrete et al., 2012; Thøgersen et al., 2015). To facilitate the sustainable movement, green consumption, and conservation, behavioral factors is being explored in emerging economies (Ali et al., 2010; Mainardes et al., 2017). These include topics such as recycling (Chu and Chiu, 2003) as well.

The population residing in urban regions increased substantially in most countries. Census of India (2011) in the year 1950, total of 30 per cent of the world's population were urbanized, and by 2050, it is projected that around 66 per cent of the world's population will be urbanized (United Nations, 2014). As per the United Nations (2018), the urban population of the world has rapidly grown from 746 million in 1950 to 4 billion in 2017. Due to urbanization of the population, increasing income levels, health hazards, and changing lifestyles have given rise to different consumption-related challenges in the country, such as packaged food items, packaged drinking water, etc. To counter these, nowadays people are gradually shifting their preferences towards organic food (Rana and Paul, 2017). The substantial growth of the organic sector is attributed to growing awareness about green products, increasing health consciousness, growth in numbers of the urban middle-class population, rising consumer disposal income, and increased spending on food products (Business World, 2018; Lee (2009)). In short, consumers are at the helm of steering the environmentally friendly product sector; they are equipped with ample knowledge, health concerns, and purchasing capacity for green products. Though not all consumers really purchase what they intend to purchase in case of green purchase decisions in particular, which led to the notion of

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https://doi.org/10.1016/j.jclepro.2019.04.389
0959-6526/© 2019 Published by Elsevier Ltd.

06/12/2021
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Received: 6 March 2019 | Revised: 7 June 2019 | Accepted: 7 June 2019
DOI: 10.1002/bsd2.82

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RESEARCH ARTICLE

WILEY Business Strategy and Development

Determinants of pro-environmental behavior and environmentally conscious consumer behavior: An empirical investigation from emerging market

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Abstract

Given the due importance of environmentally conscious consumer behavior (ECCB) and willingness to be environmentally friendly (WEF), the aim of this paper is to study the relationships between the determinants of pro-environmental behavior (e.g., perceived behavioral control, environmental knowledge, environmental concern, and perceived environmental consequences), with ECCB and WEF. The proposed theoretical model is grounded in marketing literature, extends the theory of planned behavior, and empirically tested in the Indian market. A survey with questionnaire was administered to gather data from 510 respondents from the state capital of the country. Structural equation modeling was used to test the hypotheses; the results confirm adequate support for the theory of planned behavior and proposed theoretical model. In addition, ECCB found to be significantly influenced by the consumers' environmental knowledge, and perceived environmental consequences, and environmental concern was significantly related to WEF. The study implies that green marketers should direct their marketing efforts towards integrating these four pro-environmental behavior determinants in order to facilitate the ECCB and WEF for green products. For promoting the ECCB, green marketers should strengthen environmental knowledge and perceived environmental consequences to target consumers, and for augmenting the WEF, they should improve the environment concern among consumers. This study contributes to the mainstream literature by ascertaining the distinctive impact of the four noteworthy determinants of pro-environmental behavior on ECCB and WEF in emerging markets.

KEYWORDS

environmental behavior, green consumers, green marketing, India, pro-environmental, willingness

1 | INTRODUCTION

Over the last few decades, the world witnessed unprecedented and exponential growth in environmental deterioration (Ehrlich & Ehrlich, 2012; Mishal, Dubey, Gupta, & Luo, 2017); thus, it is well momentous to the rising consumer awareness about the devastating effects of human activities on the natural environment of the planet (Smart, 2010; Spangenberg, 2004). The beginning of 19th century, the economic activities transformed human life in order to facilitate industrial and corporate evolved strategically revolutionary environmental marketing practices in order to grow in commercial markets (Orsato, 2006; Ottman, Stafford, & Hartman, 2006; Straughan & Roberts, 1999). Marketers envisaged innovative green practices that increased the modern consumers' cognitive indulgence and intensified

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Value orientation, green attitude and green behavioral intentions: an empirical investigation among young consumers

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Received 24 November 2018
Revised 17 March 2019
13 May 2019
10 July 2019
27 July 2019
1 August 2019
3 August 2019
5 August 2019
Accepted 5 August 2019

The authors would like to express their heartfelt gratitude toward the two guest editors and two anonymous reviewers in helping them to substantially improve the manuscript. In addition, the authors would like to thank Mr. Muthu Krishnan in proofreading and editing the early drafts of the manuscript.

Abstract

Purpose – *The purpose of this paper is to study the relationships between two distinct value orientations, that is, the terminal and instrumental. The effects of these value orientations on green attitude and green behavioral intentions for green products among young consumers in an emerging market against the backdrop of a value–attitude–behavior cognitive hierarchical framework has also been focused on in this study.*

Design/methodology/approach – *The study espouses a hypo-deductive research design and the measures were conceptualized and advanced based on an inclusive review of the research studies conducted in the past. Anderson and Gerbing's two-step research approach was used for partial least square structural equation modeling to assess the measurement and structural models with SmartPLS (v 3.2.6).*

Findings – *The findings suggest that the functional value is constantly essential, but not enough by itself, for envisaging green purchase behavior. The results show that both the terminal and instrumental values have a significant impact on green attitude and in turn, green attitude has a significant impact on green behavioral intentions. The instrumental value displays greater impact on both green attitude and green behavioral intentions compared to the terminal value. Additionally, the research also discloses that green attitude acts as a mediator in the relationship between terminal/instrumental value and green behavioral intentions.*

Research limitations/implications – *This paper describes two broad, yet distinctive, value orientations (i.e. terminal versus instrumental) using cross-sectional data from the state capital of the country. Future research may scrutinize the findings' (cross-cultural) generalizability using diverse data sets to assess value orientations and customers' green behavioral intentions among young consumers.*

Practical implications – *The research findings will enormously help green marketers and practitioners to recognize the roles of terminal and instrumental values in evolving green attitude and green behavioral intentions for green products among the young consumers, thereby helping to develop marketing strategies.*

Social implications – *The current research provides evidence that in emerging markets such as India, young consumers exhibit value orientation toward environmental deterioration, holding a sense of responsibility in their consumption pattern. This may pave the way forward for sustainable businesses.*

Originality/value – *This study is objectively a pioneering one that attempts to explore the relationships between the value orientations in terms of instrumental and terminal values and their effects on green attitude and green behavioral intentions toward green products using Rokeach's (1973) two-dimensional measure of values among young consumers, which is quite novel to the existing body of knowledge. Moreover, this paper has surveyed these relationships in a different research context, which can expand the knowledge about green consumer behavior in emerging markets.*

Keywords *Young consumers, Intentions, Values, Green marketing, Instrumental, Terminal, Instrumental*

Paper type *Research paper*

1. Introduction

In the past few decades, rapid technological advancements, materialistic consumption patterns, natural resource depletion and population explosion have led to planet-wide

 DOI 10.1108/YC-11-2018-0881

06/12/2021
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Fashion portals and Indian consumers: an exploratory study on online apparel retail marketing

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Abstract: The rapid proliferation of fashion consciousness in India, and augmented internet usage facilitated online shopping trend, led to increase acceptance of fashion portals. The present research was focused on the online shopping determinants and adoption of fashion portals among Indian consumers. Plethora of researches indicates that now fashion consumers have online interface, quality services, varied and relevant information to assist them in shopping. The scale constructs relate to product assortment, shopping assistance, shopping efficiency, order fulfilment, order fulfilment reliability, perceived risk and trust. A primary research was conducted on Indian consumers frequently using the fashion portals for purchases. The study determines that the fashion customers are influenced by the service convenience paradigms of fashion portals. Conversely, the consumers stress less importance to perceived risk, and trust attributes of fashion portals. The quality of services convenience offered by fashion portals is improved along with relevant information display, the customers may get attracted to visit the portals, encourage revisiting and using them for online shopping. The present research is an initial attempt to assess the level of satisfaction with using the fashion portals.

Keywords: retail; online shopping; Indian consumers; retail services; electronic retailing; fashion portals; apparel marketing; fashion; services.

Reference to this paper should be made as follows: Kautish, P. and Rai, S.K. (2019) 'Fashion portals and Indian consumers: an exploratory study on online apparel retail marketing', *Int. J. Electronic Marketing and Retailing*, Vol. 10, No. 3, pp.309–331.

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06/12/2021

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Journal of Indian Business Research

Study on relationships among terminal and instrumental values, environmental consciousness and behavioral intentions for green products
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Article information:

To cite this document:
Pradeep Kautish, Rajesh Sharma, (2018) "Study on relationships among terminal and instrumental values, environmental consciousness and behavioral intentions for green products", Journal of Indian Business Research, https://doi.org/10.1108/JIBR-01-2018-0013
Permanent link to this document:
https://doi.org/10.1108/JIBR-01-2018-0013

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www.emeraldinsight.com/1355-5855.htm

Managing online product assortment and order fulfillment for superior e-tailing service experience

An empirical investigation

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Received 3 May 2018
Revised 15 July 2018
20 October 2018
2 November 2018
29 November 2018
20 December 2018
Accepted 10 March 2019

Abstract

Purpose – The purpose of this paper is to bridge together seemingly disparate yet interconnected paradigmatic antecedents of e-tailing and servicescape, i.e., product assortment, order fulfillment, shopping assistance and its consequences for shopping efficiency.

Design/methodology/approach – The proposed conceptual model is well grounded in the extensive literature from e-tailing as well as retailing domain and to assess the plausibility of the model. Total 246 female online apparel shoppers were surveyed from an Indian university and the data were analyzed using structural equation modeling through SmartPLS.

Findings – The outcomes of the study indicate that the e-customer may derive a substantial share of shopping assistance and service interface through product assortment offered by e-tailing sites. Customer-perceived performance of this e-shopping process – a crucial element of e-tail servicescape – directly affects the shopping assistance, along with order fulfillment capability of retail scope.

Research limitations/implications – The study used a sample of graduate students at a north-west university in India, which limits the generalizability of the research to other consumer groups. The paper links a significant body of literature within a conceptually developed framework and identifies key research areas in the e-tailing realm.

Practical implications – By better understanding the role of product assortment as a value-added feature in online value co-creation process, the e-tail managers can leverage the proposed integrated capability to improve e-tailing performance and customer outcomes in the form of business.

Social implications – With rapid advancements in internet-led communication, we are witnessing the dawn of a new era of e-tail innovations around us which is expected to change the way people experience shopping.

Originality/value – This research is an attempt to enrich the level of understanding about online shopping environment in light of relationships among virtual and physical facets of e-tail, i.e., product assortment, order fulfillment, shopping assistance and shopping efficiency. The authors investigate customer-perceived product assortment performance in e-tailing and its significances on shopping outcomes.

Keywords Retailing, S-D logic, Order fulfillment, Product assortment, E-tail, E-consumer

Paper type Research paper

Introduction

The e-tail segment is expected to grow from 2.5 percent in 2016 to 5 percent by 2020 and the total organized retail market is likely to grow from 8 percent in 2016 to 25 percent in 2020 (AT Kearney, 2016). In India, consumer spending over the internet is expected to accelerate at world's highest annual growth rate of 51 percent and will reach to $120bn by 2020 (ASSOCHAM, 2016). With the rapid internet-enabled technological advancements (Leeflang *et al.*, 2014), e-tailers got unprecedented opportunities beyond the physical limits of the traditional channels (Amin *et al.*, 2015) and carved a virtually competitive community (Schramm-Klein and Wagner, 2014). The way retail landscape is evolving, in the near future successful retailers will engage their customers through omni-channels (Bell *et al.*, 2014; Verhoef *et al.*, 2015), a mashup of digital and physical experiences (Reinartz, 2016). E-tailers face challenges on account of effective web

Asia Pacific Journal of Marketing and Logistics
Vol. 31 No. 4, 2019
pp. 1161-1192
© Emerald Publishing Limited
1355-5855
DOI 10.1108/APJML-05-2018-0167

06/12/2021

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Indian Journal of Economics and Development, Vol 6 (2), February 2018

ISSN (online): 2320-9836
ISSN (Print): 2320-9828

The economic determinants of foreign direct investment in Indian economy: An analytical study

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Abstract

Objectives: The present research work is an attempt to assess the factors determining the inflow of foreign direct investment in India by evolving an empirical framework using time series data.
Methods/Statistical analysis: Owing to time series data, stationary of economic variables was checked by using unit root test. Thereafter, for assessing the unidirectional and bidirectional relationship among variables a pair wise granger causality test was performed. Further, Ramsey's reset test and white's heteroscedasticity test have been used. After investigating the tolerance and variance inflating factor, a multiple ordinary least squares regression model was developed which enabled to partially explain the inflows of FDI in Indian Economy.
Findings: The estimated model encompasses five explanatory economic variables. These variables are the market size (population), the size of the tourism industry (tourist arrivals), infrastructure development (rail and road density), economic growth (percentage change in GDP) and openness (export plus import as a percentage of gross domestic products) of markets. Hence, the paper tries to examine the impact of above said factors on Indian economy in general and their impact on foreign direct investment in particular. Apparently, some of the variables such as tourism, infrastructure, and openness of markets have exhibited a favorable impact on foreign direct investment. On the other hand, market sizes impact on FDI has been found insignificant. Therefore, in order to attract the foreign direct investment in India, a sound infrastructure, liberal economic policy, favorable tourism policy and GDP growth seem to be desirable determinants whereas population size may not be obliging in this regard.
Application/Improvements: The results of the study suggest that to increase the inflows of FDI in Indian Economy, the policy should be focused on infrastructure development and increasing economic growth. Further, the policy of trade liberalization is also beneficial for Indian Economy.
Keywords: Foreign Direct Investment, FDI Determinants, Time Series Analysis, Economic Growth, Trade-Openness, Tourism.

1. Introduction

Over the last two-and-a-half decades, policy implications of most of the developing countries have shifted from state-driven mechanism to export-led growth. Therefore, this transformation has augmented the need for foreign direct investment, especially in developing countries. In this regard, many developing countries have begun to adopt liberal foreign trade policy by modifying the existing stringent laws [1]. Apparently, poverty removal, employment generation, and literacy rate improvement have always remained a daunting task for the policymakers in India. And at the same time, the mobilization of domestic resources has declined over the years. A high growth rate is a solution to many such problems and in the absence of domestic resources; it can be performed with the greater inflows of FDI [2]. Therefore, since the liberalization policy adopted in 1991, we have seen that the Indian policymakers have been trying hard to consistently attract the FDI inflows into the country. Despite this, the growth rate in FDI inflows has shown high volatility and this raises the important question of why India is weak in attracting FDI when the economists, as well as the politicians of our country, have recognized the importance of FDI in India's growth? Thus, the present research work attempts to observe the

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African Journal of Hospitality, Tourism and Leisure, Volume 7 (2) - (2018) ISSN: 2223-814X
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Foreign Tourists Arrival in India: An Analytical Study on Seasonal Variations of Tourist Arrival and its Impact on the Growth of Foreign Exchange Earnings

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Abstract

The tourism industry is contributing to the development of the Indian economy. The role of the industry has improved and contributed in generating the needed foreign reserves. Hence, it is vital to study the rate of the growth of tourist arrivals in India. Further seasonal variation, which is a significant factor in terms of tourism, has to be studied. The seasonal analysis may help in proposing an apt policy framework, which may further enhance the scope of tourism in India. The objectives of the study were to assess the rate of growth of tourist arrival in India, and measure the seasonal variation in the tourist arrivals in India and also assess the change in foreign exchange earnings driven by the burgeoning tourism industry. Using valuable secondary sources of data over the period of 1999 to 2015, this paper seeks to capture the extent of the tourism industry's growth. Moreover, in order to assess the determinants of tourism in India, the role of seasonal fluctuations has also been considered. The results show that over the period of 1999-2015, the Indian tourist arrivals had increased at a rate of 8.23 percent per year. Apparently, the tourist arrivals are season sensitive. Therefore, seasonal adjusted values have also been calculated. The seasonal adjusted graph shows that tourist arrivals in India are indeed less season sensitive in the long term. From a government point of view, information pertaining to these factors is important as it enables government to plan required infrastructural development. Government must as a matter of urgency craft strategy according to the expected arrival of tourists or this important industry and its range of sectors will not be sustainable.

Keywords: Tourism industry, employment, foreign exchange tourist arrival, government of India

Introduction

The travel and tourism industry has grown persistently over the years in India (Gupta and Gupta, 2007). In fact, the governments across the world have understood the importance of this sector. Therefore, the tourism sector has well been promoted and supported by the governments (Ivanov and Webster, 2006). The National Committee of the Tourism Industry (1982) framed a comprehensive plan for accomplishing sustainable development (www.ibef.org). In India, the tourism sector has been developed at a priority basis. It is considered as a tool for creating employment opportunities as well as income generation in both the formal and informal sectors

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Assessing Dynamism of Crude Oil Demand in Middle-Income Countries of South Asia: A Panel Data Investigation

Global Business Review
1–15
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DOI: 10.1177/0972150918795367
http://journals.sagepub.com/home/gbr
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Rajesh Sharma[1]
Pradeep Kautish[1]
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Abstract

Using pooled mean group (PMG) estimation, the article tries to examine the impact of crude oil price, income, primary energy sources, electricity and financial crisis on the demand for crude oil in the six middle-income countries of South Asia over the period of 1988–2016, that is, 29 years. The use of PMG estimation enables us to get the short-run and long-run coefficients of comprised variables. Thereafter, dynamic ordinary least squares (DOLS) and fully modified ordinary least squares (FMOLS) panel co-integration techniques are performed to corroborate the outcomes of PMG estimation. Unlike PMG, DOLS and FMOLS panel co-integration methods examine the long-run determinants of oil demand in the presence of heterogeneity. Except for electricity, the coefficients of all other determinants are found in line with the results of PMG. However, the direction of the electricity coefficient is the same in the PMG and DOLS techniques. Therefore, the present study proposes the results of PMG estimation. The results suggest that the demand for crude oil is price inelastic and income elastic in the region. Further, the negative coefficient of electricity confirms that in the long run, electricity acts as a substitute for crude oil. Thus, the extensive use of electricity may help in reducing the demand for crude oil in the South-Asian countries. On the other hand, the primary energy is found complementary to crude oil in the selected countries over the study period. Finally, the coefficient of financial crisis, which is represented by a dummy variable, advocates that the financial crisis has a negative and significant impact on the demand for crude oil in the middle-income countries of South Asia.

Keywords

Crude oil demand, financial crisis, South-Asian countries, PMG, panel data

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Vision
22(4) 1–11
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DOI: 10.1177/0972262918803173
http://journals.sagepub.com/home/vis
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Impact of Selected Macroeconomic Determinants on Economic Growth in India: An Empirical Study

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Abstract

Due to the socio-economic, infrastructural and governance peculiarities, identification of key macroeconomic factors determining the economic growth in developing countries becomes a complicated case. The present study attempts to assess the impact of foreign aid, government consumption expenditure, foreign direct investment, trade openness, exchange rate, human capital development, and inflation on economic growth in India by using yearly data for the period of 46 years, that is, from 1971 to 2016. An autoregressive distributed lag (ARDL) bounds model enables to examine the short-run and long-run impact of selected determinants on economic growth during the study period. The outcomes of the study find that in the long run, foreign aid, the government's final consumption expenditure and foreign direct investment have a positive and significant impact on economic growth, whereas, economic growth has been negatively influenced by exchange rate and human capital development. Contrary to the long run, foreign aid has a negative and significant impact on economic growth in the short run. The short-run outcomes show that all the selected macroeconomic determinants have either negative or positive influence on economic growth. To ensure the long-run economic growth, besides regulating the exchange rate fluctuations, policies related to export -import and human capital development need to be re-examined.

Key Words

Foreign Aid, GDP, Government Consumption Expenditure, Trade Openness, Human Capital Development

Introduction

Are economic growth determinants reckonable? Macroeconomists have long pondered this question. The strength of an economy can be assessed by analysing the macroeconomic determinants, which are empirically tested. Various international studies suggest that these parameters vary from country to country and time to time. Nevertheless, in cross-country data of 98 countries, per capita income, which depends on economic growth, has shown a strong positive correlation with the savings and negative correlation with the population growth (Mankiw, Romer, & Weil, 1992). Indeed, the economic growth has directly or indirectly been affected by population growth (Furuoka, 2010), technological advancement (Ramirez, Ranis, & Stewatr, 2011), accumulation of physical and human capital (Maria & Stryszowski, 2009; Sahoo, 2012) and export–import policy of a country (Rodriguez & Rodrik, 1999). However, due to the structural and economic environment of a country, the influence of these parameters may be fragile over the period of time. Taking the evidence of Latin America, Chile and Mexico by using cross-sectional and panel data, Fischer (1993) observed that restoring budget deficit and regulating inflation have helped in fostering economic growth in the region. Similarly, Manmohan and Woo (2010) spotted a negative linear relationship

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Consumer values, fashion consciousness and behavioural intentions in the online fashion retail sector

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Received 23 March 2018
Revised 15 April 2018
2 July 2018
7 July 2018
16 September 2018
Accepted 21 September 2018

Abstract

Purpose – The purpose of this paper is to study the underlying relationships among two distinct forms of consumer values, namely, instrumental and terminal values, fashion consciousness and behavioural intentions in the context of online fashion apparel retail sector.

Design/methodology/approach – A conceptual model and subsequent measurement scale were developed, grounded on in-depth review of the extensive literature and validated with customers engaged in online shopping of fashion apparels. The model was empirically examined, and a total of 395 responses were gathered from an online survey administered at a northeastern university in India. The model was validated using structural equation modelling, and a two-step approach suggested by Anderson and Gerbing (1988) was used to evaluate the measurement and structural models for the research.

Findings – The results of the study indicate that instrumental and terminal values significantly affect fashion consciousness, and fashion consciousness has a significant impact on behavioural intentions as well. The research brings out that fashion consciousness acts as a partial mediator between instrumental/terminal values and behavioural intentions. It is noteworthy that compared to terminal values instrumental values display a greater influence on both the variables fashion consciousness and behavioural intentions.

Research limitations/implications – The conclusion of present research will notably assist the fashion retailers, online marketing researchers and experts understand the importance of terminal and instrumental values in increasing fashion consciousness, leading to strategically design campaigns for promoting and instigate consumers' positive behavioural intentions in the best interest of the online fashion retail sector.

Practical implications – The study results provide suggestions for competitive marketing strategies for online fashion companies operating in the emerging markets like India.

Originality/value – The present study is first of its kind attempt to use Rokeach's (1973) two-dimensional measure of human values, in order to discover the terminal and instrumental values relationship and their influence on fashion consciousness and behavioural intentions in the online fashion retail industry.

Keywords Online shopping, Consumer behaviour, Values, Instrumentalism, Fashion consciousness, Fashion retailing

Paper type Research paper

1. Introduction

Across the globe, the luxury fashion consumption has grown exponentially in the last two decades (Giovannini *et al.*, 2015; Jain, 2017). India has emerged as the largest economy in the world (Paul and Mas, 2016; Wealth X, 2018) which led to rise in disposable income levels and, in turn, boosted the appetite for lifestyle oriented fashion consumption, e.g. luxury brands (Li *et al.*, 2012; Roy *et al.*, 2016; Saran *et al.*, 2016). Miller and Mills (2012) proposed the Brand Luxury Model across three specific fashion categories. Luxury is far more than just the materialistic attribution oriented possessions (Berthon *et al.*, 2009; Sanyal *et al.*, 2014). Kastanakis and Balabanis (2012) examined the relationship between interdependent self-concept and bandwagon consumption mediated by the level of a consumer's status-seeking predispositions, susceptibility to normative influence, need for uniqueness and consumers' propensity to engage in the "bandwagon" type of luxury consumption. Paul (2015) also explains the same phenomenon of marketing luxury goods to the mass by

International Journal of Retail & Distribution Management
Vol. 46 No. 10, 2018
pp. 894-914
© Emerald Publishing Limited
0959-0552
DOI 10.1108/IJRDM-03-2018-0060

06/12/2021
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Indian Journal of Economics and Development, Vol 6 (11), November 2018

ISSN (online): 2320-9836
ISSN (Print): 2320-9828

Monetary policy transmission through banking channel: is India ready for external benchmarking?

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Abstract

Objectives: This work assesses the effectiveness of various internal as well as external benchmarking systems with respect to transmission of RBI's monetary policy rates to bank lending rates in India.
Methods/Analysis: This study has used the database on Indian Economy published by Reserve Bank of India (RBI). A number of independent variables, including the lagged variants of some of them, have been used to perform the multivariate regression. Proper segregation of data has also been done to account for the impact of the major economic event of November 2016 namely 'demonetisation of higher denomination currency notes' in India.
Findings: Though this study finds that, barring the highly ineffective Benchmark Prime Lending Rate (BPLR) system, a significant progress has been made by Reserve Bank of India (RBI) in monetary policy transmission first through Base Rate System and then through Marginal Cost of funds based Lending Rate (MCLR) System. However, this paper finds that India is not yet ready to adopt the external benchmarking of lending rates, as proposed by an internal study group of RBI in 2017, primarily due to following reasons (a) Volatility issue of the proposed benchmark rates; (b) Lack of volumes, depth and maturity making them susceptible to manipulation; (c) Infeasibility of linking liability side and unilateral linking of asset side may hit banks' profitability badly; (d) Manipulation through spreads would still be possible; (e) Possibility of draconian centralization of powers in the hands of RBI may be dangerous for the economy; (f) Possibility of lobbying by banking industry to influence RBI cannot be ruled out; and (g) It would be against the spirit of liberalization.
Application: This paper not only attempts to give a perspective with respect to prevailing and proposed systems of monetary policy transmission, but also encourages further research, so as to facilitate better policy formulation by RBI, which is evaluating all possible options, including external benchmarking of lending rates, in quest of perfecting the monetary policy transmission in India.
Keywords: Monetary Policy Transmission, Interest Rate Pass-through, MCLR, External Benchmark Rate.
JEL Classification: E43, E50, E52, E58

1. Introduction

In 1994, the Reserve Bank of India (RBI) had deregulated the lending rates in order to give a free hand to banks, wherein the banks were required to declare their Prime Lending Rates (PLRs) for credits above Rupees 0.2 million, but this system fell short of attaining the desired objectives of having transparent and competitive lending rate regime as it resulted into varied rates of PLRs and the spreads thereupon. Moreover, the PLRs were not guided by the policy rates of RBI, thereby impacting the transmission. With an objective to correct the situation, RBI introduced a new system called Benchmark Prime Lending Rate (BPLR) in April 2003 whereby the banks were advised to compute their benchmark rates based on their cost of funds, operating expenses and a reasonable profit margin. It was expected that the BPLR would be the rate at which banks would grant loans to their most credit-worthy or prime customers and the lending rates of all other customers would be linked to this BPLR with some spread over and above BPLR depending upon their creditworthiness to account for the inherent risk. However, the BPLR system turned out to be a great disaster and failed to achieve the objectives of bringing transparency and ensuring effective transmission of interest rates, simply because there was no restriction on the banks to lend below BPLR. The banks were very quick in increasing their BPLR with any increase in policy repo rate, but did not show the same promptness when there was a decrease in the policy repo rate.

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Priyanka Jain Vishal Vyas Ankur Roy , (2017)," Exploring the Mediating Role of Intellectual Capital and Competitive Advantage on the Relation between CSR and Financial Performance in SMEs ", Social Responsibility Journal, Vol. 13 Iss 1 pp. -
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To cite this document:
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JMV Journal of Marketing Vistas
ISSN 2249-9067 Volume 6, No 2, July-December 2016 pp. 50-58

Factors determining the Customer's Satisfaction for E-Tourism: Factor Analysis Approach

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Abstract

The charming beauty of Rajasthan state has mesmerized the whole world in terms of tourism. The development of tourism industry has played a significant role in the economic development of Rajasthan. This paper seeks to outline the way in which customer satisfaction has been measured in the Rajasthan tourism industry and the means by which this could be developed further to provide a measure of satisfaction. In order to improve the tourism, Information &Communication Technology (ICT) involvement has increased significantly. Due to the benefits of e-management, agencies/organizations disseminating tourism have started using internet based services. Present paper makes an attempt explore the dimensions of the customer satisfaction in e-tourism. A questionnaire was prepared and sent to the target respondents who were the visitors from the world. These respondents have experienced e-tourism at least once in lifetime. This research yields rich insights for the managers of r-tourism firms, by introducing the factors which have the most significant impact on customers' convenience. The result shows that the significant factors affecting convenience in e-tourism are website; Price; Financial Security; Convenience, Product Information; and Promotional Deals.

Keywords

E-tourism, Information and Communication Technology, Customer Satisfaction

Introduction

Tourism is the backbone of Indian economy. The World Tourism Organization defines tourists as people "traveling to and staying in places outside their usual environment for not more than one consecutive year for leisure, business and other purposes (UNWTO-1995). The access to information about the tourism destinations, climate, necessary requirement etc. are essential before planning a tour. Now a days, the concept of e-tourism is popular because of its 'one click information' providing feature. Information and Communication Technology

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Construct Validity and Preferential Values: Mutual Fund as Investment Avenue

Dr. Vishal Vyas, Dr. Priyanka Jain, and Dr. Ankur Roy

Abstract

This study has made an attempt to measure the construct validity to determine the means of awareness, information sources, and the factors that an individual investor takes into consideration before choosing mutual fund as an investment option. The study also examines the preferential features related to the fund selection behavior of investors towards mutual funds. Confirmatory factor analysis was applied on the data collected from a sample of 254 mutual fund investors (based in Rajasthan, India) through a pre-tested questionnaire. Results suggest that model fit statistics are reasonably acceptable and investors service is an important preferential feature considered by the investors followed by intrinsic fund quality, sponsors reputation and performance and credibility of image.

Keywords: *Mutual fund, Confirmatory Factor analysis, Construct validity, Investor's behavior*

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India is undoubtedly emerging as the next big investment destination, riding on a high savings and investment rate, as compared to other Asian economies. As per a report authored by PWC "The World in 2050," the average real GDP growth in India would likely to be in the range of 5.8% between 2007-2050.The Indian mutual funds industry is witnessing a rapid growth as a result of infrastructural development, increase in personal financial assets, rise in foreign participation, growing competition and risk in the stock market, higher tax rates and increasing inflation. With the growing risk appetite, rising income, and increasing awareness, mutual funds in India are becoming a preferred investment option compared to other investment vehicles like Fixed Deposits (FDs) and postal savings that are considered safe but give comparatively low returns, according to "Indian Mutual Fund Industry."

The Indian mutual fund industry is undergoing a metamorphosis, which inadvertently marks a point of inflection for the market participants. Income and growth schemes made up for majority of Assets under Management (AUM) in the country. Individual investors make up for

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Article

Corporate Social Responsibility and Financial Performance in SMEs: A Structural Equation Modelling Approach

Global Business Review
17(3) 1–24
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SAGE Publications
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DOI: 10.1177/0972150916630827
http://gbr.sagepub.com
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Priyanka Jain[1]
Vishal Vyas[2]
Durga Prasad S. Chalasani[3]

Abstract

The aim of this study is to explore the relationship between corporate social responsibility (CSR) (defined through multi-stakeholder's framework) and financial performance in the context of Rajasthan small and medium enterprises (SMEs). To achieve this objective, an exploratory study was conducted and data were collected using structured questionnaire based on pretested scale items from 384 SMEs and structural equation modelling (second order) was employed. The statistics shows the overall model fit, and the findings indicate a significant but a weak positive relationship between CSR and financial performance. The results are in conformance with previous research works (Weber, 2008). It is also evident from the findings that although SMEs are socially responsible towards their different stakeholders, CSR is not a part of their strategy; rather, it is more an informal and self-driven approach. For them, CSR is not meant for economic imperatives; rather, they associate it with religious spirit. Due to constraints that they face in terms of resource and personal that can be deployed for CSR activities, the notion of CSR among them is still philanthropic and non-institutionalized.

Keywords

Corporate social responsibility, small and medium enterprises, financial performance

Introduction

Over the past 15 years, debate about corporate social responsibility (CSR) and its implementation in practice has increased in both variety and volume. Bowen (1953) was the first who introduced the idea

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Research article

Transient viscosities of negatively buoyant concentrated alumina suspensions

Deepak Sharma,[1] *Suresh Singh Chauhan,*[1] *Harlal Singh*[2] *and Amit Mukherjee*[1]*

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Received 24 April 2015; Revised 2 November 2015; Accepted 4 January 2016

ABSTRACT: The transient viscosities of sterically stabilized alumina suspensions with different degrees of aggregation were measured at low viscous flows in a Couette viscometer. The well-dispersed suspensions showed an increase in viscosity under a constant applied shear while the flocculated suspensions showed just the opposite behaviour. The drifts in the viscosity of the well-dispersed suspensions show strong features of shear-induced particle migration. However, experimental observations strongly indicate that the observed viscosity profiles of these suspensions are resultant of the competitive processes of shear-induced particle migration and shear rejuvenation. The drifts in viscosity of the well-dispersed suspension could be correlated to the degree of aggregation present in the suspension. On the other hand, the viscosity profiles of the flocculated suspensions showed characteristic shear rejuvenation behaviour. © 2016 Curtin University of Technology and John Wiley & Sons, Ltd.

KEYWORDS: alumina suspension; transient viscosity; shear induced diffusion; shear rejuvenation

INTRODUCTION

In recently reported investigations on the time and shear-dependent viscosity of a series of well-dispersed suspensions of alumina particles,[1,2] it was surprisingly observed that for the well-dispersed suspensions there was a continuous increase in viscosity with time under the action of a constant applied shear. The results obtained from the aforementioned studies indicated that particle migration under the action of shear may be the reason for such drifts. Moreover, the degree of the viscosity drifts varied for these suspensions. The results strongly suggested that an increase in the average particle sizes of the dispersed phase enhanced the viscosity drifts for these suspensions. On the other hand, under the same applied shear, the flocculated suspensions showed a decrease in viscosity with time.

Previously,[3–5] it was shown that the process of particle migration under the action of an applied shear can be modelled as a diffusive process. In these processes of diffusion, induced by shear, the spherical particles in a suspension migrate from the higher stressed region to the lower stressed region of the suspension. The migration of the particles is a consequence of the presence of a concentration gradient in the suspension, and the particles migrate from a higher concentration region to a lower concentration region. In the presence of such unequal concentration of particles within the suspension, a particle initially moving in a streamline will face more number of interactions from the higher concentration end. Moreover, such concentration difference of particles within the Couette cup will also result in a viscosity gradient within the suspension. Thus, two interacting spherical particles will no longer have identical centre of rotation, and a centre of mass and the particles will migrate from a higher viscosity region of the suspension to a lower viscosity region. The total effective diffusivity of particles will thus be a sum of the previous two mechanisms. In addition, migration will also result from random self-diffusion.[6] It was further shown[3,4] that the diffusive process is dominated by the gradient in viscosity. Surface roughness and irregularity in shapes of the particles in a concentrated suspensions will further accentuate the diffusive mechanism, as the bulk fluid stresses driving the particles together in the flow is proportional to suspension viscosity, while the lubrication forces is proportional to just the fluid (continuous phase) viscosity. This imbalance combined with surface roughness would naturally imply that in concentrated suspensions, particles will simply approach each other, come in physical contact and rotate owing to the vorticity of the shear flow. Because of irreversibility of these interactions, a permanent displacement of the particles from their original streamlines at the end of each

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Indian Journal of Biotechnology
Vol 15, April 2016, pp 266-268

Short Communications

Molecular evidence of Chili vein mottle virus and Chilli leaf curl virus simultaneously from naturally infected chilli plants (*Capsicum annuum* L.)

Anurag Kumar Sahu, Chitra Nehra, Ritesh Mishra, Rakesh Verma and R K Gaur*

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Received10 August 2014; revised 8 March 2015; accepted 23 April 2015

The occurrence of *Chilli leaf curl virus* (ChLCV) and *Chilli vein mottle virus* (CVMV) were detected by using the duplex PCR in the mixed infected Chilli plants (*Capsicum annuum* L.). The duplex PCR was done by using the specific primer Pot 1 and Pot 2 for CVMV and AVF28 and AV29R for ChLCV. The amplicon and the sequence analysis confirmed the presence of potyvirus and begomovirus in the mixed infection. This combinations exhibited synergistic symptoms and large numbers of cells were doubly infected. This paper reports highly specific conventional PCR assays for detection of two independent viruses infecting chilli plants simultaneously.

Keywords: *Chilli leaf curl virus*, *Chilli vein mottle virus*, Duplex PCR, begomovirus, potyvirus

Chilli is an important and widely cultivated spice and vegetable crop. From the economic point of view, chilli is no longer considered a minor vegetable crop. It is one of the most susceptible crops and has been found to be affected by various viral pathogens, which cause heavy losses to chilli production[1,2]. Natural occurrence of several viruses have been reported on chilli by various workers and among them *Chilli leaf curl virus* (ChLCV), *Cucumber mosaic virus* (CMV) and *Chilli vein mottle virus* (CVMV) have been reported as most destructive viruses affecting chilli cultivation in terms of incidence and yield loss[1]. The literature survey revealed that in last few years, the leaf curl disease of chilli has become the major constraint for chilli production in most of the chilli growing areas[3-5]. In India, the most important disease caused by viruses in chilli is yellow mosaic disease[6]. Incidence of the disease is reported to be 12-95% resulting yield losses as high 65-75%[7,8].

The mixed infection by the two or more plant viruses results in the complete loss of crop. Biological diversity of the plant virus increases the mixed infection in nature, which leads the interference and cross-protection[9]. The cross-protection strategies may control the various plant viruses and increase the possibility of disease management. Although detection of mixed infection through serological methods is available, it fails at the time of low titer of the viruses. In the present study, we have used the duplex PCR for the detection of CVMV and ChLCV infecting the chilli simultaneously.

During the survey in year 2012-13, about twenty Chilli leaves showing the mosaic and leaves curling were collected from the Shekhawati region of Rajasthan, India. Both the viruses were present alone and in mixed fashion in the samples tested. Dual infection of CVMV and ChLCV was the most prevalent mixed virus infection in the fields. Most of the viruses infecting samples showed similar symptoms, *i.e.*, mosaic, leaf curling and leaf distortion. Two sets of the universal primer as per the Table 1 were used for the detection and the presence of CVMV and ChLCV, respectively. Total RNA was extracted from mixed infection as well as from infected chilli samples using TRI regent as per the manufactures protocol. DNA was also extracted from mixed as well as leaf curl samples using CTAB method. The duplex PCR was carried out by using the two sets primers in a 50 µL reaction mixture, which contained 3 µL DNA, 5 µL cDNA, 10× buffer 5 µL, $MgCl_2$ 2.5 µL, dNTP 4 µL, each primers 1 µL and Taq polymerase 0.6 µL. The PCR was performed for 35 cycles at 94°C for 30 sec, 56-58°C for 45 sec and 72°C for 30 sec, followed by 72°C extensions for 10 min.

The amplified products were analyzed electrophoretically in 0.8% agarose gels (Fig. 1). Further, the amplicon was sent for the sequencing and submitted to GenBank, USA [JN000700 for ChLCV and KF220408 for CVMV (Fig. 1; lane 3)]. Sequence analysis confirmed that the viruses in the mixed infection belong to potyvirus and geminivirus family. Phylogenetic tree was constructed by

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Iranian Journal of Organic Chemistry Vol. 9, No. 4 (2017) 2215-2219

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Synthesis and biological activity of novel 3-(4-methylthio benzene sulfonyl)-2,4-dimethyl/2,4-diphenyl/4-methyl-2-phenyl/2-ethoxy-4-methyl/ 2, 4-diethoxy–1,5-benzothiazepines

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Received: August 2017; Revised: September 2017; October: 2017

Abstract: An efficient synthesis of novel 2,3,4-trisubstituted 1,5-benzothiazepines **5a-e** incorporating sulfonyl group is described. Compounds **5a-e** were synthesized by the reaction of 3-(4-methylthio benzene sulfonyl)-2,4-dimethyl/2,4-diphenyl/4-methyl-2-phenyl/2-ethoxy-4-methyl/2,4-diethoxy propane-1,3-dione **4a-e** with 2-aminobenzenethiol in acidic condition. Formation of compounds **4a-e** were achieved by the reaction of 4-methylthio benzene sulfonyl chloride (**2**) with 2,4-dimethyl/2,4-diphenyl/4-methyl-2-phenyl/2-ethoxy-4-methyl /2,4-diethoxy propane-1,3-dione **3a-e**. The structure of the compounds has been established by elemental, IR, ^{1}H NMR, ^{13}C NMR and Mass spectral analyses. The *in vitro* antibacterial and antifungal activities of the synthesized substituted 1,5-benzothiazepines were investigated against two bacterial strains, viz. *Staphylococcus aureus* and *Klebsiella pneumonie* and two fungal strains, viz. *Aspergillus niger* and *Candida albicans*. The compound 5c was found to more active against all tested microorganisms.

Keywords: Propane-1,3-dione; Substituted benzothiazepine; Sulfonyl compound; Biological activity.

Introduction

Heterocyclic compounds are having profound impact on our modern world coupled with its future. Indeed, the coverage of heterocyclic compounds is vast and constitute important domain for the society viz. energy, environment, biology, medicine, agribusiness and materials. Benzothiazepines have attracted attention as an important class of heterocyclic compounds in the field of drugs and pharmaceuticals [1]. The superiority of *diltiazem* over other conventional vasodilators has resulted in to discovery of other useful compounds in recent years.

The utility of 1,5-benzothiazepines and its derivatives as medicament is well explored. A literature survey reveals the enhanced bioactivity of annulated benzothiazepines, such as antimicrobial [2-8], antipsychotropic [9-11], antihypertensive [12-15], cardiovascular [16-18], antiasthma [19], anticancer [20,21], platelate aggregation inhibitor and Ca antagonist [22-25]. The research on the compounds containing sulfonyl group have been a focus of attention for a long time due to their diversified biological activities. Sulfones occupy a unique position in the drug industry with their antimalarial [26], bactericidal [27-29] and antitubercular activity [30-32]. The sulfone *Depsone* (sulfone) is well known antileprotic drug [33].

The introductions of an alkyl substituent at the desired position in heterocycles are often key intermediate in the synthesis of pharmaceutical drugs. Relatively large number of 1,5- benzothiazepine derivatives having various substituents at position-

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The Indian Journal of Political Science
Vol. LXXIX, No. 4, October-December, 2018 pp. 910-917 (ISSN No. 0019-5510)

ONE NATION, ONE ELECTION: A HEALTHY PRACTICE FOR INDIAN POLITICAL CULTURE

Sanju Sharma
Kumar Sambhav Pareek

The argument in favour of simultaneous elections is the idea of "one nation, one election". The founding fathers of Indian constitution sought a stable representative democracy in India, with similar electoral system-designs for both national and state legislative assemblies through the constitutional architecture. Simultaneous elections were envisaged to be the norm but the exception in Indian polity. The idea of holding elections simultaneously is in news after it got a push from Prime Minister Narendra Modi.

The present paper outlines the meaning and scope of simultaneous elections and analyses the necessity and feasibility to conduct them in India. Drawing light on the historical andconstitutional aspects ofelections in India, the rationale for the concept of simultaneous elections is claimed. With a detailed evaluation of this concept in Indian scenario, the paper aims at ascertaining its introduction in Indian polity. In the end it provides a framework of the relevant constitutional and statutory provisions to be amended.

The term "Simultaneous Elections" is defined as structuring the Indian election cycle in such a manner that elections to Lok Sabha and State Assemblies are harmonized together. The voter would cast his/her vote for elections of Lok Sabha and State Assembly on a single day and at the same time under this scheme. Simultaneous elections do not mean that voting needs to happen on a single day across the country for Lok Sabha and State Assemblies. This can be carried out in a phase-wise manner as per the existing practice only if the voters in a particular constituency vote for both State Assembly and Lok Sabha the same day.

Simultaneous elections are not a novel idea in the country. The First General Elections were held simultaneously to Lok Sabha and LegislativeAssemblies in 1951-52. This practice of simultaneous elections continuedfor three consequent terms in the elections held in the years of 1957, 1962 and 1967. Later as a result of premature dissolutions and extension of terms of both the Lok Sabha and various State Legislative Assemblies, separate elections to Lok Sabha and States Legislative Assemblies have been conducted for the last forty eight years. Therefore the cycle of simultaneous elections got disturbed.

. Critics often dismiss the historical happenings of successful conduct of simultaneous elections from 1951 to 1967 as mere products of historical accident or coincidence. But this is not the correct. The founding fathers of Indian constitution devised similar electoral system-designs for both national and state legislative assemblies through the constitutional architecture with a vision.Article 83(2) of the Constitution provides for a term of five years for Lok Sabha, from the date of its first sitting unless dissolved earlier. Article 172 (1) provides for same provision for state legislative assemblies i. e., five-year tenure for State Legislative Assembly from the date of its first sitting. Hence it can be

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Proc. Natl. Acad. Sci., India, Sect. B Biol. Sci.
https://doi.org/10.1007/s40011-018-1006-9

RESEARCH ARTICLE

Molecular Characterization of Begomoviruses DNA-A and Associated Beta Satellites with New Host *Ocimum sanctum* in India

Chitra Nehra[1] · Avinash Marwal[2] · Rakesh Kumar Verma[1] · R. K. Gaur[1]

Received: 1 December 2017 / Revised: 13 June 2018 / Accepted: 25 June 2018
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Abstract *Ocimum sanctum* (Tulsi) is a native Indian subcontinent plant with important medicinal values. Leaves with mosaic and curling observed on *O. sanctum* in Rajasthan province of India were severely stunted having symptoms of typical *Begomovirus* infection. The authors report on a comprehensive study of sequence variations, phylogeny and recombination breakpoints for *Tomato leaf curl virus*, prevailing in the plant *O. sanctum*. To confirm *Begomovirus* infection, PCR and whole genome amplification via rolling circle experiments were exhibited by means of complete nucleic acid (DNA) isolated from symptomatic plants leaves. Sequence analysis established the association of betasatellite molecule along with DNA-A genome and contemplated as isolate of *Tomato leaf curl virus* as it showed 98% similarity with ToLCV. The present study includes phylogenetic, recombination and pathogenicity analysis of ToLCV infecting *O. sanctum*.

Keywords Natural infection · *Tomato leaf curl virus* · Pathogenicity · Recombination

Significance Statement This study includes phylogenetic, recombination and pathogenicity analysis of TLCuV infecting *O. sanctum*. As far as anyone is concerned, the carried out study is the foremost account of TLCuV naturally infecting a new host *O. sanctum* in India.

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Published online: 30 June 2018

Introduction

The family *Geminiviridae* is grouped in nine genera, Mastrevirus, Curtovirus, Begomovirus, Turncurtovirus, Topocuvirus, Eragrovirus, Becurtovirus, Capulavirus and Grablovirus; in view of their genetic architecture, carrier insect transmission and variety of host [1]. The *Begomovirus* genera comprise the largest group of viruses having monopartite or bipartite nature, communicating diseases with the aid of *Bemisia tabaci* (white flies) in plentiful of monocotyledonous and dicotyledonous plants worldwide [2]. Alphasatellites or betasatellites have a single stranded DNA in nature and use machinery of allied monopartite *Begomoviruses* chiefly reported from the old world, while *Begomoviruses* prevailing in the new world area comprise of two DNA segment molecules, i.e. DNA-A and DNA-B [3]. Monopartite *Begomovirus*, comprises of ssDNA genome having a magnitude around 2.8 kB which is homologous to DNA-A constituent new world *Begomoviruses*, which encodes 6 proteins, 2 from coding strand (protein responsible for viral coat [V1] and pre-coat protein [V2]) and the rest 4 on the complementary strand of DNA molecule (protein aiding in start of replication [C1], protein helping in start of transcription [C2], protein responsible for augmenting of replication [C3], finally pathogenicity decisive protein [C4].

The betasatellites having size of ~ 1.4 kB which is approximately fifty percent in length to the DNA-A molecule, enhances disease intensity in plants by suppressing its host defense activities [4]. While alphasatellites may attenuate the symptoms as caused by helper begomoviruses *Begomoviruses* go through repeated recombination procedures adapting as per new host/environment, resulting in appearance of new isolates. Acquirement of new DNA molecules by inter/intraspecific recombination

06/12/2021

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Plant Gene xxx (2018) xxx-xxx

Contents lists available at ScienceDirect

Plant Gene

journal homepage: www.elsevier.com

Journal Cover Image

Complexity and recombination analysis of novel begomovirus associated with Spinach yellow vein disease in India

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ARTICLE INFO

Keywords:
Spinach olaracea
Begomovirus
Betasatellites

ABSTRACT

Leaves with vein yellowing were observed on Spinach (*Spinacia oleracea*) in Rajasthan province of India. The plants were severely stunted in growth and exhibited symptoms typical of *Begomovirus* infection. Here we report a comprehensive study of complexity and recombination of novel begomovirus associated with spinach yellow vein disease. It is probably a perpetuation of *Papaya leaf curl virus* in absence of its main host and thus raises concern about its spread to other crops. Analysis of samples collected in the survey indicates that SYVD infected plants are associated with a begomoviruses (novel species showed < 91% nucleotide sequence similarity) and its associated betasatellites. Interestingly, most of the begomoviruses were found to be inter-species recombinants and the betasatellites possess high nucleotide variability, due to recombination. This suggested the existence of a complex recombination pattern to form gene pool of the crop-infecting begomovirus betasatellites complexes. The Nucleotide diversity ( ) and nucleotide substitution rates were determined for the DNA-A of begomoviruses SYVSV is 0.10382 and 2.436 10^{-3}substitutions site^{-1} year^{-1} respectively. Thus mutation and recombination are driving forces for the emergence and evolution of new begomoviruses. This strengthens the hypothesis for increase of host range of begomovirus and indicates that the high evolutionary rate of the begomoviruses is primarily due to frequent recombination and mutation.

1. Introduction

The Geminiviridae family contains virus that exhibit characteristic twinned geminate particle morphology with circular, single-stranded DNA (ssDNA) genomes (Cui et al., 2004; Cui et al., 2005). Based upon their host ranges, insect vectors and genome organizations, they are classified into seven genera viz. Begomovirus, Becurtovirus, Curtovirus, Eragrovirus, Mastrevirus, Topocuvirus and Turncurtovirus (Varsani et al., 2014). The *Begomovirus* genus includes virus with bipartite genome, indicating that the genes are resident on two different circular ssDNA molecules (DNA A and DNA B) each of about 2.6 to 2.8 kb (Brown et al., 2012) or monopartite genome with all genes resident on one (DNA A-like) ssDNA of about 2.8 kb. The Begomoviruses are emergent pathogens of crops transmitted by whiteflies (*Bemisia tabaci*) throughout the tropical and subtropical regions of the world (Markham et al., 1994; Hanley-Bowdoin et al., 1999).

The majority of monopartite begomoviruses are associated with betasatellites, which affect the replication of their respective viruses and may alter the symptoms in host plants. Betasatellites typically contain a satellite conserved region (SCR), an adenine-rich region and a C1 ORF. The C1 ORF has been characterized as a pathogenicity determinant that suppresses host antiviral silencing and virus movement in plants (Cui et al., 2005; Yang et al., 2011; Li et al., 2014). The diversity and host range of these betasatellite associated viruses is increases (Leke et al., 2011; Leke et al., 2012). Recombination is known to play a major role in the emergence and evolution of geminiviruses (Padidam et al., 1999; Lefeuvre and Moriones, 2015). From an evolutionary perspective, recombination during the replication of begomoviruses alone may not lead to the genetic variation de novo. Nucleotide substitutions that occur during evolution also contribute to genetic variation. Recombination has been reported to be the major factor in the emergence of begomoviruses infecting crops in India (Singh et al., 2012). Mutation, pseudo-recombination and recombination are driving forces for the emergence and evolution of new begomoviruses. This stresses the importance of recombination studies when analyzing new begomoviruses.

S. oleracea is also infected by the *Begomoviruses*. Spinach (*Spinacia oleracea*) is an important green-leafy vegetable of *Amaranthaceae* family that is cultivated extensively in India. It is often recognized as one of

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https://doi.org/10.1016/j.plgene.2018.01.001
Received 24 October 2017; Received in revised form 6 January 2018; Accepted 9 January 2018
Available online xxx
2352-4073/ © 2017.

06/12/2017

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RJC

RASĀYAN *J. Chem.*
Vol. 12 | No. 1 |290 - 293| January - March | 2019
ISSN: 0974-1496 | e-ISSN: 0976-0083 | CODEN: RJCABP
http://www.rasayanjournal.com
http://www.rasayanjournal.co.in

SYNTHESIS OF NOVEL 4-(4-METHOXYBENZENE SULPHONYL)-3, 5-DIMETHYL/3-METHYL-5-PHENYL/3, 5-DIPHENYL/3, 5-DIMETHYL-1-PHENYL/3- METHYL -1, 5-DIPHENYL /1, 3, 5-TRIPHENYL PYRAZOLE

Sandhya Chhakra and S. S. Chauhan*
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ABSTRACT
An efficient synthesis of novel 3, 4, 5-trisubstituted pyrazole (2a-c) and 1, 3, 4, 5-tetrasubstituted pyrazole (2d-f) by the reaction of (1a-c) with NH_2-NH_2/phenyl hydrazine in absolute C_2H_5OH.The structure of the various pyrazole derivatives (2a-f) has been elucidated from elemental analysis and spectral studies viz. IR, NMR.
Keywords: β-diketone, hydrazine hydrate, phenyl hydrazine, sulphonyl group, and spectral studies.
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INTRODUCTION

The five-membered heterocycles containing two adjacent nitrogen heteroatoms represent a class of important compounds. The pyrazole ring has pulled in much consideration as it has turned out to be genuinely available and indicates diverse biological activity.[1,2] The significance of pyrazole lies in the way that they can be viably utilized as antiinflammatory[3], anticonvulsant[4], antibacterial agents[5,6], antitumor[7], antiviral[8]and CNS depressant[9].

The compound contains sulphonyl group which has been a focus of attention for their diversified biological activities[10].Sulfones involve one of a kind position in the medication business with their bactericidal[11, 12]and antimalarial[13] activity.

The marketed drugs of pyrazole, such as *Ampyrone*, *Antipyrine*, *Dipyrone*, *Isofezolac*, *Lonazolac*,and *Pyrolan*® have incredible therapeutic esteem, prompted the scan for fresher bioactive compounds of this class with 4-methoxybenzene sulphonyl, as one of the substituents in the ring.

EXPERIMENTAL

Melting points are uncorrected (open capillary tubes method). The IR spectra were recorded on a Nicolet-Megna FT-IR 550 spectrophotometer in KBr pellets. The ^{1}H-NMR spectra were run on a BRUKER AVANCE II 400 NMR Spectrometer at 400.13 in $CDCl_3$ using TMS as an internal standard. Impurity checked by thin layer chromatography. Satisfactory elemental analyses were obtained.

Generalized Preparation

Preparation of Substituted Pyrazole(2a-c)[14-18]

A mixture of 1a-c (β–diketone[19-20], 2.70 g., 0.01M) and NH_2-NH_2 (0.5 g., 0.01 M) was placed in a flask and refluxed in absolute C_2H_5OH (8 ml) for about eight hours on a warming mantle. The resultant reaction mixture was cooled and filtered. The crude product so obtained was recrystallized from C_2H_5OH. Impurity in the compound was checked by thin layer chromatography using chloroform: methanol (9: 1), as the mobile phase.

Rasayan J. Chem., 12(1), 290-293(2019)
http://dx.doi.org/10.31788/RJC.2019.1215030

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Papaya yellow leaf curl virus: A newly identified begomovirus infecting Carica papaya L. from the Indian Subcontinent

Article *in* Journal of Horticultural Science and Biotechnology · February 2019

DOI: 10.1080/14620316.2019.1570827

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Chemosphere xxx (xxxx) 131273

Contents lists available at ScienceDirect

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journal homepage: http://ees.elsevier.com

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Synergistic role of bacterial consortium to biodegrade toxic dyes containing wastewater and its simultaneous reuse as an added value

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ARTICLE INFO

Article history:
Received 14 December 2020
Received in revised form 9 June 2021
Accepted 15 June 2021
Available online xxx
Handling Editor: Eldon R Rene

Keywords
Bioremediation
Biodegradation
Bacterial mix consortium
Toxicity
Azo dyes
Sorghum bicolor

ABSTRACT

The current environmental research has fascinated the sustainable exploitation of mix bacterial consortium to biodegrade the environmentally-related toxic compounds, including hazardous synthetic dyes. Based on the existing literature evidence, textile and other industrial waste effluents pollute the natural water bodies. Textile effluent contains synthetic dyes which are liberated in the environment without proper treatment. The presence of toxic dyes added to the textile effluents undoubtedly affects the flora and fauna as that untreated water is used for irrigation by local farmers. Many conventional and biological methods are in action for the treatment of wastewater. Physical and chemical processes are expensive as compared to microbial treatments. The use of microbial consortia generates efficient results. Wastewater is a valuable resource, however, up to 80% of wastewater is released to different water matrices. This discernment needs to change for a better tomorrow. In this context, herein, we present a robust microbial-assisted treatment and simultaneously reuse of the treated wastewater as an added value to induce plant growth. Thus, the microbial approach for textile waste treatment release by-product after degradation should be non-toxic for the environment. In the present study, the toxicity of synthetic textile dyes mix Reactive Red 120, Reactive Orange 122, Reactive Yellow 160, and Reactive Blue 19 was investigated using a bioassay method with plant species namely *Sorghum bicolor*. Plate and Pot experiment was conducted with respect to untreated Azo dyes, degraded metabolites obtained from single bacteria, and consortium efficient. Seed germination (89%), shoot length (12.4 cm), root length (15.6 cm) of the plants were observed for bacterial consortium degraded metabolites exposed seeds after comparing with the control. The degraded metabolite also increases protein (45.56 mg/g) and sugar (3.15 mg/g) contents. Bioremediation of various textile industrial effluents saves the ecosystem from the harmful effects of hazardous dyes. The biological decolorization of the textile azo dyes was investigated under co-metabolic conditions. The degraded metabolites can be used to enhance crop productivity and for commercial application. This mandates the current and future research to develop economically feasible and environmentally sustainable wastewater treatment practices.

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1. Introduction

Globally, the decline of water quality has become a serious concern. The rise in population has increased the demand for basic needs (food, water, and clothes), which rapidly increase industrialization (Mishra and Maiti, 2019). As industrialization increase, the significant usage of synthetic Azo dye is [illegible]haria and Ahluwalia, 2015). When applied to any surface substances of dye adhere with substrate either by the covalent bond formation, salts complexion, mechanical retention, or adsorption. Dyes are used in the tanning and leather industry, food industry, paper industry, textile industry, photo-electrochemical cells, hair coloring, and cosmetics. Hazardous components present in dyes remain challenging to be degraded effectively (Fernandes et al., 2020; Kishor et al., 2021). Therefore, their presence indicates toxicity in water and causes serious health concerns. The textile industry is one of the major sectors for using synthetic dyes and consumes large volumes of water (Pandey et al., 2007; Dhanve et al., 2008; Khan and Joshi, 2020). Unfortunately, water bodies are used as sinks for wastewater from domestic and textile industries release significant quantities of hazardous effluents, which cause substantial threats to the environment, and the disposal contains around 10–15% of dyestuff (Pearce et al., 2003; Robinson et al., 2001) mainly Azo dyes from reactive groups (Kalyani et al., 2008). According to the World Health Organization (WHO), up to 20% of pollution caused due to dyestuff released from textile industries (Sarkar et al., 2017). Several dyes are present in textile wastewater effluents causing toxic effects to plants grown with untreated water (Chandra, 2016) that produces a high concentration of polycyclic aromatic hydrocarbons (Ning et al., 2015) and sulfonated aromatic amines (Arslan-Alaton and Olmez-Hanci, 2010; Osma et al., 2010). Disposal of these effluents

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https://doi.org/10.1016/j.chemosphere.2021.131273
0045-6535/© 2021.

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Gallic acid analogues with antibreast cancer and antioxidant action: synthesis and pharmacological assessment

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Received: 16 May 2021 / Revised: 14 June 2021 / Accepted: 28 June 2021

Abstract: Breast cancer is one of the important public health problems today and recent treatments have not been found to be very effective for advanced-stage metastatic disease of the breast. In the present study ten 3,4,5- trihydroxybenzohydrazone derivatives (AR 01- AR 10) were synthesized by two different methods viz. reflux and stirring. It was observed that compounds synthesized by stirring method acquire good yield and require less time in comparison to reflux method. Further cytotoxicity activity performed on two breast cancer cell lines viz. MDA-MB-468 and MCF-7 revealed moderate activity in all compounds at 40 µg/mL and 80 µg/mL which has the highest in samples AR 01 and AR 10 for both cell lines. Considerably all compounds have shown potent antioxidant activity at 50 µg/mL and above concentrations. Tumor in mice treated with compound AR 01 was found to be smaller in comparison to control and AR 10. Findings revealed that compound having electron donating group showed more potent activity against breast cancer cell lines both in vitro and in vivo. Cytotoxicity activity also corelates with QSAR study and showed that compounds having donating group showed positive contribution towards the toxicity. These findings suggest that gallic acid derivatives were potent cytotoxic against

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Turkish Journal of Computer and Mathematics Education Vol.12 No.12 (2021), 3920-3928

Research Article

A Review Study of New Numerical Methods for Solving Differential Equations with Impetus of Inter Disciplinary Applications with MATLAB

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Article History: Received: 11 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 23 May 2021

Abstract

In this paper, we present a review study of new numerical methods to solve ordinary differential equations in both linear and non-linear cases with impetus of inter disciplinary applications with MATLAB. We use and apply Daftardar - Gejji technique on theta-method to derive a new family of numerical method in form of review study. It is shown that the method may be formulated in an equivalent way as a Runge-Kutta method. The Stability of the method is analyzed.

Keywords- Ordinary Differential Equations, Numerical Methods, Iterative Method.

2010 Mathematics Subject Classification: 34XX, 34Mxx, 34Fxx, 35-XX, 35R11.

1. Introduction

Numerical methods are one of the main techniques used in solving differential equations. For

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Turkish Journal of Computer and Mathematics Education Vol.12 No.12 (2021), 3920-3928

Research Article

A Review Study of New Numerical Methods for Solving Differential Equations with Impetus of Inter Disciplinary Applications with MATLAB

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Article History: Received: 11 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 23 May 2021

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Keywords- Ordinary Differential Equations, Numerical Methods, Iterative Method.

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1. Introduction

Numerical methods are one of the main techniques used for solving differential equations. For many years, the constructi d stable numerical methods for t lutions of ordinary differential

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Saudi Journal of Biological Sciences 28 (2021) 5754–5759

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Original article

Bis- and mono-substituted Chalcones exert anti-feedant and toxic effects on fall armyworm *Spodoptera frugiperda*

Ahanthem Priyanca Devi [a], Ahmad Alsulimani [b], Jose R. Hidalgo [c], A. Neske [a], R.Z. Sayyed [d,*], Montaser Hassan [e], Keshav Lalit Ameta [a,*], Hayam Elshazly [f,g]

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ARTICLE INFO

Article history:
Received 26 April 2021
Revised 1 May 2021
Accepted 6 June 2021
Available online 11 June 2021

Keywords:
Mono- and bis-chalcones
Spodoptera frugiperda
Antifeedant
Toxicity
Nutritional effects

ABSTRACT

Spodoptera frugiperda is a highly polyphagous migratory lepidopteran pest species. It causes infestation in crops leading to the severe crop losses. Being a new invasive parasite, its susceptibility to insecticides needs to be explored; and therefore, there is an urgent need to develop the potent insecticides for the effective control of this insect pest. To attain the crop sustainability, the antifeedant, toxicity and nutritional effects on larvae of *Spodoptera frugiperda* were studied with six mono- and eight bis- substituted chalcones. The antifeedant activity was calculated when 50% of the larvae control ate 50% of the diet through the FR factor. Toxicity was assessed through larval, pupal mortality and the emergence of adults and nutritional effects with consumption rates (IC), growth (GR) and consumption efficiency (EIC). The bis-chalcones 6b, 6e, 6f and 6h caused lethal effect on *S. frugiperda* in the first larval stages, being 6b the most toxic (85%). Adults who survived showed malformations and decreased size, which led to death. The larvae fed with aggregate in the bis-chalcones diet: 6b, 6e and 6f had the highest percentage of intake and the poorest conversion of nutrient absorption (ECI), which suggests that the larva metabolizes food for energy and results in a decrease of growth and death in early stages. Bis-chalcones showed more toxicity than mono-chalcones and 6b causes the most toxic and dietary change.
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1. Introduction

Spodoptera frugiperda also known as the fall armyworm is a highly polyphagous migratory lepidopteran pest species. It infects a wide range of crops including wheat, soybean, millets, peanut, sorghum, sugarcane and corn. It causes infestation in crops leading to the severe crop losses (Assefa and Ayalew, 2019). It is a destructive insect pest responsible for major problems in agricultural crop production, especially maize (Maruthadurai and Ramesh, 2020). The abilities of this insect pest to breed rapidly, migrate, and feed on a wide range of host plants, makes it very difficult to control (Maruthadurai and Ramesh, 2020; Deshmukh et al., 2020). Selection of proper insecticide is one of the important requirements for the crop sustainability, which ensure the less toxicity to humans and more specific to key pests. The presently used pesticides for agricultural work to control insects and mealy bugs are highly toxic in nature for the human life. To achieve the eco-friendly, egalitarian and ethical pest management, there is a need of a mechanism which provides pest specific, less toxic and cost-effective procedure.

Chalcones are commonly known as α, β-unsaturated ketone consisting of two aromatic rings which are joined by three carbon chain. Chalcones are considered as one of the most significant type of natural products found in various plant species. Chalcones are very reactive species due to the presence of a conjugated enone

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Peer review under responsibility of King Saud University.

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https://doi.org/10.1016/j.sjbs.2021.06.016
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Orbital: Electron. J. Chem. **2021**, 13(3), 259-263

Orbital
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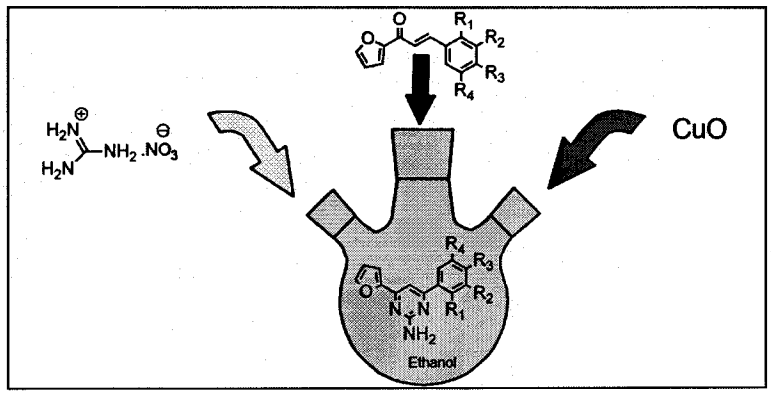
Full Paper | http://dx.doi.org/10.17807/orbital.v13i3.1621

CuO Nanocatalyzed Improved Synthesis of Some 2-Aminopyrimidines

Ahanthem Priyanca Devi and Keshav Lalit Ameta*

An effective and simple method for the synthesis of substituted 2- aminopyrimidines has been developed using chalcones, guanidine nitrate and aqueous sodium hydroxide in the presence of CuO nanoparticle as catalyst. The developed strategy has various advantages such as short reaction time, improved yields and the catalyst used is recyclable and inexpensive.

Graphical abstract



Keywords

Chalcones
CuO nanocatalyst
Guanidine nitrate
Pyrimidine

Article history

Received 19 April 2021
Revised 20 May 2021
Accepted 20 May 2021
Available online 25 June 2021

Handling Editor: Adilson Beatriz

1. Introduction

Heterocyclic compounds are found in nature abundantly and are of great importance to life due to their structural scaffolds that exist in various natural products such as hormones, antibiotics and vitamins [1, 2] and they are widely used to design biologically active compounds. Pyrimidines are heterocyclic compounds which have nitrogen atom at positions first and third of six membered ring. Pyrimidines are found in many bioactive natural products. The pyrimidine skeleton is a key nucleus in DNA and RNA and associated with various biological and pharmaceutical activities such as anthelmintic [3], cell inhibitor [4], anti-cancer [5], antimicrobial [6], anti-fungal [7], anti-leishmanial [8], etc. The property of aminopyrimidine derivatives to inhibit the protein kinase makes it an important class in organic synthesis [9, 10]. Substituted aminopyrimidine nuclei are one of the commonly marketed drugs. The synthesis of 2-aminopyrimidines and its derivatives through various methods are reported [11, 12].

Chalcone, which is commonly known as α,β-unsaturated carbonyl compounds occupy a special place in organic and medicinal chemistry. Chalcones are abundantly found in edible plants and are assumed to be the pioneer of flavonoids and isoflavanoids. Chalcones are coloured compounds due to the presence of auxochrome and chromophore. Chalcones act as an excellent precursor for the synthesis of various heterocycles. Compounds having chalcone skeleton possess numerous ranges of biological activities [13-17].

Nowadays, nanocatalyst is used more frequently than the conventional catalyst because of their unique properties such as reactive morphologies, high-surface area and recyclability [18-21]. Copper nanocatalysts have gained much attention among metal nanocatalysts due to their unfamiliar properties and potential applications in various fields. CuO has been

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Published by Federal University of Mato Grosso do Sul | www.orbital.ufms.br

06/12/2021
REGISTRAR
Mody University of Science and Technology
Lakshmangarh (Distt Sikar)

www.whiteblacklegal.co.in ISSN: 2581-8503

ARBITRATION AND CONCILIATION ACT, 1996: THE SCENARIO AFTER AMENDMENTS

(By Megha Middha)

I. INTRODUCTION

"Differences we shall always have but we must settle them all, whether religious or other, by arbitration." - Mahatma Gandhi

Judiciary is an important organ of the government which has been made independent by the Constitution of the country. Time and again it has been observed that judiciary in our country has always been overburdened by the myriad number of cases that are filed every day before it and as a result, there is delay in getting the justice. Therefore, arbitration has emerged as an independent process through which the parties try to settle the disputes out of the court. The process is also helpful in speedy delivery of justice. Arbitration has gained importance in the present scenario and helped in reducing the burden of the courts. Today people prefer arbitration over litigation. In addition to this, with the globalization, the countries enter into trade agreements with the other countries and they make sure while drafting the contract to include arbitration clause to resolve the matter in case a dispute arises between them. Unlike the judges in courts, the arbitrators in arbitration method are appointed by the parties themselves. The arbitrators appointed have to follow the principles of natural justice and they are required to be impartial towards the parties. The decision given by the arbitrators is known as "award" unlike the decision of a court which is "judgment". The Indian Arbitration Act also applies in International Commercial Arbitration. There are various kinds of arbitrations like firstly, there is ad hoc arbitration where parties themselves select their arbitrators, procedures etc; then there is domestic arbitration in which the parties are subject to the Indian jurisdiction or the cause of action takes place in India. There is also, international arbitration, institutional arbitration and foreign arbitration; the award passed in foreign arbitration is termed as "foreign award". Indian Arbitration Act has provisions for the enforcement of foreign awards. The present article will first look into brief the history and importance of the Act and then will turn to the amendments that have been made recently in 2015.

Though the traces of the same can be found when the King Solomon solved the matter of two ladies who were claiming to be mothers of a small baby. Later on the scope of the arbitration got expanded when the rulers started using the same for resolving the disputes related to commercial matters as well. This way it can be seen that arbitration has its roots from ancient period of time and presently, it has gained a lot of importance in domestic as well as

06/12/2021

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LEX JURA LAW JOURNAL VOLUME II ISSUE I

ROLE OF COMMERCIAL BANKS IN FINANCING SMALL SCALE INDUSTRIES

- Megha Middha[1]

ABSTRACT

Priority Sector in India has a major role to play and contribute towards the economy of India. The saddening feature is that despite being an important contributor to economy, it has often been neglected. It becomes the duty of the banks and other financial organizations in the country to help them in their upliftment. Banks have always played a pivotal role in lending loans to people at a certain interest rate and depositing the money of the public with them safely. But if the priority sector of the country is excluded of such facilities from the bank, then it is really impossible to think about the development of the country. Therefore, the present article shall discuss upon the role that Commercial banks play in lending of loans to the priority sector. The article shall focus on the various categories included under the priority sector by RBI. The various schemes which are provided by the Ministry of Micro, Small and Medium Enterprises shall be looked into detail. The article shall also look into the role played by SIDBI in the growth of priority sector and the various schemes offered by SIDBI shall be looked into. Henceforth, it is very much necessary to look up to the needs of this sector and provide the required financial assistance. If no educational loans or no lending is done to this sector, then the future of the country seems to be in dark. It would be really difficult to see the economy of the country falling. India is a developing nation, and for it to come under the category of developed nation, it needs to improve its economy and that cannot take place by ignoring the priority sector.

Keywords

Commercial Banks, MSMEs, Priority Sector Lending, SIDBI, Schemes.

06/12/2024

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Hypothesis:

[1] Assistant Professor, School of Law, Mody University of Science and Technology, Lakshmangarh, Sikar(Rajasthan).

IRJMSH

INTERNATIONAL RESEARCH JOURNAL OF MANAGEMENT SOCIOLOGY & HUMANITIES

An Internationally Indexed Peer Reviewed & Refereed Journal

UGC ID - 48312

Impact Factor* : 6.2311

Ref:IRJMSH/2018/A107192

DOI : HTTPS://DOI.ORG/10.32804/IRJMSH

ISSN 2277 – 9809 (0) 2348 - 9359 (P)

THIS CERTIFIES THAT

SHIVANGI SHARMA

HAS/HAVE WRITTEN AN ARTICLE / RESEARCH PAPER ON

CORPORATE SOCIAL RESPONSIBILITY: FROM THE LENS OF HUMAN RIGHTS

APPROVED BY THE REVIEW COMMITTEE, AND IS THEREFORE PUBLISHED IN

Vol - 9 , Issue - 1 Jan , 2018

REGISTRAR
Mody University of Science and Technology
Lakshmangarh (Distt Sikar) 332311

06/12/2017

IRJMSH

Editor in Chief

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doi

Certificate No. IJLMH-01142

INTERNATIONAL JOURNAL OF LAW MANAGEMENT & HUMANITIES

[ISSN 2581-5369] | Indexed at 23 Databases | PIF (2020) - 4.895

Certificate of publication for manuscript titled

Case Comment on Rajiv Raturi V. Union of India: The Dawn of Disability Rights in India

Authored By

Shivangi Sharma

Assistant Professor at Mody University, India.

Published in

Volume 4, Issue 3 (2021), Pages: 5367 - 5371

DOI: https://doij.org/10.10000/IJLMH.111143

REGISTRAR
Mody University of Science and Technology
Lakshmangarh (Distt Sikar) 332311
06/12/2021

INTERNATIONAL JOURNAL OF LAW MANAGEMENT AND HUMANITIES

Mr.Gyan Prakash Kesharwani
Chairperson & Publishing Editor

Dr. Pooja Dasgupta
Editorial Director

ZENITH International Journal of Business Economics & Management Research_____ ISSN 2249- 8826
ZIJBEMR, Vol.7 (10), OCTOBER (2017), pp. 66-76
Online available at zenithresearch.org.in

EMANCIPATION THROUGH PEACE EDUCATION – LEVERAGING CORPORATE SOCIAL RESPONSIBILITY FOR NON-EXPLOITATIVE SOCIAL ENLIGHTENMENT

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ABSTRACT

Peace is the foremost of virtues possessed by civilized societies the world over. Educationists have for long emphasized the crucial role played by peace and non-violence in the attainment of growth and stability. It is imperative on the part of policy-makers to carve out a niche for the compulsory inclusion of peace education in the academia. With the opening up of the Indian economy and the entry of philanthropic private players into the education sector, the poverty-stricken have been handed over a golden opportunity to break the shackles of discrimination. Instead of plunging deep into the gutters of crime and amorality, they are successfully delving deeper into the sea of blessed knowledge. This paper dispassionately examines the evolution of educational values down the ages, highlighting the revolutionary transformation attained in the process. Further, it envisions the role of business corporations in rendering free education as a part of their social responsibility which, no doubt, is a stepping stone towards attaining non-exploitative social enlightenment.

KEY WORDS: Peace, Education, Corporate Social Responsibility.

06/12/2017

REGISTRAR
Mody University of Science and Technology
Lakshmangarh (Distt Sikar) 332311

International Journal of Advance and Innovative Research
Volume 6, Issue 2 (XIII): April - June, 2019

ISSN 2394 - 7780

CORPORATE RESTRUCTING IN INDIA THROUGH "DEMERGERS": EXAMINING THE SUFFICIENCY OF AVAILABLE LAWS IN REGULATING IT's VARIOUS ASPECTS

Shrawani Shagun[1] and Dr. Aseem Chandra Paliwal[2]
Assistant Professor[1] and Associate Professor[2], Mody University

ABSTRACT

In the early 21st century corporate sector witnessed the growth of corporate restructuring or Demerger and was accepted throughout the globe due to its overwhelming benefits that involves a process of wreathing corporate entities strategically operating under same line of business or other to put themselves under a single corporate umbrella with a view to create a buffer against the market cruelties and to pave the way of future growth. It was expected by De-merger to curb imprudent and colossal wastage of business opportunities and prospects the possibility of enhancing corporate control and shareholders' value. The rationale behind the corporate restructuring lies in extending the fence of ownership to survive and going ahead.

Various types of corporate restructuring may be grouped according to their nature and objectives such as – capital restructuring, organizational restructuring and technological restructuring. Corporate restructuring, though criticized as merely a rearrangement of deck chairs on the Titanic, is fueled no doubt by the globally based consultancies to reach a new height with a whole host of strategic options – expansion, contraction, corporate control and changes in ownership structure. One of the modes of contracting size is demerger. By whatever name it is called – split-up, split-off or spin-off it intends to trim size to sharpen company's core competency for growth and efficiency. In the present chapter corporate restructuring, global overview of corporate restructuring, corporate restructuring scenario in India, demerger as a mode of corporate restructuring, historical background of demerger, history of demerger in India, legal aspects of demerger in India and a preview of the research work have been introduced.

Keywords: corporate restructuration, Demergr, shareholders, company law, business goal

RESEARCH OBJECTIVE

The object of the paper would be to highlight the nature, the position that exists in other countries and to find out how it will impact our current system. Particularly the paper will focus on the reasons for adopting this business strategy and that if the government mandates it in order to curb the monopoly practices or if the company has several business lines and the management is unable to control all of them at the same time.

06/12/2019
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RESEARCH QUESTIONS

This paper would raise and attempt to answer the following questions –

- In what ways the shareholders would be benefited from the demerger?
- Whether the process of demerger under the Companies Act, 2013 is effective?
- Whether with the help of demerger, the company is able to focus on its core goal of each business which can be reflected in the increasing valuation of the company in the market?

HYPOTHESIS

Is the laws regulating Demerger in India adequate to regulate and helpful in achieving the objective by companies to boost their shareholders value in the long run and the clear perspective of the businesses which are to be operated separately ?

RESEARCH METHODOLOGY

The present study is Doctrinal; primary sources have been used extensively which includes acts, committee reports, policies of government etc. Books and Articles have been used as Secondary Sources. It has been tried that the study covers all the main aspects related to the topic. To give an overall view of the topic different sources have been taken which includes foreign reports, however Indian authors have been stressed upon.

LIMITATION

The approach is doctrinal hence the paper might lack on a practical aspect and the author is dependent on views of scholars to express her opinion.

INTRODUCTION

RIGHT TO EDUCATION

Aditi Sharma *

Introduction

The quality of education of the child will determine the quality of life in nation. As it is well illustrated.

"In ancient shadows and twilights where childhood had strayed, The world's great sorrows were born And its heroes were made. In the lost boyhood of Christ was betrayed. "Both at national and International levels efforts are being made to educate more and more people as education contributes in the development of the society which is consistent with the dignity. India got independence in 1948 and since the people of India struggling to make primary education compulsory. Recently in 2009 in India, Elementary Education has become a fundamental right and has been included under article 21 A in Indian constitutions. But does this right provide education to all? Certainly not, there are many loopholes available in this right which detained children to take compulsory primary education. Education comprises of both- intrinsic as well as instrumental values. It is an end in itself as well as means for the development of human and the society. Education helps in enhancing the inherent dignity of individuals and his attitude towards the society. To strengthen the Indian Education System, an educational policy was adopted by the Indian Parliament in 1968.

Education was made an important and integral part of the national development efforts. After independence there has been an effort to spread education to all levels of Indian society. Statistics point to the fact that a large percentage of children in age group 6-11 years have been enrolled in school. At some places, the enrollment rate is 90 percent. In Indian Education system, adult education programmes covers the age group 1-35 and has been vigorously implemented by the government with the cooperation of many voluntary agencies. Even then much has to be done to realize the target which is 100% coverage adults. Education provides human dignity to a person, to develop himself as well as contribute towards the development of his country. The framers of our constitution realizing the importance of education impose a duty on the State under Article 45, as one of the Directive Principles of State Policy, to provide free education to all children until they complete the age of 14 years, within 10 years from the commencement of the Constitution. The object was to abolish illiteracy from the country. It was expected that the elected Governments of the country would honestly implement this directive. But, this right was not recognised by many of the States. **Elementary education forms the** foundation for all levels of learning and development. It empowers and equips individuals with analytical capabilities, instills confidence and fortifies them with determination to achieve goal-setting competencies. It, therefore, plays a pivotal role in improving the

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08/12/2021

REGISTRAR
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Lakshmangarh (Distt Sikar) 332311

CERTIFICATE ID : IJLRA107E

CERTIFICATE OF
- PUBLICATION -

THIS IS TO CERTIFY THAT THE PAPER ENTITLED

Witness Protection Scheme, 2018 – Key Highlights

Authored By

Aditi Sharma

06/12/2021

has been published in IJLRA ISSN 2582-6433

REGISTRAR
Mody University of Science and Technology
Lakshmangarh (Distt Sikar) 332311

IJLRA
INTERNATIONAL JOURNAL FOR LEGAL RESEARCH & ANALYSIS

Vishvesh

Vishvesh Singh (Editor in Chief)
ISSN : 2582 - 6433

Website : ijlra.com || Email : editor@ijlra.com || (M) : 7042148991

CERTIFICATE ID : IJLRA533B

CERTIFICATE OF
- PUBLICATION -

THIS IS TO CERTIFY THAT THE PAPER ENTITLED

Good Governance: Checkpost To A Fair Legal System

Authored by

Aditi Sharma

has been published in IJLRA ISBN : 978-81-948082-1-3

06/12/2021

REGISTRAR

Modi University of Science and Technology
Lakshmangarh (Distt Sikar) 332311

IJLRA

Vishvesh

Vishvesh Singh (Editor in Chief)

ISBN : 978-81-948082-1-3

Website : ijlra.com || Email : editor@ijlra.com || (M) : 7042148991

www.whiteblacklegal.co.in

ISSN: 2581-8503

WHITE BLACK LEGAL

VOLUME 1: ISSUE 2

|| December 2019 ||

Email: editor@whiteblacklegal.co.in

Website: www.whiteblacklegal.co.in

LAW AUDIENCE JOURNAL (ISSN (O): 2581-6705)
CERTIFICATE OF PUBLICATION

This certificate is awarded to

MS. ADITI SHARMA

Her paper titled **"WITNESS PROTECTION WITH RESPECT TO INTERNATIONAL SCENARIO AND JUDICIAL PRONOUNCEMENTS"**, authored by Ms. Aditi Sharma, has been published in Volume 2 & Issue 2 June 2020 of Law Audience Journal (ISSN (O): 2581-6705). The paper was subjected to proper Double-Blind Peer-Review Policy. Law Audience Journal has been indexed in the databases of **DRJI, CiteFactor, Cosmos, RootIndexing and IP Indexing**. We wish the author a very best of luck for her future efforts.

Awarded on 30th June 2020.

30-06-2020
DATED

(FOUNDER CEO
EDITOR-IN-CHIEF
PUBLISHER)

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Lakshmangarh (Distt Sikar) 33303

GLOBAL JOURNAL OF MEDICAL RESEARCH: B
PHARMA, DRUG DISCOVERY, TOXICOLOGY & MEDICINE
Volume 19 Issue 1 Version 1.0 Year 2019
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

Doha Declaration: Compulsory Licensing and Access to Drugs

By Ms. Kiran Kumari & Dr. Ajay Sharma

Mewar University

Abstract- This paper analyses compulsory licensing evolution phases and sheds light on reasons behind development especially after trade related aspects of intellectual property rights (TRIPS) provisions. Without patents, the innovators can neither be adequately compensated for their costs of research nor be encouraged for further research to develop new and improved products. Patent protection is therefore accepted as a necessary evil, despite its conflict with the competitions laws and human rights law (in case of pharmaceutical patents). Prior to Doha declaration pharmaceutical companies were enjoying the monopoly right because of patent protection regime for manufacturing, sale, and import the products which result into high cost of the patented products. Doha Conference on November 14, 2001 forced many countries to amend their patent rights for the purpose of compulsory licensing. This increased cost on patented molecules was a major hindrance for access to medicine. Public health officials considered Doha Declaration on compulsory licensing a positive approach in prioritizing public health over intellectual property rights. (Jain, 2009)

Keywords: TRIPS, compulsory license, patent.

GJMR-B Classification: NLMC Code: QV 4

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06/12/2019

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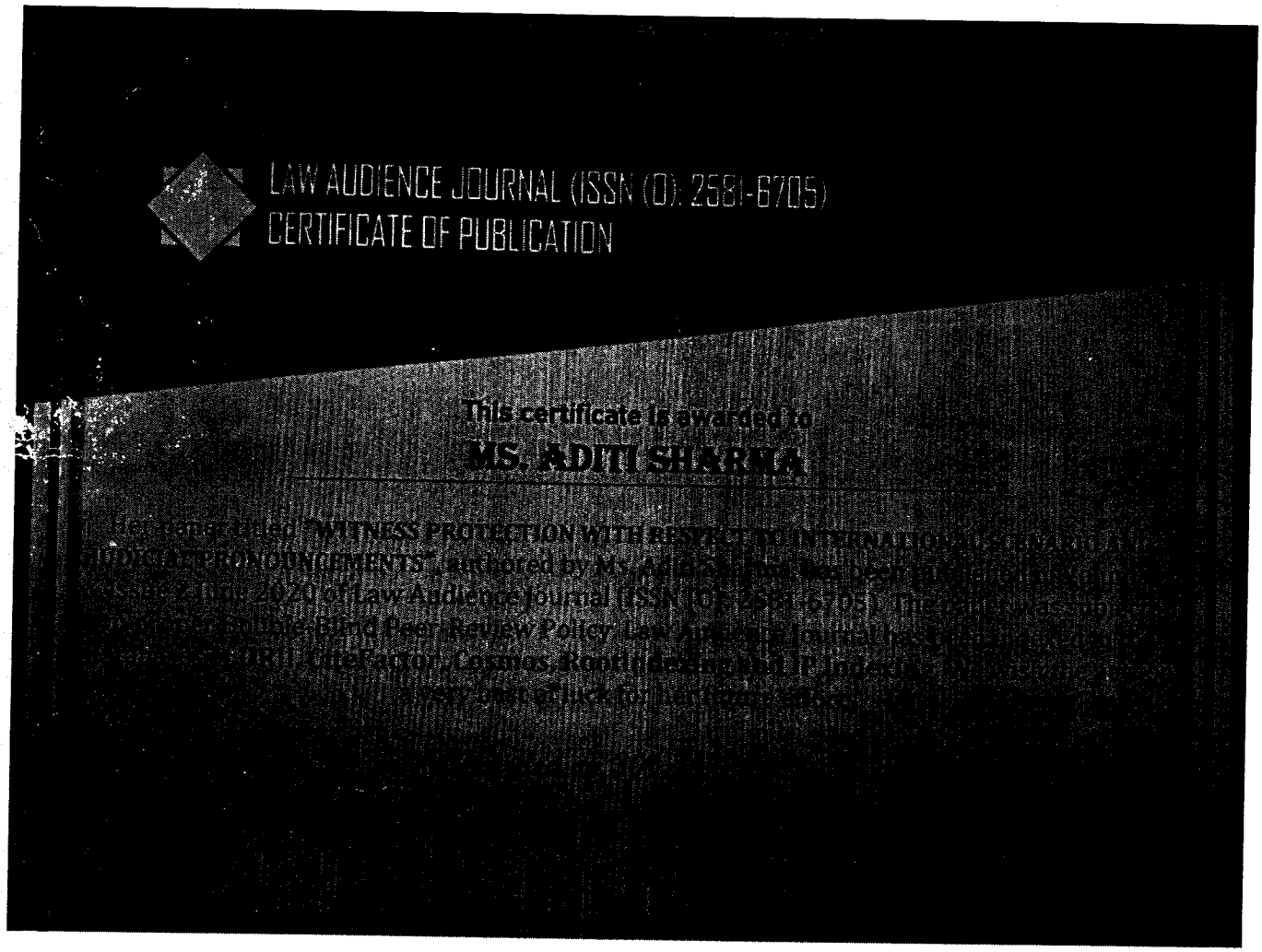

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312

GLOBAL JOURNAL OF MEDICAL RESEARCH: B
PHARMA, DRUG DISCOVERY, TOXICOLOGY & MEDICINE
Volume 19 Issue 1 Version 1.0 Year 2019
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals
Online ISSN: 2249-4618 & Print ISSN: 0975-5888

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Multicultural Education

Volume 7, Issue 12, 2021

INDIGENOUS SPIRITUAL PRACTICES AND THEIR SOLICITATION FOR SUSTAINABLE LEADERSHIP: INSIGHTS FROM BHAGAVAD GITA

Ms. Sunita Thalor, Dr. Priti Vyas

Article Info

Article History

Received: October 31, 2021

Accepted: November 05, 2021

Keywords *Bhagavad Gita, Indigenous, Leadership, Relatable, Sustainable, Western Theories.*

DOI: 10.52102/zenodo.5644277

(ISSN:1068-3844)

Abstract

Leadership is the art of inspiring, influencing, and motivating a group of people to achieve a common goal. In spite of the availability of so many leadership theories and statistics, there are gaps in the training of leadership skills among the learners. Most of the modern management theories emphasize mainly on memory power, not on intellectual power and practice. These theories have content related foreignness and lack relatability. Thus, an attempt has been made through this descriptive research to reveal the secrets of Krishna, one of the greatest leaders of the universe, from Bhagavad Gita to explore the twenty six virtues of a great leader such as self-control, sacrifice, fearlessness, etc. Krishna's classical guidance to the science of self-realization ensures sustainable leadership among the learners and guides them to the right path. These principles will also help a crestfallen and deflated learner and warrior to fight again with renewed strength.

INTRODUCTION

Leadership is an act of taking decision to stand in order to encourage, guide and motivate others to accomplish a shared objective. *Leadership mainly focuses on removing obstacles so that the team members can perform their task with freedom and independence. Leaders stimulate and encourage their team members by involving them in planning and decision making activities, and* leadership denotes an assortment of skills like self-control, confidence, clear vision, social grace, crisis management, positive attitude, etc., which help an individual to face disturbed circumstances of life. From decades employers as well as educators have shown the value and importance of leadership skills for individuals' overall growth. Leadership skills provide self-management abilities, create good interpersonal relationship, and enable individuals to contribute more to the organisation. They also bring uniformity, regularity, and stability in actions. Lack of leadership skills lead to confusion, disorder, wastage, and depression. The necessity of leadership skills has been given discriminating prominence for individuals, as they contain all other important skills (India Today, 2019). Leadership skills are extremely important for the management graduates who wish to get a job of their choice, and who aim to climb the ladder of success in their professional life. But according to industry's perception there are gaps between the leadership skills possessed by management graduates and the employers' expectations as stated in Varun Khosha's article *Near 40% India Inc. Employees Rate their Top Management's Skills as Poor: Survey* (2017), that 40 percentages of the employees' leadership skills are very poor and only 5 percentage of the employees are satisfied with their performance. Another report by Sandip Foundation's article *99% of MBAs & 80% of Engineering Graduates in India are Unemployable* (2019), also stated that"80% of engineering and 99% of MBAs graduates are unemployable in India".

There are a numbers of reasons for this condition, but mainly this gap exists in the training of management students as they have been learning leadership mainly through the western theories given,

28/12/2021

Registrar
Jodhpur University of Science and Technology

LINGUISTICA ANTVERPIENSIA, 2021 Issue-3
www.hivt.be
ISSN: 0304-2294

Prevalence of Depression on College Students and Effectiveness of Bhagavad Gita for Imbibing Universal Management Skills

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Issue Details

Issue Title: Prevalence of Depression on College Students and Effectiveness of Bhagavad Gita for Imbibing Universal Management Skills

Received:08 February

Accepted: 19 March, 2021

Published:22 May, 2021

Pages: 3528-3540

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Abstract

College time is very important time in a student life as it provides responsibility, job opportunities, and promises to give a comfortable life in future. But at the same time these responsibilities and opportunities make students feel pressurised which can cause mental health problems, such as, stress, depression, schizophrenia, anxiety, etc. These types of mental health problems enable the student to have suicidal tendencies. Most of the researchers have found out that these mental health issues are present in the college students across the world. Students are facing these issues because of assignment's deadlines, exam, coursework, social relationships, and transition from school to college life. For these problems there are many suicidal prevention helplines but still these problems are getting nastiest day by day. The main reason of these problems is college students are lacking in managing their lifes. Therefore, this paper aims to explore five most important universal management skills from Bhagavad Gita's verses, like, leadership, time management, stress management, decision making, and positive attitude. These five management skills help Indian college students to manage their mental health problems effectively and, have a sustainable growth and balance life.

Key Words: College Students, Depression, Suicidal Tendencies, Bhagavad Gita, Management skills

1. Introduction

College education is very important part of a student's life. It imparts knowledge among students; prepare them for social challenges and emphasis on their physical and psychological well- being. Although college life is providing all these benefits to a student but along with these all benefits, college students are suffering from depression. Depression is an extremely prevalent

28/12/2021
Registrar
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International Journal of Applied Mathematics
& Statistical Sciences (IJAMSS)
ISSN(P): 2319–3972; ISSN(E): 2319–3980
Vol. 9, Issue 2, Feb–Mar 2020; 31–40
© IASET

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CASE STUDY FOR VINAYAK RESTAURANT QUEUING MODEL

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ABSTRACT

Waiting time and service system is a part of our daily life in various service areas such as: restaurant, ATM, Clinic, Toll tax, Ticket window in cinema, Bus stand and Railway station. Here, our focus is on Restaurant Management System. Every restaurant loses their customers just because of a long queue and maximum waiting time. Restaurant provides more waiting chairs only. We need to be improving the service time which shows improvement in queuing situation. Here, we apply queuing model. This paper aims to shows the multi-channel queuing model M/M/S. We use M/M/S queuing model since this restaurant has 10 service stations. We have obtained one month daily customers data from a restaurant named "Vinayak restaurant" in Laxmangarh, Sikar city. Using little's theorem and the multi-channel waiting line model M/M/S. we have determined the arrival rate λ service rate μ. The utilization rate ρ and the average waiting time in the queue before getting service. At Vinayak restaurant, the arrival rate λ is 1.40 customers per minute (cpm). Customer waiting time is 10 minute and the utilization rate is 0.49. We have discussed the benefits of applying queuing model to a busy restaurant.

KEYWORDS: *Queue, Little's Theorem, Restaurant M/M/S Queuing Model, Waiting Time, Restaurant Data, (A, B, C, D..... X, Y, Zmanner)*

Article History

Received: 06 Feb 2020 | Revised: 27 Feb 2020 | Accepted: 07 Mar 2020

INTRODUCTION

Queuing theory is the mathematical study of the congestion and delays of waiting in line. A waiting line system or queuing system is defined when a person or object spends time in waiting line to complete a transaction or activity. A waiting time can be measured by its two extreme point of service: a low level of service and a high level of service. Queue or waiting lines are familiar event to all, waiting line are not only the lines of human beings but also the aeroplane seeking to land at busy airport, ships to unloaded machine parts to be assemblies, cars waiting in traffic, etc. Queuing theory is concerned with the statistical description of the behaviour of queues with finding.

Queuing theory assesses two keys aspects – customer arrival at the facility and service. This theory is used to model and predict waiting time and the number of customer arrival. This paper uses queuing theory to study the waiting line in Vinayak restaurant at Laxmangarh in Sikar. This is the busiest restaurant in Sikar. It provides 60 tables for 52 customers. There are 10 waiters working at one time. During weekdays (Monday to Thursday) there are over 200

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AN INVENTORY MODEL FOR TIME DEPENDENT DETERIORATE RATE AND VARIABLE HOLDING COST

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Received: Jan 28, 2019; **Accepted:** Feb 18, 2019; **Published:** Mar 01, 2019; **Paper Id.:** IJMCARJUN20196

1. INTRODUCTION

Inventory is described as stock of goods. It also described as the process to raise the business. It comprises all the features like storage of goods/products, controls the number of products in stock. Inventory is ideal for run the business successfully and effectively. If inventory not applicable, it may harm the business. It comprises various divergent conditions into models. This condition may comprises the deterministic demand, change in demand with time, deterioration etc.

In inventory models, deterioration may be taken as degeneracies loss of resources. The fact of controlling and maintaining inventory of deteriorating items become a challenging for decision making.

Demand plays very important role in inventory. In the classical inventory model the demand rate was assumed to be constant but it is not always possible. For example seasonal fruits, vegetables, other items etc.

Inventory models can be divided into two kinds of models. First is deterministic and another one is stochastic model. In deterministic model, demand for a time period is known. In stochastic model, the demand is a random variable having known probability distribution.

By using the deterioration of resources, Inventory for deteriorating goods was first studied by Whitin in 1952. Emmons's (1968), Azoury and Miller (1984), Azoury (1985) expanded the approach. In the present paper, we consider the model of Covert and Philip (1973) and extend it to include a time-quadratic demand rate, shortages in inventory and time dependent holding cost. Demand changing with time was expanded by Dave and Patel S.K. Ghosh and K.S. Chaudhary had considered quadratic demand in their inventory model. An inventory model of deteriorating items was developed by Hariya (1995) for time varying demand with shortages. Chang and Dye (1999) developed an inventory model with time varying demand. Uttam Kumar Khedelkar and Diwakar Shukla

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Molecular Biology Reports
https://doi.org/10.1007/s11033-021-06922-9

MINI REVIEW ARTICLE

Epigenetic regulation of salinity stress responses in cereals

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Received: 6 July 2021 / Accepted: 30 October 2021
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Abstract

Cereals are important crops and are exposed to various types of environmental stresses that affect the overall growth and yield. Among the various abiotic stresses, salt stress is a major environmental factor that influences the genetic, physiological, and biochemical responses of cereal crops. Epigenetic regulation which includes DNA methylation, histone modification, and chromatin remodelling plays an important role in salt stress tolerance. Recent studies in rice genomics have highlighted that the epigenetic changes are heritable and therefore can be considered as molecular signatures. An epigenetic mechanism under salinity induces phenotypic responses involving modulations in gene expression. Association between histone modification and altered DNA methylation patterns and differential gene expression has been evidenced for salt sensitivity in rice and other cereal crops. In addition, epigenetics also creates stress memory that helps the plant to better combat future stress exposure. In the present review, we have discussed epigenetic influences in stress tolerance, adaptation, and evolution processes. Understanding the epigenetic regulation of salinity could help for designing salt-tolerant varieties leading to improved crop productivity.

Keywords DNA methylation · Epigenetic · Histone modification · Plant tolerance · Salt stress

Introduction

Cereals crops are an important food source constituting nutritionally rich components for human health. They are a rich source of fiber, vitamins, and minerals along with considerate protective and disease preventive properties [1]. The yield of these crops is constantly being challenged by the increasing magnitude of biotic and abiotic stresses. Among the abiotic stresses, most of the cereal crops are sensitive to salinity with varying degrees of sensitivity among the genotypes [2]. Salinity interferes the water transport and nutrient homeostasis in plants thereby causing osmotic stress and nutrient disparity [3, 4]. Breeding and development of salt-tolerant cultivars in cereals is a challenging task as many different morphological, physiological, and metabolic processes are regulated by a multitude of tolerance mechanisms [5]. The soil is known to be saline when the concentration of potassium ions, chloride ions, and sulfate ions is more than optimum and electrical conductivity is higher than 4 dS m^{-1}causing a 50% loss in the field's productivity [6]. Salinity has become a major concern as approximately 20% of the world's agricultural fields are saline which reduces the overall production and productivity of cereals [7]. Plants show a varying response to salt stress depending on their

Md. Mahtab Rashid, Anukool Vaishnav and Rakesh Kumar Verma have contributed equally to this work.

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Published online: 12 November 2021

28/11/2021
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Annals of Biology **36** (1) : 34-37, 2020

Characterization of Defective Genome of Begomovirus Infecting Cape Daisy

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(Received : September 10, 2019; Accepted : November 18, 2019)

ABSTRACT

Cape daisy is an ornamental plant, often found infected with begomovirus. Infected leaves showing vein net formation and yellowing were collected and revealed with begomovirus infection. Defective molecules of quarter and half in size originated from monopartite helper begomovirus were commonly generated by some deletions in virus genome. Characterization of defective molecules of PepLCBV and PeLCV from cape daisy showed that the molecules of half size were derived from the deletion of complementary sense strand genes, while quarter size molecule evolved by further deletion of some part of coat protein gene (AV1) causing truncated AV1.

Key words : Geminiviridae, begomovirus, defective genome, gene deletion

INTRODUCTION

Geminiviridae is the largest plant virus family, responsible for great loss of economically important food and fibre crops worldwide in tropical and sub-tropical regions. Geminiviruses are single stranded (ss) circular DNA virus transmitted by insects of order hemiptera (Whitfield *et al.*, 2015; Zerbini *et al.*, 2017). Based on the host range and transmission vector geminiviruses are divided into nine genera : *Becurtovirus*, *Begomovirus*, *Capulavirus*, *Curtovirus*, *Eragrovirus*, *Grablovirus*, *Mastrevirus*, *Topocuvirus* and *Turncurtovirus* (Tahir *et al.*, 2017). *Begomovirus* is the main and largest genus of the family comprising ~ 88% of all geminivirus species (Varsani *et al.*, 2017; Cantú-Iris *et al.*, 2019). Begomoviruses have emerged as one of the most destructive plant viruses for crops. Begomoviruses are transmitted by whitefly (*Bemisia tabaci*) and mainly infect dicots. Begomovirus can be monopartite (contains DNA-A) or bipartite (contains DNA-A and DNA-B) of 2.6-2.8kb (Brown *et al.*, 2015). DNA-A encodes six proteins, two in the virion sense strand (AV1: Coat protein and AV2 : pre-coat protein) and four in complementary sense strand (AC1 : Rep, AC2 : Trap, AC3 : REn and AC4). These begomovirus (Table 1) are involved in replication, regulation of viral gene expression, suppression of antiviral activity and symptoms development (Fondong, 2013). Now-a-days mixed infection of plant viruses are very common in fields. Mixed infection is the main reason for virus evolution because it provides preconditions for recombination of intrahost virus-virus interaction and generates the new species with modified genome which may be more severe to crops. In this study, first time two defective genomes of begomoviruses infecting cape daisy (*Osteospurmum fruticosum*) are reported.

MATERIALS AND METHODS

The leaf samples of cape daisy plant showing typical begomovirus symptoms : yellowing, vein net and plant stunting were collected from Sikar region, Rajasthan. To identify the causative agent total DNA was extracted from symptomatic leaves by using CTAB method (Doyle and Doyle, 1990). A universal set of primers (CPF-AATTATGTCGAAGCGAGCTGC and CPR-TAAT-ATCAATTCGTTACAGAG) was used to confirm the infection of virus (Sohrab *et al.*, 2014).The resultant amplicons were run on 1% agarose gel to confirm the amplification. The amplified products were checked for rolling circle amplification (RCA) by using TempliPhi

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Proc. Natl. Acad. Sci., India, Sect. B Biol. Sci.
https://doi.org/10.1007/s40011-018-1006-9

RESEARCH ARTICLE

Molecular Characterization of Begomoviruses DNA-A and Associated Beta Satellites with New Host *Ocimum sanctum* in India

Chitra Nehra[1] · Avinash Marwal[2] · Rakesh Kumar Verma[1] · R. K. Gaur[1]

Received: 1 December 2017 / Revised: 13 June 2018 / Accepted: 25 June 2018
© The National Academy of Sciences, India 2018

Abstract *Ocimum sanctum* (Tulsi) is a native Indian subcontinent plant with important medicinal values. Leaves with mosaic and curling observed on *O. sanctum* in Rajasthan province of India were severely stunted having symptoms of typical *Begomovirus* infection. The authors report on a comprehensive study of sequence variations, phylogeny and recombination breakpoints for *Tomato leaf curl virus*, prevailing in the plant *O. sanctum*. To confirm *Begomovirus* infection, PCR and whole genome amplification via rolling circle experiments were exhibited by means of complete nucleic acid (DNA) isolated from symptomatic plants leaves. Sequence analysis established the association of betasatellite molecule along with DNA-A genome and contemplated as isolate of *Tomato leaf curl virus* as it showed 98% similarity with ToLCV. The present study includes phylogenetic, recombination and pathogenicity analysis of ToLCV infecting *O. sanctum*.

Keywords Natural infection · *Tomato leaf curl virus* · Pathogenicity · Recombination

Significance Statement This study includes phylogenetic, recombination and pathogenicity analysis of TLCuV infecting *O. sanctum*. As far as anyone is concerned, the carried out study is the foremost account of TLCuV naturally infecting a new host *O. sanctum* in India.

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Published online: 30 June 2018

Introduction

The family *Geminiviridae* is grouped in nine genera, Mastrevirus, Curtovirus, Begomovirus, Turncurtovirus, Topocuvirus, Eragrovirus, Becurtovirus, Capulavirus and Grablovirus; in view of their genetic architecture, carrier insect transmission and variety of host [1]. The *Begomovirus* genera comprise the largest group of viruses having monopartite or bipartite nature, communicating diseases with the aid of *Bemisia tabaci* (white flies) in plentiful of monocotyledonous and dicotyledonous plants worldwide [2]. Alphasatellites or betasatellites have a single stranded DNA in nature and use machinery of allied monopartite *Begomoviruses* chiefly reported from the old world, while *Begomoviruses* prevailing in the new world area comprise of two DNA segment molecules, i.e. DNA-A and DNA-B [3]. Monopartite *Begomovirus*, comprises of ssDNA genome having a magnitude around 2.8 kB which is homologous to DNA-A constituent new world *Begomoviruses*, which encodes 6 proteins, 2 from coding strand (protein responsible for viral coat [V1] and pre-coat protein [V2]) and the rest 4 on the complementary strand of DNA molecule (protein aiding in start of replication [C1], protein helping in start of transcription [C2], protein responsible for augmenting of replication [C3], finally pathogenicity decisive protein [C4].

The betasatellites having size of ~ 1.4 kB which is approximately fifty percent in length to the DNA-A molecule, enhances disease intensity in plants by suppressing its host defense activities [4]. While alphasatellites may attenuate the symptoms as caused by helper begomoviruses *Begomoviruses* go through repeated recombination procedures adapting as per new host/environment, resulting in appearance of new isolates. Acquirement of new DNA molecules by inter/intraspecific recombination

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Plant Gene xxx (2018) xxx-xxx

Contents lists available at ScienceDirect

Plant Gene

journal homepage: www.elsevier.com

Journal Cover Image

Complexity and recombination analysis of novel begomovirus associated with Spinach yellow vein disease in India

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ARTICLE INFO

Keywords:
Spinach olaracea
Begomovirus
Betasatellites

ABSTRACT

Leaves with vein yellowing were observed on Spinach (*Spinacia oleracea*) in Rajasthan province of India. The plants were severely stunted in growth and exhibited symptoms typical of *Begomovirus* infection. Here we report a comprehensive study of complexity and recombination of novel begomovirus associated with spinach yellow vein disease. It is probably a perpetuation of *Papaya leaf curl virus* in absence of its main host and thus raises concern about its spread to other crops. Analysis of samples collected in the survey indicates that SYVD infected plants are associated with a begomoviruses (novel species showed < 91% nucleotide sequence similarity) and its associated betasatellites. Interestingly, most of the begomoviruses were found to be inter-species recombinants and the betasatellites possess high nucleotide variability, due to recombination. This suggested the existence of a complex recombination pattern to form gene pool of the crop-infecting begomovirus betasatellites complexes. The Nucleotide diversity ( ) and nucleotide substitution rates were determined for the DNA-A of begomoviruses SYVSV is 0.10382 and 2.436 10^{-3} substitutions site^{-1} year^{-1} respectively. Thus mutation and recombination are driving forces for the emergence and evolution of new begomoviruses. This strengthens the hypothesis for increase of host range of begomovirus and indicates that the high evolutionary rate of the begomoviruses is primarily due to frequent recombination and mutation.

1. Introduction

The Geminiviridae family contains virus that exhibit characteristic twinned geminate particle morphology with circular, single-stranded DNA (ssDNA) genomes (Cui et al., 2004; Cui et al., 2005). Based upon their host ranges, insect vectors and genome organizations, they are classified into seven genera viz. Begomovirus, Becurtovirus, Curtovirus, Eragrovirus, Mastrevirus, Topocuvirus and Turncurtovirus (Varsani et al., 2014). The *Begomovirus* genus includes virus with bipartite genome, indicating that the genes are resident on two different circular ssDNA molecules (DNA A and DNA B) each of about 2.6 to 2.8 kb (Brown et al., 2012) or monopartite genome with all genes resident on one (DNA A-like) ssDNA of about 2.8 kb. The Begomoviruses are emergent pathogens of crops transmitted by whiteflies (*Bemisia tabaci*) throughout the tropical and subtropical regions of the world (Markham et al., 1994; Hanley-Bowdoin et al., 1999).

The majority of monopartite begomoviruses are associated with betasatellites, which affect the replication of their respective viruses and may alter the symptoms in host plants. Betasatellites typically contain a satellite conserved region (SCR), an adenine-rich region and a C1 ORF. The C1 ORF has been characterized as a pathogenicity determinant that suppresses host antiviral silencing and virus movement in plants (Cui et al., 2005; Yang et al., 2011; Li et al., 2014). The diversity and host range of these betasatellite associated viruses is increases (Leke et al., 2011; Leke et al., 2012). Recombination is known to play a major role in the emergence and evolution of geminiviruses (Padidam et al., 1999; Lefeuvre and Moriones, 2015). From an evolutionary perspective, recombination during the replication of begomoviruses alone may not lead to the genetic variation de novo. Nucleotide substitutions that occur during evolution also contribute to genetic variation. Recombination has been reported to be the major factor in the emergence of begomoviruses infecting crops in India (Singh et al., 2012). Mutation, pseudo-recombination and recombination are driving forces for the emergence and evolution of new begomoviruses. This stresses the importance of recombination studies when analyzing new begomoviruses.

S. oleracea is also infected by the *Begomoviruses*. Spinach (*Spinacia oleracea*) is an important green-leafy vegetable of *Amaranthaceae* family that is cultivated extensively in India. It is often recognized as one of

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https://doi.org/10.1016/j.plgene.2018.01.001
Received 24 October 2017; Received in revised form 6 January 2018; Accepted 9 January 2018
Available online xxx
2352-4073/ © 2017.

28/12/2021

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Journal of Plant Pathology (2016), 98 (1), 105-110 Edizioni ETS Pisa, 2015

GENETIC VARIABILITY OF THE REPLICASE (NIb) GENE OF *PAPAYA RINGSPOT VIRUS* IN NORTHERN INDIA INDICATES COMMON ANCESTRY WITH ISOLATES FROM CHINA AND TAIWAN

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SUMMARY

The purpose of the present study was to investigate the genetic variability and phylogeny of *Papaya ringspot virus* (PRSV) on the basis of NIb (replicase) gene. The NIb and coat protein (CP) regions of about 2.5 kb of seven PRSV isolates from North India were cloned and sequenced. The North Indian isolates R2R and R5R have higher and lower sequence similarity with other PRSV isolates, respectively. Sequence comparison of NIb gene of 42 PRSV isolates, revealed that the average evolutionary divergence of all sequence pairs were 10.6% and 11.2% at amino acid and nucleotide level, respectively. Transitions were more frequent than transversions in the analyzed sequences. Maximum likelihood phylogenetic tree of combined NIb and CP regions indicated the common ancestry of North Indian isolates with Chinese and Taiwanese isolates. One potential recombination breakpoint in isolate R5R, together with its higher sequence identity and common ancestry with Chinese PRSV isolates, suggest the possible import of the former from the Chinese subcontinent.

Key words: *Papaya ringspot virus*, phylogeny, recombination, transitions and transversions

INTRODUCTION

Papaya (*Carica papaya*) is one of the most important fruits in tropical and subtropical countries with its high nutritive and medicinal value. The total world annual production of papaya is estimated about 6 million tonnes and India leads the world in papaya production with an annual output of about 3 million tonnes (Database of National Horticulture Board, Ministry of Agriculture, and Government of India). *Papaya ringspot virus* (PRSV) is the causative agent of the most prevalent and devastating disease of papaya. PRSV has been recognized as a worldwide pathogen infecting papaya and cucurbits. The virus is grouped into the papaya infecting type (PRSV-P) which affects both papaya and cucurbits, while cucurbit infecting type (PRSV-W) affects cucurbits but not papaya (Gonsalves *et al.*, 2010). PRSV (genus *Potyvirus*, family *Potyviridae*) has a positive single-stranded RNA of approximately 10 kb that contains a large open reading frame (Tripathi *et al.*, 2008). The viral RNA encodes a single, large polyprotein that is cleaved by three virus-encoded proteases (P1, helper component proteinase, and the nuclear inclusion body A proteinase) into ten functional proteins (P1, HC-Pro, P3, 6K1, CI, 6K2, VPg, NIa-Pro, NIb, and CP) and additional peptide P3N-PIPO (Chung *et al.*, 2008; Verma *et al.*, 2014). The PRSV is transmitted non-persistently by aphid vectors and primarily limits production by destroying the photosynthetic ability, vegetative vigor and eventually the mortality (Lius *et al.*, 1997). In addition, PRSV also reduces the quality by limiting the size of fruits, ringspots on fruits and water-soaked streaks on stems and petioles of papaya (Chiang *et al.*, 2007).

RNA viruses have an immense potential for high genetic variability, rapid evolution and adaptation to new conditions and new environments due to their fast replication, large population size and high mutation rates (Cuevas *et al.*, 2012). In many of these viruses, genome recombination or reassortment of genomic fragments between divergent virus strains enhance the genetic variability and accelerate evolution (Hon *et al.*, 2008; Nagy, 2008). Recombination between divergent sequence variants of potyviruses have generated new genotypes and also plays important role in the diversification and evolutionary dynamics of potyviruses (Jang *et al.*, 2009). Several reports on PRSV diversity, phylogeny and recombination have been published, which were focused on the coat protein gene (Jain *et al.*, 1998, 2004; Srinivasulu and Sai Gopal, 2011). In this work, we performed an updated analysis of the genetic variability and phylogeny of PRSV isolates based on the replicase gene. Until now, there is no report on genetic variability in the NIb gene of PRSV. In this study, we assessed the genetic variability in NIb gene (replicase gene) of PRSV and evaluate the phylogeny and recombination in particular gene. With this aim (i) we sampled 57 papaya leaf samples from different regions of Northern India, (ii) we

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Indian Phytopath. 70 (3) : 394-396 (2017)
DOI 10.24838/ip.2017.v70.i3.74245

SHORT COMMUNICATION

Genetic variability of multifunctional HC-Pro gene of *Lettuce mosaic virus* in northern region of India

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Received: 26 May 2017/ Accepted: 31 July 2017/ Published online: 30 August 2017
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ABSTRACT: *Lettuce mosaic virus* (LMV) is an economically important pathogen causing mosaic disease in spinach *(Spinacia oleracea)*. Isolates of LMV originating from different geographical regions in northern India were collected during the survey of 2013-2014. *Lettuce mosaic virus* (LMV) belongs to *Potyviridae* family (genus *Potyvirus*) and is mainly transmitted by aphids. This study covered the genetic variability of Helper component proteinase (HC-Pro) gene of LMV isolates. HC-Pro is multifunctional activity gene, which helps in transmission of virus. The amplified PCR products of ~1.3 kilo basepairs (kb) were obtained from five different isolates, sequenced and deposited in NCBI GenBank. Two isolates R4 and HR1 from Rajasthan (KJ558375, KM501033), isolate R5 from Haryana (KP635365), isolate R6 from Uttar Pradesh (KP635366) and isolate R4 from Delhi (KP635367)]. The phylogenetic analysis of LMV HC-Pro sequences is showed divergence with other isolates. These isolates showed two different clusters *vis-a-vis* diversity amongst each other.

Keywords: Diversity, HC-Pro, Lettuce mosaic virus, *Potyvirus*, spinach

Spinach (*Spinacia oleracea*) is a common edible vegetable crop grown in the temperate region throughout the world. Being a high nutritional value, it is a rich source (> 20% of the Daily Value) of vitamin A, vitamin C, vitamin K, magnesium, manganese, folate and iron. According to UC pest management guidelines several plant viruses are reported from spinach (http://www.ipm.ucdavis.edu/PMG/r732100611.html). These viral diseases may cause growth stunting and yellowing of plants and reduction in the yield. Several society reports (http://www.apsnet.org/publications/commonnames/Pages/Spinach.aspx) indicated that spinach is infected by as many as 10 viruses belonging to the genus namely; *Hybrigeminivirus, Luteovirus, Umbravirus, Fabavirus, Cucumovirus, Potyvirus, Tobamovirus* and *Tospovirus* are reported from worldwide (Fotopoulos *et al.*, 2011).

LMV belongs to the genus *Potyvirus* and reveals characteristic symptoms of dwarfing, poor heading, mottling, and vein clearing (Lim *et al.*, 2014). Besides the non-persistent transmission by aphid/vector (*Myzus persicae* and *Macrosiphum euphorbiae*) it is also transmitted by exchange of contaminated seeds and it depends on cultivars as well as age of seedling at the time of inoculation (Jones *et al.*, 2003). It is possible to differentiate between vector of LMV that land but do not replicate in the crops (transient vectors) (e.g. *Myzus persicae Sulzer*), transient nonvectors [e.g. *Hyalopterus pruni* (Geoffroy)], colonizing vectors [e.g. *Macrosiphum euphorbiae* (Thomas)] and colonizing non-vector species (e.g. *Nasonovia ribisnigri* Mosley) (Moreno *et al.*, 2007).

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Helper component proteinase (HC-Pro) is a multifunctional protein and it plays an important role in transmission of *Potyvirus* (Verma *et al.*, 2014; Mishra *et al.*, 2014). HC-Pro is generally divided into three functional domains: domain I (N-terminal domain) whose main function is to mediate aphid transmission, has likely been coevolving with the other two domains, a central region, and a cysteine protease domain (CPD) in the C-terminal region. N terminal region is required for aphid transmission and efficient genome amplification, the central region for long distance movement in plants (Bihong *et al.*, 2011). PCR based detection method is primary approach for identification the HC-Pro gene of LMV.

Leaf of spinach showing characteristic symptoms of virus infection including dwarfing, mottling, mosaic and vein clearing (Fig. 1) were collected during field

Fig. 1. Spinach leafs showing potyvirus infection (curling in leafs)

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Juvenile Delinquents: A Study

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ABSTRACT

Juvenile delinquency is a emerging social problem that significantly impacts all section of the society. Delinquency refers to a set of behaviors that are not in line with the collective practices and/or ethics of the dominant social group. Essentially, these behaviors deviate from societal norms and more specifically they violate established criminal codes and laws. Juvenile delinquency incorporates not only general criminal activity but conduct that is only unlawful for youths, such as running away from home and skipping school. Considering the magnitude of the problem and issues involved, analysis indicates that the number of factors for neglect and delinquency are mostly common and interrelated, based on socio-economic and psychological reasons. Poverty, broken homes, family tensions, emotional abuse, rural-urban migration, break-down of social values and joint family system, atrocities and abuses by parents or guardians, faulty educational system, the influence of media besides the unhealthy living conditions of slums and such other conditions explain the phenomena of juvenile delinquency. The most profound consequence of crimes committed by juveniles carries due to socio-economic and psychological problems which reflect on their family members and the society. With these criminal activities the juveniles habituate to consume alcohol or other drugs. The main objective of this paper is to study the family structure, education status and drug habit of juvenile delinquents. For this 50 Juvenile delinquents were taken as a sample.

Key words: Juvenile Delinquency, Juvenile Delinquents.

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INTRODUCTION

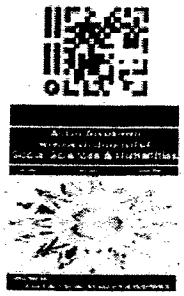
The family is considered to be the first and most essential unit of social organization. It is the first institution of children's socialization and it is considered to be the most influential environmental determining the formation of personality development of the child. Today, the relationships and transitions between family, school and work are being changed. Social relations that ensure a smooth process of socialization are collapsing; lifestyle trajectories are becoming more varied and less predictable. Delinquency is an act or conduct of a juvenile which is socially undesirable. Juvenile delinquency generally means the failure of children to meet certain obligations expected of them by the society. Juvenile delinquency is expression of an unsatisfied urge in the juvenile delinquent. Whether a particular actor conduct of the child would be deviant or not will depend on various factors and vary in different States, Cities and also time to time. The juvenile delinquent has even been defined as "a child trying to act like a grown up". A particular act of the child may be viewed as

28/12/2021

AARJSH VOLUME 4 ISSUE 2 (FEBRUARY 2017) ISSN : 2278 – 859X

A Peer Reviewed International Journal of Asian Academic Research Associates

AARJSH
ASIAN ACADEMIC RESEARCH JOURNAL OF SOCIAL SCIENCE & HUMANITIES



CHILD ABUSE AND NEGLECT CAUSE JUVENILE DELINQUENCY

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Abstract

Juvenile delinquency is the broad-based term given to juveniles who commit crimes. A delinquent child is a child of a certain age, who has violated a criminal law or engaged in a disobedient, indecent or immoral conduct. Young people who are at risk of becoming delinquent often live in difficult circumstances. Youth nowadays, regardless of gender, social origin or country of residence, are subject to individual risks but are also being presented with new individual opportunities—some beneficial and some potentially harmful. Considering the magnitude of the problem and issues involved, analysis indicates that the number of factors for neglect and delinquency are mostly common and interrelated, based on socio-economic and psychological reasons. Child maltreatment, which includes both child abuse and child neglect, is a major social problem and also associated with juvenile delinquency. A sample of 60 children was taken to achieve the purpose of the study in which half were juvenile delinquents and rest was their counterparts. This paper is an attempt to analyze that child abuse cause to delinquency.

28/12/2017

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Methods & Protocols

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SCHOOL OF MEDICINE AND PUBLIC HEALTH

Efficacy of core stability and supervised hip strengthening on knee osteoarthritis: a Randomized study protocol

Eficácia da estabilização central e fortalecimento supervisionado do quadril na osteoartrite de joelho: um protocolo de ensaio clínico randomizado

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ABSTRACT | INTRODUCTION: Osteoarthritis (OA) is a significant problem associated with pain; it reduces function, and hampered the quality of life. Only a few previous studies have established the comparative effect of core stability and hip strengthening exercise. **OBJECTIVE:** To investigate core stability and its relationship with supervised hip strengthening exercise in the management of knee OA. **METHODS:** This is a single centered project, two-group, pre-test, a post-test, randomized clinical trial where Forty-six patients with knee OA will be randomly allocated into two groups, Group A (experimental group 1) and B (experimental group 2) will receive core stability and hip strengthening exercise on three days a week for four weeks respectively across twelve treatment sessions. The primary outcome measure will be Knee Injury and Osteoarthritis Outcome measure (KOOS) in both English and Hindi versions, and secondary outcome measures will be Timed Up and Go test (TUG), Chair stand test to quantity pre and post effect of the intervention. **EXPECTED RESULTS:** This study planned to assess the efficacy and importance of core stability and hip strengthening exercise in reducing pain, improving function and quality of life in patients with knee OA. **PROTOCOL/TRIAL REGISTRATION NUMBER:** CTRI/2020/06/025973

KEYWORDS: Exercise. Knee osteoarthritis. Pain. Quality of life.

RESUMO | INTRODUÇÃO: A osteoartrite (OA) é um problema significativo associado à dor, que reduz a funcionalidade e prejudica a qualidade de vida. Apenas alguns estudos prévios estabeleceram o efeito comparativo da estabilização e do exercício de fortalecimento do quadril. **OBJETIVO:** Investigar a estabilização e sua relação com o exercício supervisionado de fortalecimento do quadril no tratamento da OA do joelho. **METODOLOGIA:** Este é um projeto de ensaio clínico centralizado, dois grupos, pré-teste pós-teste, randomizado, onde quarenta e seis pacientes com OA de joelho serão alocados aleatoriamente em dois grupos. Grupo A (grupo experimental 1) e B (grupo experimental 2) receberão exercícios de estabilização e fortalecimento do quadril três dias por semana durante quatro semanas, respectivamente, em doze sessões de tratamento. A medida de desfecho primário será a medida de desfecho de lesão no joelho e osteoartrite (KOOS), ambas as versões em inglês e hindi, e as medidas de desfecho secundário serão o teste Timed Up and Go (TUG), o teste de suporte da cadeira para quantidade pré e pós efeito da intervenção. **RESULTADOS ESPERADOS:** Este estudo planejou avaliar a eficácia e a importância da estabilização e exercícios de fortalecimento do quadril na redução da dor, melhorando a função e a qualidade de vida em pacientes com OA de joelho. **NÚMERO DE REGISTRO DO PROTOCOLO / TESTE:** CTRI/2020/06/025973

PALAVRAS-CHAVE: Exercício. Osteoartrite do joelho. Dor. Qualidade de vida.

28/04/2021

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Submitted 07/15/2021, Accepted 10/04/2021, Published 10/21/2021
J. Physiother. Res., Salvador, 2021 November;1(1(4):823-832
http://dx.doi.org/10.17267/2238-2704rpf.v11i4.3972 | ISSN: 2238-2704
Assigned editors: George Dias, Katia Sá

How to cite this article: Guliya S, Chahal A, Samuel AJ. Efficacy of core stability and supervised hip strengthening on knee osteoarthritis: a Randomized study protocol. J Physiother Res. 2021; (1(4):823-832. http://dx.doi.org/10.17267/2238-2704rpf.v11i4.3972

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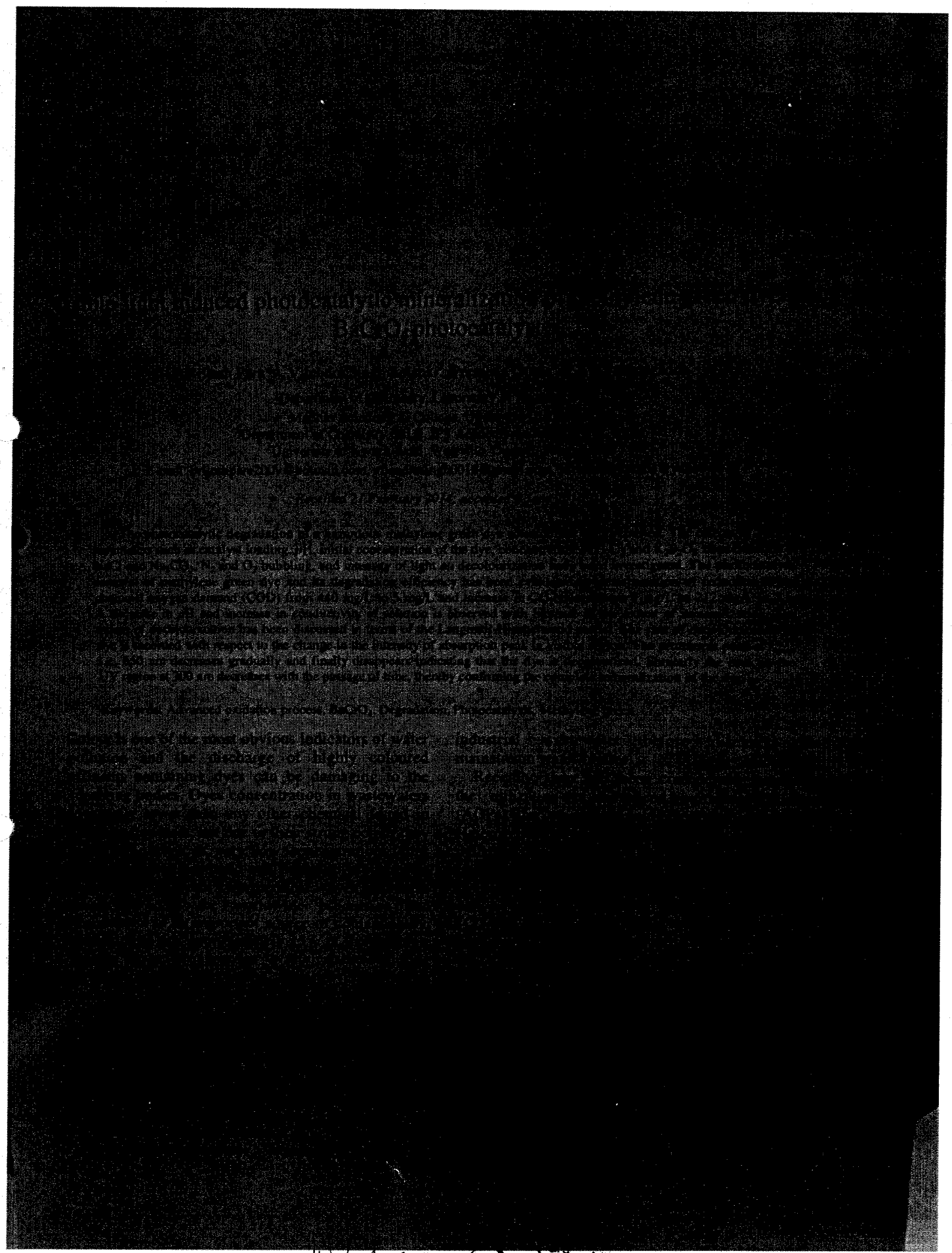

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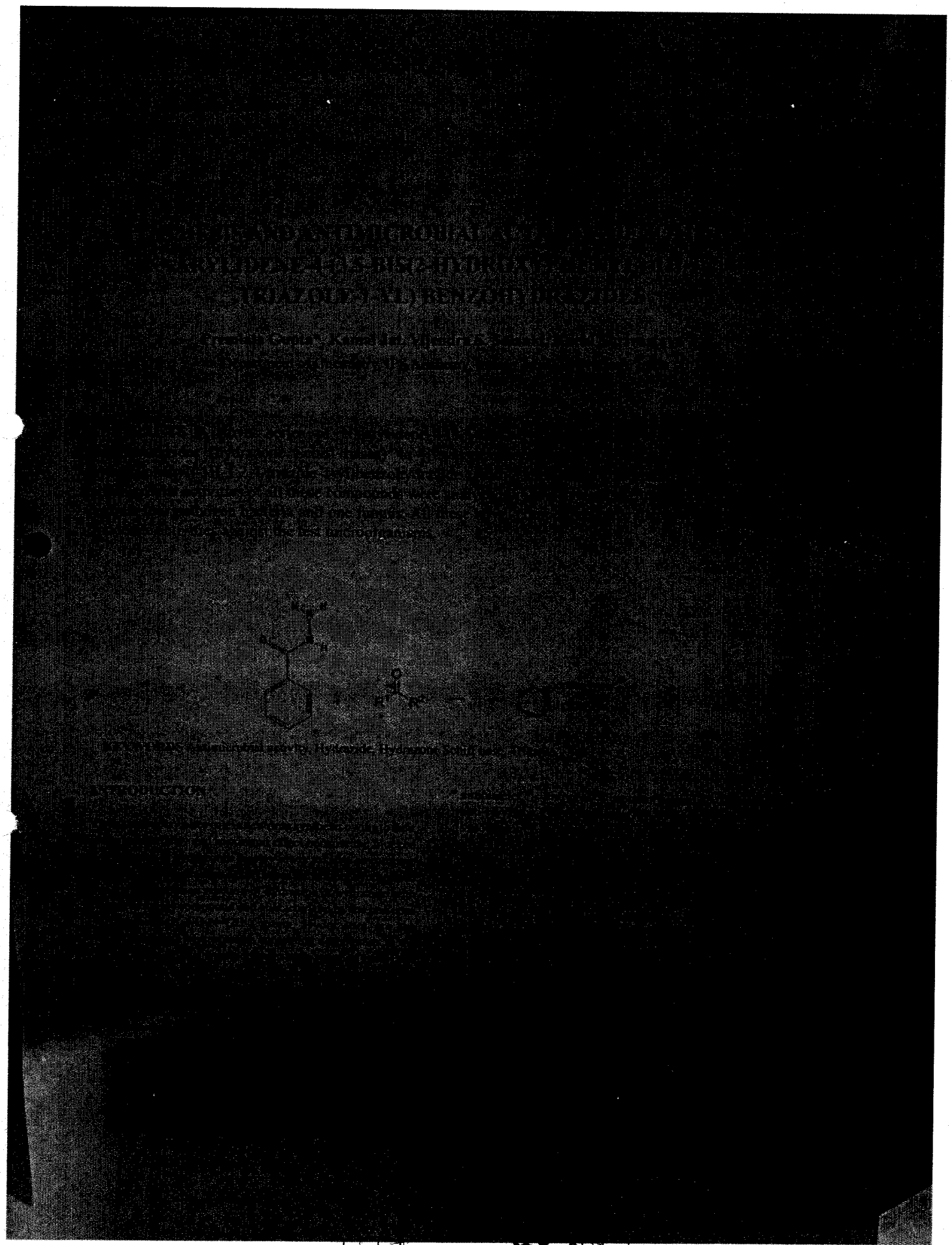

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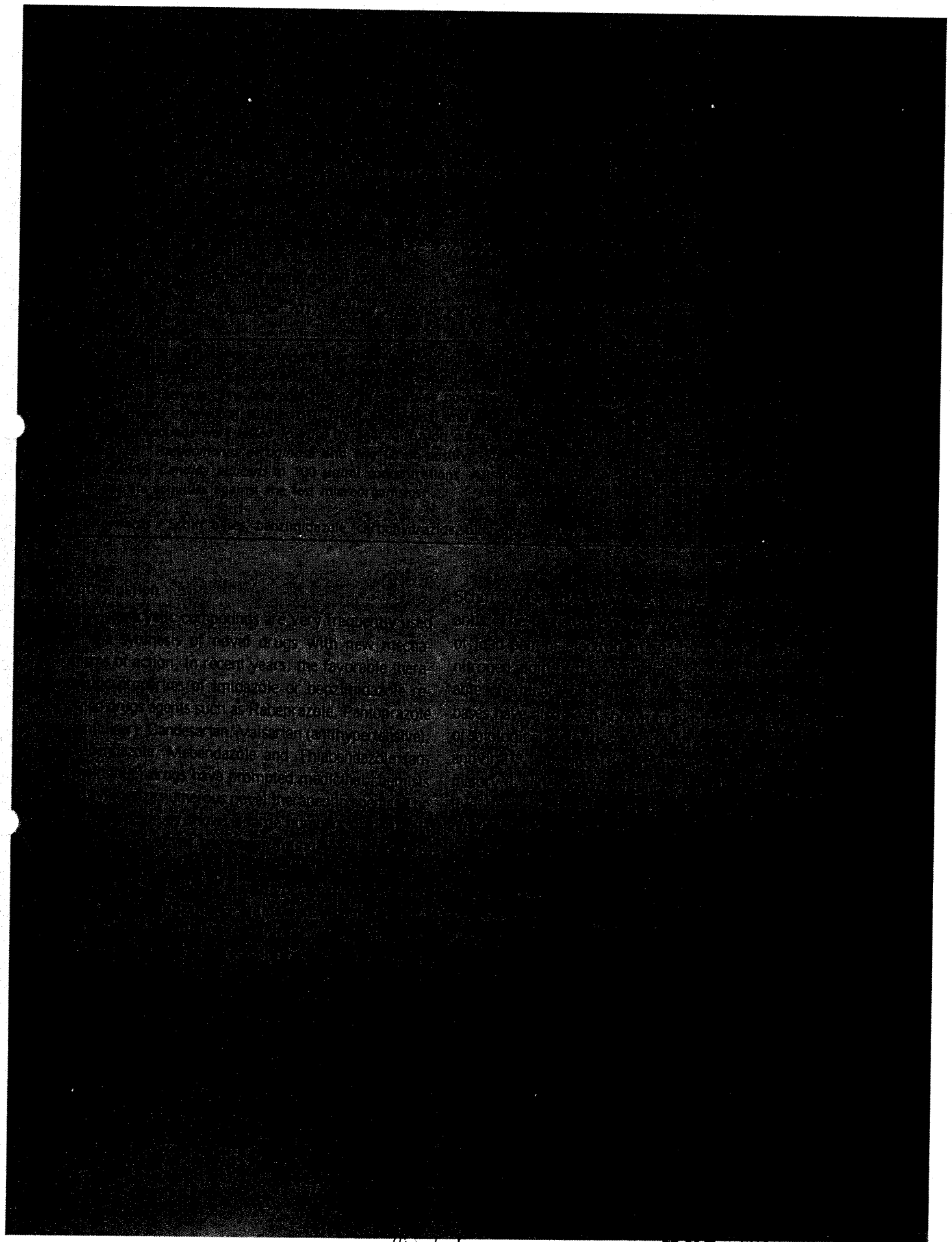

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Asian Journal of Chemistry; Vol. 32, No. 11 (2020), 2677-2684

ASIAN JOURNAL OF CHEMISTRY

https://doi.org/10.14233/ajchem.2020.22806

REVIEW

A Review on Advanced Oxidation Processes (AOPs) for Wastewater Remediation

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Received: 1 February 2020; *Accepted*: 3 May 2020; *Published online*: 28 October 2020; AJC-20087

In 21st century, organic and domestic wastes and discharges from varied chemical and manufacturing industries to water bodies become a critical issue and challenge for the researchers, engineers and policy makers. Advanced oxidation processes (AOPs) are efficient, sustainable, economically viable and green techniques to elimination on-degradable organic pollutants by biological and traditional processes. A number of research articles have been published from the past two decades on the wastewater treatment using various advanced oxidation processes. The main objective of this review paper is to provide the quick view for researchers, academicians and scientists in the area of wastewater treatment using various types of AOPs, which incorporate green principles involves in the processes for removal of different pollutants and contaminants including dyes, phenols, pesticides, herbicides etc. from wastewaters, with emphasis on the degradation efficiency of various photocatalysts. The formation reactions of $^{\bullet}OH$ radical and the mechanisms of degradation of various organic pollutants in the wastewater is also discussed. This review covers various types of advanced oxidation processes, *viz.*, ozone-based processes, photocatalysis and Fenton-based reactions.

Keywords: Advanced oxidation processes, Degradation, Hydroxyl radical, Photocatalyst, Wastewater, Dyes, Pesticides.

INTRODUCTION

Water covers 71% of the earth's surface but comprise only 2.5% fresh and potable earth's water. In the recent times, the presence of various potentially hazardous organic and inorganic compounds in industrial and municipal wastewaters is of major concern. These pollutants enter the water systems through different sources and depending on their stability and solubility, can be transported and distributed in the water system and could persist longer periods, either in dissolved form or in sediments. While, water consumption is periodically growing the problems related to provision of safe water and water treatment are increasing day to day in most of the developing countries. It becomes paramount to secure water from pollution and to develop cost effective remedial methods for its protection for sustainability of the today's environment [1-3].

Traditional wastewater treatment processes to treat polluted water from textile, paper and pesticides industry include chemical precipitation with alum or ferrous sulphate, which suffers from drawbacks such as production of a large volume of sludge leading to the disposal problem, the contamination of organic and inorganic substances in the treated wastewater, *etc.* Moreover these processes are inefficient to complete mineralization of hazardous pollutants. To overcome these problems advanced oxidation processes (AOPs) can acts as an alternatives or complementary method in established wastewater treatment and generate very reactive free radicals, especially hydroxyl radicals ($^{\bullet}OH$) generated *via* chemical (O_3/H_2O_2, O_3/OH^-), Fenton and photochemical (UV/O_3, O_3/H_2O_2, photo-Fenton, TiO_2, $ZnO/UV/O_3$, visible or solar light) reactions [4-7].

These technologies (*e.g.*, photocatalytic oxidation, Fenton's chemistry and ozonation) can mineralize organic and inorganic pollutants completely and have been applied successfully for the degradation of hazardous pollutants into CO_2, H_2O and inorganic minerals [8,9]. Efficiency of these processes is depends on the production of different types of free radicals such as

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28/12/2021

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IOP Publishing
J. Phys.: Condens. Matter 32 (2020) 325701 (13pp)
Journal of Physics: Condensed Matter
https://doi.org/10.1088/1361-648X/ab858f

Metamaterial-plasma based hyperbolic material for sensor, detector and switching application at microwave region

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Received 2 January 2020, revised 15 March 2020
Accepted for publication 1 April 2020
Published 15 May 2020

Abstract

Superconductor-plasma based hyperbolic material (SPHM) and meta-material-plasma based hyperbolic materials (MPHM) are the plasma based composite hyperbolic materials. Using the effective medium theory, the permittivity of SPHM and MPHM has been investigated. Perpendicular and parallel permittivities, real and imaginary part, versus normalized frequency have been analyzed with variation of filling fraction of composite hyperbolic material. The optical properties of one-dimensional ternary periodic structure (1DTPS) containing Si, SiO_2 and SPHM or MPHM have been studied using the well-known simple transfer matrix method and Bloch's function. The absorption spectra of 1DTPS containing plasma based hyperbolic material have been analyzed with the variation of incident angle, electron collision frequency of plasma and filling fraction of the composite materials. By studying absorption property of 1DTPS, the absorption spectra of MPHM were found to yield better results compared to the absorption spectra of SPHM. The calculations reveal that meta-material-plasma based hyperbolic material may be used to design the sensor, detector and switching applications at microwave region.

Keywords: plasma based hyperbolic material, SPHM, MPHM, ternary periodic structure and microwave devices

(Some figures may appear in colour only in the online journal)

1. Introduction

The fundamental phenomenon of optics is wave interference that is concerned with electromagnetic (EM) wave propagation in the material. The propagating phase of the EM wave plays an important role for wave interferences in periodic structure. By analysis of phase at the interface of materials, the wave interference property of two dielectric mediums is determined. Photonic crystals (PCs) are artificially designed periodic nanostructures of dielectric, metal, plasma, graphene etc. The PCs are made of two or more than two media with periodic variation of optical constants in space. In 1987 first time, the existence of photonic band gap (PBG) in periodic nano-structure was theoretically suggested by John [1] and was experimentally proposed by Yablonovitch [2]. These PCs prohibit the certain frequency ranges of propagating EM wave, which are commonly referred as photonic band gap (PBG) materials [3–5]. The PBGs find the fascinating applications in absorbers [6], waveguides [7], optical fibers [8], lasers [9], cavities [10], and many other applications [11–16]. The periodic

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1361-648X/20/325701+13$33.00

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28/12/2021
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Journal of Superconductivity and Novel Magnetism
https://doi.org/10.1007/s10948-021-05962-3

ORIGINAL PAPER

Omnidirectional Reflectance of Superconductor-Dielectric Photonic Crystal in THz Frequency Range

Girijesh Narayan Pandey[1] · Bhuveneshwer Suthar[2] · Narendra Kumar[3] · Khem Bahadur Thapa[4]

Received: 19 March 2021 / Accepted: 6 July 2021
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Abstract
In this paper, we analyze the omnidirectional reflection characteristics of a superconductor photonic crystal for TE and TM modes, by using the transfer matrix method and Bloch theorem. SPC is conceived as a periodic media made of superconducting and dielectric materials. By plotting the reflectance spectra and band structures of SPC in THz frequency region, we found two ODR bands in THz frequency range for both TE and TM modes. In our work, the ODR bandgap for TM mode is wider than TE mode, which can be considered as a key feature of such SPCs. Further, we observe the effect of the variations of thicknesses of the dielectric and superconducting materials as well as the variation of the refractive index of dielectric material, on the ODR bandgaps, and some insights are drawn. It is to note that the both ODR bandgaps increase continuously with increasing the thickness of superconducting layer, while on increasing the thickness of dielectric layer, the first bandgap shows reverse effect. Moreover, the first ODR bandgap is found to be more effective at the lower refractive index of dielectric material, while the second ODR bandgap is more effective at the higher refractive index. The novel ideas from the results of ODR bandgaps for such SPCs can be used in designing reflectors or optical mirrors in THz frequency range.

Keywords Transfer matrix method · Superconductor photonic crystal · Band structure · Omnidirectional reflection

1 Introduction

After initialization from pioneering works of Yablonovitch [1] and John [2] in 1987, the field of photonic crystals (PCs) emerged as a major field of interdisciplinary research. A PC is a micro- or nano-scale electromagnetic (EM) media, consisting of periodic variation of dielectric constant, which causes photonic bandgap (PBG) analogous to electronic bandgap in the semiconductor. Generally, the PBG is obtained due to separation in air and dielectric band, which has a strong dependence on polarization (transverse electric TE and transverse magnetic TM) and angle of incidence. The complete or common photonic bandgap, which is independent of both polarizations (TE and TM modes) and angle of incidence, is known as omnidirectional reflection (ODR) bandgap [3]. The physical aspects of ODR are as follows: first, the propagation of the parallel wave is conserved at boundaries of the medium because the EM wave does not disturb the translational symmetry along the parallel direction ($k\|$) and second, when EM wave is incident from superconducting material, it must follow $\omega > ck\|$, corresponding to free modes of propagation above the dielectric. ODR bandgap has various potential applications as an optical mirror, optical filter, high reflective coating, etc. [3, 4]. At each crystal interface, the waves are interfered with each other due to the phenomenon of the periodic variation in the refractive indices [5].

In recent decades, the researchers have been using the dispersive media to get the tunable PCs, such as semiconductor PCs [6, 7], chalcogenide PCs [8], plasma PCs [9], superconductor PCs [10, 11], and liquid crystal PCs [12]. In more recent, the superconductor-based PCs have received

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Published online: 14 July 2021

28/12/2021

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Silicon
https://doi.org/10.1007/s12633-021-01405-9

ORIGINAL PAPER

Design of Cold Plasma Based Ternary Photonic Crystal for Microwave Applications

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Received: 7 July 2021 / Accepted: 18 September 2021
© Springer Nature B.V. 2021

Abstract
In this paper, we propose a 1D ternary photonic crystal with Silicon/MCP/Air structure, whose transmission properties have been analyzed. By employing the TMM, the transmittance spectra are plotted for the introduced TPC in four cases by varying the parameters: angle of incidence, lattice constant, static magnetic field, and electron density. The focus of this analysis is to illustrate the PBGs or zero-transmission regions (GHz) exhibited by the TPC in these four cases. In the first case, there exist three PBGs at normal incidence in which the first two bands are enhanced with increase in the incident angle, while the third band shows reverse nature. At the incident angle 89°, three sets of multiple sharp peaks of transmission, showing multichannel filter characteristics, occur in place of allowed regions, and such abnormal feature of the TPC is attributed to the existence of MCP. Next it is demonstrated that such TPC can be exploited as multiband reflectors for a larger lattice parameter with increased thickness of the Si layer. In the third and fourth cases, the first bandgap is found to be least sensitive to the variations in the parameters, while the tunability in second and third bands in both cases is opposite to each other. By comparing the features of this TPC with a binary PC of Silicon/MCP structure, the tunablity in the second bandgap is far better in case of TPC. Based on the investigated results, the TPC under different conditions may be a good candidate for various applications, including highly tunable broadband and multiband reflectors; and multichannel filters for dense wavelength division multiplexing and high-speed signal processing.

Keywords Silicon · Cold plasma · Ternary · Transmittance · Oblique · Tunability

1 Introduction

In recent decades, the field of photonic crystal (PC) research has grown exponentially and made a substantial progress. The PCs unprecedentedly enable manipulation and control of the propagation of light, by prohibiting some frequency ranges to propagate through them called photonic bangaps (PBGs), and have emerged as an influential sphere of research [1, 2]. A one-dimensional (1D) PC is usually a class of simplest periodic composite materials with high refractive index contrast exhibiting features of Bragg's reflection, and is easier to fabricate. The focus of research has been extensively centered on the binary PC and propagation characteristics of such PCs have been analyzed with and without introduced designed defects. To achieve the tunable PC characteristics, the investigations were carried out on the dispersive media, such as semiconductor, plasma, superconductor, liquid crystal, etc., and such PCs with these novel materials have globally generated a great deal of attention by offering reduction in damping of the electromagnetic waves [3–10].

A plasma photonic crystal (PPC) is an artificial periodic array of alternating thin films of un-magnetized or magnetized plasma and a dielectric material or vacuum as the second layer [2]. The PBGs offered by a PPC can be controlled by means of the plasma parameters, like electron density and collision frequency. Among PPCs, a magnetized cold plasma based PC offers an additional parameter called gyro-effective frequency under a magnetic field that depends on the external magnetic field influencing magnetization in the cold plasma. There are two types of polarization configurations, namely right-hand and left-hand polarizations; which occur with positive and negative values of the periodic magnetic field respectively [11–17]. Cold plasma is generally enough cool and it is

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349-366

Int J Pharm Bio Sci 2016 April; 7(2): (P) 29 – 39

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Original Research Article

Nanotechnology

International Journal of Pharma and Bio Sciences

ISSN 0975-6299

CHARACTERIZATION AND ANTIMICROBIAL ACTIVITY OF GREEN SYNTHESIS SILVER AND GOLD NANOPARTICLE FROM *ZIZYPHUS* AGAINST CLINICAL BACTERIA

MUKESH SHARMA*, UMA BHARDWAJ AND OP JANGIR

Department of Biotechnology, Maharaj Vinayak Global University, Jaipur

ABSTRACT

Green synthesis of nanoparticles opens a new window in the biomedical research. The study was undertaken to examine, rapid and ecofriendly chemical reaction for the synthesis of Gold nanoparticles (GNP) and Silver nanoparticles (SNP) from *Zizyphus nummularia* (Rhamnaceae). The gold and silver nanoparticles were characterized by UV-visible spectroscopy and they gave a peak at 551 and 438 nm. Scanning electron microscopy (SEM) and Transmission electron microscopy (TEM) revealed that gold nanoparticles were observed as nanorods in shape with 208 nm in size while silver nanoparticles were spherical in shape of size 298 nm. Further, the antibacterial activity of synthesized silver and gold nanoparticles showed effective inhibitory activity against clinical isolated *Escherichia coli* MTCC 1302, *Salmonella typhimurium* MTCC 1254, *Bacillus subtilis* MTCC 1133 and *Pseudomonas aeruginosa* MTCC 2295.

KEY WORD: *Zizyphus*, Nanobiotechnology, nanomaterials, Green synthesis, silver nanoparticles, Gold nanoparticles.

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Int J Pharm Bio Sci 2016 April; 7(2): (B) 630 - 637

Molecular Biology

Review Article

International Journal of Pharma and Bio Sciences

ISSN 0975-6299

RNA INTERFERENCE IN DENTISTRY: A CRITICAL REVIEW

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ABSTRACT

RNA interference (RNAi) is emerging as a promising technology in dentistry. This paper focuses on the applications and future prospects of RNAi, which opens new horizons in the diagnosis and treatment of dental diseases. RNA interference shows potential as a new and effective method of gene silencing that can selectively target and shut off the post-transcriptional expression of mRNAs. Thus, RNAi may play a big role in dental therapeutics because of its potential to modulate tissue regeneration, bone resorption, oral cancer development, tooth repositioning, and insurgence of craniofacial deformities. This paper updates the current knowledge and future aspects of RNAi in the field of dentistry.

KEY WORDS: RNA interference dental disorders, tissue regenerations gene silencing.

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28/12/2024

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Available online at www.ijmrhs.com

ISSN No: 2319-5886

International Journal of Medical Research & Health Sciences, 2016, 5, 5:88-95

Evaluation of potent hydro-alcoholic extract of leaves of *Azadirachta Indica* for isolation and identification of anti-helminthic compound

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ABSTRACT

The traditions of collecting, processing and applying plant and plant-based medications have been handed down from generation to generation. In many African countries, traditional medicines, with medicinal plants as their most important components, are sold in marketplaces or prescribed by traditional healers (without accurate dose value) in their homes. The value of ethno-medicine and traditional pharmacology is nowadays gaining increasing recognition in modern medicine because the search for new potential medicinal plants is frequently based on an ethno-medicinal basis. The experiment was carried out to isolate and determine the anti-helminthic activity of the molecule (s) isolated from hydro-alcoholic extract of leaves of Azadirachta indica (Neem). The isolation and characterization of the potent molecule was undertaken by chromatographic and spectroscopic techniques. The compound was obtained as a greenish-brown powder after drying and was found to be a tetranor-triterpenoid limonoid. The compound showed Rf value of 0.56 when compared to standard (0.57). The isolated compound showed the retention time of 3.8 minutes very much similar to that of the standard. The compound demonstrated paralysis as well as death of worms in a lesser time at 10 and 20 µg/ml compared to piperazine citrate and albendazole (15 mg/ml). It was observed that anti-helminthic activity was significant as the concentration of the compound varies. The results showed the significant potency of azadirachtin as a significant anti-helminthic.

Keywords: Azadirachta indica, azadirachtin, anti-helminthic compound, hydro-alcoholic extract, terpenoid.

INTRODUCTION

The traditions of collecting, processing and applying plant and plant-based medications have been handed down from generation to generation. In many Afro-Asian countries, traditional medicines, with medicinal plants as their most important components, are sold in marketplaces or prescribed by traditional healers (without accurate dose value) in their homes. Because of this strong dependence on plants as medicines, it is important to study their safety and efficacy. [1] The value of ethno-medicine and traditional pharmacology is nowadays gaining increasing recognition in modern medicine because the search for new potential medicinal plants is frequently based on an ethno-medicinal basis.[2-4] At least 12,000 phytochemicals (secondary metabolites) have been isolated from plants, a number estimated to be less than 10 % of the total. Translation of ethnobotanical information for isolation and identification of phytochemicals is required for revealing the pharmacological status of the important phytochemicals.[5] These secondary metabolites functions in defense against predators and pathogens as allelopathic agents or attractants in pollination and seed dispersion. Plants with anti-helminthic activity have been reviewed.[6] Anti-helminthic activity of some plants has also been reported akin to that of sorghum *Allium sativum, Zingiber officinale, Cucurbita mexicana* and *Ficus religiosa, Artemisia brevifolia, Calotropis procera Nicotiana tabacum,*

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Available online www.jocpr.com

Journal of Chemical and Pharmaceutical Research, 2016, 8(4):1374-1381

Research Article

ISSN : 0975-7384
CODEN(USA) : JCPRC5

Isolation and identification of amarogentin as an antihelminthic compound in *Swertia chirayta*

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ABSTRACT

In the ethno-pharmacological approach, local knowledge about the potential uses of the plants is very useful as compared to the random approach where indigenous knowledge is not taken into consideration. Compounds for different pharmacological activities have been isolated from plants. Plants are capable of synthesizing an overwhelming variety of low molecular weight organic compounds usually unique and complex in structure. Phytochemicals produced in plants are secondary compounds responsible metabolic activities and defense in purpose. In the present investigation, a significant biomarker, amarogentin was isolated from the gradient column fractionation of hydro-alcoholic extract of Swertia chirayta. The compound was obtained as a pale yellow powder after drying and was found to be an iridoid glycoside. The compound showed Rf value of 0.75 when compared to standard. The isolated compound showed the retention time of 6.78 minutes very much similar to that of the standard. The compound demonstrated paralysis as well as death of worms in a lesser time at 20 µg/ml compared to piperazine citrate and albendazole (15 mg/ml). The results showed the significant potency of amarogentin as a significant anti-helminthic.

Keywords: Swertia chirayta, amarogentin, anti-helminthic compound, hydro-alcoholic extract, glycoside.

INTRODUCTION

Plants are capable of synthesizing an overwhelming variety of low molecular weight organic compounds usually unique and complex in structure. Phytochemicals produced in plants are secondary compounds responsible metabolic activities and defense in purpose. Phytochemicals are produced by specific biochemical pathways, which occur inside the plant cells. At least 12,000 phytochemicals (secondary metabolites) have been isolated from plants, a number estimated to be less than 10 % of the total. Translation of ethnobotanical information for isolation and identification of phytochemicals is required for revealing the pharmacological status of the important phytochemicals [1]. These secondary metabolites functions in defense against predators and pathogens as allelopathic agents or attractants in pollination and seed dispersion. Plants with anthelmintic activity have been reviewed [2]. Anthelmintic activity of some plants has also been reported akin to that of sorghum *Allium sativum, Zingiber officinale, Cucurbita mexicana* and *Ficus religiosa, Artemisia brevifolia, Calotropis procera Nicotiana tabacum* and *Butea monosperma* [2-8]. Previous study already revealed the anti-helminthic potency of some indigenous botanicals including *Swertia chirayta* [9]. The present study was thus carried out to isolate the potent anti-helminthic compound from hydro-alcoholic extract of *Swertia chirayta*.

28/12/2017

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ORIGINAL RESEARCH PAPER | Medical Science | Volume : 6 | Issue : 8 | August 2016 | ISSN - 2249-555X | IF : 3.919 | IC Value : 74.50

Molecular Line Probe Assay for the Detection of Multi Drug Resistant Tuberculosis and Comparison of Results with Conventional Solid Culture and Drug Susceptibility Testing

KEYWORDS

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ABSTRACT ***Background:*** *Drug-resistant TB often goes undetected and untreated in many countries. The laboratory is an essential component in TB control programs to provide culture and drug susceptibility test services. In this study we evaluated the performance of line probe assay (LPA) in comparison with LJ culture DST.* ***Methods:*** *Samples from Three thousand and sixty two (N=3062) MDR-TB suspects were included in the study. Sputum smear microscopy was done for all the specimens and all smear positive specimens were processed for LPA and LJ culture and DST.* ***Results:*** *Overall concordance between conventional DST and LPA was observed among 652 specimens. In comparison to 238 culture isolates observed sensitive on LJ C-DST, 226 were found sensitive by LPA (concordance=95%). Further, In comparison to 426 culture isolates observed resistant on LJ C-DST, 12 more cases were found resistant by LPA (Concordance= 97.3%).* ***Conclusion:*** *Overall concordance of the LPA with conventional DST was 96%.*

Introduction

The global threat of multidrug-resistant tuberculosis (MDR-TB; strains of *Mycobacterium tuberculosis* resistant to at least rifampicin and isoniazid) to TB control, underscores the importance of prompt and rapid identification of such resistant *Mycobacterium tuberculosis* strains. Isoniazid (INH) and rifampicin (RIF) are the key first-line anti-tuberculosis drugs, and resistance to these drugs i.e. MDR-TB, is likely to result in treatment failure and poor clinical outcomes.[1] India has the largest number of estimated MDR-TB cases amongst notified TB patients of any country.

Smear microscopy has long been known as the primary method for screening of TB, with a case detection rate of not more than 68%.[2] Conventional culture-based methods, Lowenstein Jensen (LJ) culture and drug susceptibility testing (C&DST) remain the "gold standard" for TB diagnosis in developing countries as these techniques have been greatly improved and routinely used over the past decade. However, the time for a bacteriological culture-based diagnosis of TB may require several weeks to months.[3] To address such delay in TB diagnosis as well as to discretely improve the diagnosis accuracy, molecular diagnosis aspects need to be considered for the early detection of MTB which involves the detection of the mutation in specific genes imparting resistance against rifampicin (RIF) and/or isoniazid (INH), mostly used as the first line anti-tubercular drugs.

Newly developed molecular based methods have advantages over conventional phenotypic methods in terms of both accuracy and turnaround time. The GenoType MTBDRplus assay is a commercially available line probe assay (LPA) from Hain Lifescience, Nehren, Germany, and is designed to simultaneously detect the most important gene mutations conferring R (*rpoB* genes) and H (*inhA*, *katG*) resistance in MTB isolates in 8 hours.[4]

Although the GenoType MTBDRplus assay has been studied in several laboratories, there is a wide variation in circulating MTB strains across the globe, and false negative results can occur due to the presence of unique genetic mutations in the different settings. Hence validation in different settings is needed to ensure acceptable performance.

Therefore, in the present study we attempted to evaluate the performances and utility of the LPA assay for the rapid and detection of multi drug resistant tuberculosis. The results of the molecular diagnostic method was compared with that of the conventional phenotypic drug susceptibility test (DST) to demonstrate the sensitivity, specificity and accuracy of LPA with its capacity to shorten the time required for TB diagnosis compared to that of the conventional method.

Materials and Methods

Selection of cases

Samples from a total of Three thousand and sixty two (N=3062) MDR-TB suspects were included in the study

28/12/2016

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Available online at www.elixirpublishers.com (Elixir International Journal)

Bio Technology

Elixir Bio. Tech. 96 (2016) 41214-41216

Elixir ISSN: 2229-712X

Phytochemical evaluation and GC – MS analysis of *thevetia peruviana* leaves extract

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ARTICLE INFO

Article history:
Received: 20 May 2016;
Received in revised form:
17 June 2016;
Accepted: 24 June 2016;

Keywords
Thevetia peruviana,
phytochemical screening,
GC-MS analysis.

ABSTRACT

Thevetia peruviana, cultivated as an ornamental plant and planted as large flowering shrub, belongs to the family Apocynacea. The aim of this study is to screen the phytochemicals present in the leaves of Thevetia peruviana and further analysis of the components present in it by GC- MS analysis.The leaves were sequetially extracted based on the polarity viz., hexane , acetone and methanol and subjected to phytochemical screening which revealed the presence of bioactive compounds such as alkaloids, flavanoids, cardiac glycosides, steroids, terpenoids, tannins, phenols, quinones and saponins.The GC- MS analysis of the acetone extract revealed the presence of 33 compounds. This study forms a basis for the biological characterization and importance of the compounds identified.

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Introduction

Plant products have been part of phytomedicines since time immemorial. These can be derived from any part of the plant like leaves, roots, bark, flowers, seeds etc. Plant products provide crucial, unmatched chemical diversity to modern drug discovery programs. The role of traditional medicine in the solution of health problems is invaluable on a global level.The use of herbal medicines have become popular due to the belief that green medicines are safe, easily available with less or no side effects. Indeed, the market and public demand has been so great that there is a great risk that many medicinal plants today, face either extinction or loss of genetic diversity. Knowledge of the chemical constituents of plant is desirable because such information will be valuable for the synthesis of complex chemical substances and also helps to find the scientific basis of the therapeutic action of these green medicines.

Thevetia peruviana is native to tropical America, especially Mexico, Brazil and West Indies but now frequently grown throughtout the tropical. It belongs to the family Apocynaceae and commonly known as yellow oleander or luckynut. In its native countries, the plant has been known for more than 2000 years. It grows as a shrub or small tree no taller than 8m. The yellow oleander is cultivated in garden and roadside as ornamental plant. Flowers bloom from summer to fall and is orange – yellow in colour. The tender fruits is deep yellow in colour which turns black when is mature. The leaves show a dark green surface. Mostly all parts of plant i.e. leaves, seed, flower, fruits and root are considered as potential source of biologically active compounds.Various bioactivities of Thevetia peruviana such as anti spermatogenic (Gupta et al, 2011), piscicidal (Singh et al, 2010), anti termite (Gachanja et al, 2010), anti fungal (Raul Brunode Sousa et al, 2003; Chewachong et al, 2010), anti inflammatory (venkataraman et al, 2010), anti diarrhoeal, anti microbial and cytotoxic (Ahmed et al, 2011) have been reported.

The aim of the present work was to identify the phytocomponents present in the hexane, acetone and methanol extracts of the leaves of *Thevetia peruviana* by qualitative phytochemical testing and to identify the compounds present in the acetone extract of the leaves by Gas Chromatography – Mass spectrum (GC – MS) analysis.

Materials and Methods

Collection of plant materials

Fresh leaves of *Thevetia peruviana* were collected randomly from Jaipur, Rajasthan and identified and authenticated in the herbarium unit of Department of Botany, Rajasthan University and a voucher specimen (RUBL211530) has been deposited.

Plant extract preparation

The leaves were properly washed with tap water and then rinsed with distilled water. The rinsed leaves were shed dried for 1 week. The crispy leaves were then reduced to powder using a blender and then stored in air tight bottles. The powdered plant material (50gm × 3) was extracted with Hexane, Acetone and Methanol by continuous hot extraction using soxhlet appratus at a temp. not exceeding the boiling point of the solvents. The extacts were then filtered and evaporated on a water bath at low temp. (40°C - 50°C) to a syrupy consistency and then to dryness; and were stored at 4°C until used.

Phytochemical evaluation

The hexane, acetone and methanol crude extracts were subjected to phytochemical tests for the presence of different metabolites using standard protocols viz. Alkaloids (Dragendroff's test, Mayer's test), Flavanoids (Ammonia test), Cardiac glycosides (Killer – Killani's test), Steroids (Salkowski test), Terpenoids (Salkowski test), Tannins (Ferric chloride test), Saponins (Foam test), Phenols (Ferric chloride test) and Quinones (Conc. Sulphuric acid test).

GC – MS analysis

A shimadzu QP – 2010 plus with thermal desorption system TD20 was used to obtain the chromatograms. The name and specification of the column used is Rtx - 5MS (30m×0.25mm internal diameter×0.25µm film thickness

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ISSN 2320-5407 International Journal of Advanced Research (2016), Volume 4, Issue 7, 1726-1731

ISSN NO. 2320-5407

Journal homepage: http://www.journalijar.com
Journal DOI: 10.21474/IJAR01

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH

RESEARCH ARTICLE

"SYNTHESIS, CHRACTERIZATION AND EVALUTION OF ANTIMICROBIAL EFFECT OF CHITOSAN CONJUGATED SILVERNANOPARTICLES AGAINST PATHOGENIC BACTERIA AND THEIR BIOMEDICAL APPLICATION ".

Prachi Goyal, Dr Uma bhardwaj and Mukesh Sharma.

Manuscript Info

Manuscript History:

Received: 12 May 2016
Final Accepted: 19 June 2016
Published Online: July 2016

Key words:
chitosan, silvernanoparticles, TEM, SEM, FTIR.

Corresponding Author

Prachi goyal.

Abstract

The study is aimed to determine the antimicrobial evaluation of chitosan conjugated silver nanoparticles againist pathogenic bacteria. Pathogenic bacteria samples were collected from SMS hospital and then subjected to identification of bacteria according to their m characterstics and morphology. Chitosan conjugated silver nanoparticles synthesized by adding NaOH and $AgNo_3$ solution to chitosan solution at 45°c and were characterized by UV, SEM, TEM and FTIR. The antimicrobial activity was determined by kirbuy stokes method. Antibacterial effect of chitosan-silver nanoparticle was increased by increasing the concentration of the (ch-AgNPs). The presence of small concentration of silver nanoparticles in the composite was enough to significantly enhance antibacterial activity.

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Introduction

Nanotechnology has developed to be a considerable research field in all disciplines including medicinal chemistry.[1] The physical properties, size and orientation of nanoparticles have allegedly shown to alter the performance of any material.[2] Chitosan is a linear polymer composed of glucosamine and N-acetyl glucosamine linked with a b-1-4-glycosidic linkage . chitosan is a biopolymer, biocompatible, and can be degraded with the help of enzymes in human body, the degradation products of chitosan are non-hazardous.[3] Chitosan is semi-crystalline polymers and its crystallinity plays a vital role in adsorption effectiveness. Chitosan is a biopolymer which shows a broad spectrum of antimicrobial potency by binding to the negatively charged bacterial cell wall attached to the DNA, inhibiting its replication.[4] Silver nanoaparticles has an important application in the area of biology such as a DNA sequencing and antimicrobial agent. Silvernanoparticles has been well-known to show strong toxicity towards a wide range of microorganisms.[5] Silver nanoparticles, typically size in the range of 1 -10 nm append to the surface of cell membrane and considerably disturb its appropriate functions like permeability and respiration [6]. Silver nanoparticles (AgNPs) have been proven to acquire immense importance and thus, have been widely studied. The use of AgNps in various applications such as electrical conducting, sensing, catalytic, optical and antibacterial applications[7] In the last some years, there has been an rise in studying AgNPs on account of their essential antbacterial efficacy[8]. Chitosan silver nanoparticles can be used in future generation as therapeutic agents against numerous drug-resistant microbes[9].

Chitosan has various applications in many areas, mainly pharmaceutical and biomedical fields, because to its specific properties Among these properties chitosan has excellent biocompatibility; high bioactivity; reactivity of the group amino deacetylated; biodegradability; selective permeability; polyelectrolyte action; antimicrobial activity; ability to form gel and film; chelation ability and absorptive capacity. These specific properties provide a wide variety of applications to the chitosan, such as: anti-bacterial drug carrier of controlled release, both chitosan and silvernanoparticles are antibacterial agents so chitosan conjugatedAg nanoparticle has exhibited strong antibacterial effect. Comparative studies showed that chitosan-Ag nanoparticle is much more effective against bacteria than pure chitosan. Chitosan can be used as a stabilizing agent instead of chemical reducing agent for protecting Ag

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ISSN 2456-4400

RESEARCH ARTICLE INTERNATIONAL JOURNAL OF MEDICAL LABORATORY RESEARCH

EVALUATION OF SERUM FERRITIN, CRP, VITAMIN D3, VITAMIN B12 AND IRON IN CELIAC DISEASE: A CROSS SECTIONAL STUDY

Prof. Uma Bhardwaj[1], *Mukta Sehgal[2] Dr. Biswajit Sen[3], Binish Jawed[2],Taranjeet Singh[2]

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Received:13 Sep, 2016/Accepted:10 Oct, 2016

Abstract: Malabsorption associated with weight loss, growth retardation and vitamin/mineral deficiencies characterized classical Celiac disease(CD). The aim of this study was to assess the levels of serum Ferritin, Vitamin B 12, Vitamin D3, serum Iron in newly diagnosed untreated CD patients. Newly diagnosed CD patients (n=28) and same number of matched healthy individuals were compared. Serum Ferritin was below the lower limit of normal in 85%, serum Vitamin B12 in 86 %,serum Vitamin D3 in 92.86 % in CD patients. These values were statistically significant as compared to controls($p < 0.00001$),($p < 0.042479$) respectively. Levels of serum Iron were not statistically significant. Estimation of C-Reactive protein (CRP) was done to assess the inflammatory response which did not reveal any significant elevation. The study indicates that estimation of serum nutritional parameters should form an integral part of investigation in all clinically suspected or newly diagnosed CD patients.

Key words: Celiac disease, C-reactive protein, Endomysial antibodies, Deamidatedglidin peptide.

INTRODUCTION:

Celiac disease(CD) is an inflammatory autoimmune disorder traditionally known to involve the mucosa of the small intestine in genetically susceptible individuals.[1]However, in the past two decades, CD has been shown to be a multi-system disorder with non-classical presentation [2-3-4].These days, many individuals present with no or only minor extra-intestinal symptoms. Indeed, microcytic or macrocytic anemia may occasionally be the only clinical symptom to suggest CD.[5]

Several studies have demonstrated deficiency of micronutrients in CD with varying results.[6]The deficiencies of minerals and vitamins status of CD patients has not been widely reported in Indian literature. Therefore, we aim to measure essential serum nutritional variables in order to assess whether any significant difference exists among CD patients when compared with apparently healthy individuals. In the present study the levels of serum Ferritin, Vitamin D3, Vitamin B12 and Iron were evaluated. We also looked for changes in the serum C-reactive protein (CRP)levels to assess the inflammatory response.

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ISSN 2456-4400

Sehgal et al., Int J Med Lab Res 2016, 1(2): 6-9

RESEARCH ARTICLE INTERNATIONAL JOURNAL OF MEDICAL LABORATORY RESEARCH

CAN DEAMIDATED GLIADIN PEPTIDE ANTIBODIES BE CONSIDERED MORE SPECIFIC THAN TRADITIONAL MARKERS FOR CELIAC DISEASE- A PILOT STUDY

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Received:13 Sep, 2016/Accepted:20 Oct, 2016

Abstract: A prospective study of the clinical diagnosis, duodenal biopsies and serological results in patients with suspected celiac disease was undertaken from Feb 2014 to March 2016.In the study the assay sensitivity and specificity for diagnosing CD were 92.98% (95% CI= 83% to 100%) and 100% (95%CI=96.19% to 100%) for IgG and 55.36% (95% CI=41.47.8% to 68.66%) and 100% (95% CI= 96.23% to 100%)for IgA antibodies to DGP respectively. The sensitivity and specificity of IgA tTG was found to be96.49% (95% CI= 87.892% to 99.57%) and 78.95% (95% CI= 69.38% to 86.64%) respectively. In conclusion the addition of DGP antibody test in combination with tTG antibodies makes the test more acceptable to the patients than undergoing invasive endoscopic procedure.

Key words: Celiac disease,DeamidatedGliadin Peptide,Tissue Trans Glutaminase,Positive Predictive Value,Negative Predictive Value,Upper Limit of Normal.

INTRODUCTION:

The appreciation ofthe importance of gliadin deamidation in the immunopathogenesis of Celiac disease has led to the development of commercially available diagnostic tests based on antibodies to deamidated gliadin peptides.Recently the use of these autoantibodies have shown high specificity and sensitivity in detecting Celiac disease[1]. We could findno publishedreports from the Indian sub-continent regarding the use of DGP as a reliable tool for diagnosis and management of celiac disease. Therefore, we undertook this pilot study to look at its efficacy.

MATERIALS AND METHODS:

A total of 152 patients(both children and adults) were studied.75 subjects acted as controls. IgA antibodies against tTG were determined by ELISA test.Indirect Immunofluorescence tests were employed to detect IgA and IgG class antibodies against deamidated gliadin peptides(GAF3X) and IgA class antibodies against Endomysium.Auto antibodies against endomysium were detected by using tissue sections of primate intestine. For the determination of antibodies against deamidated gliadin a repetitive gliadin-analoguefusion

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ISSN 2456-4400

Jawed et al., Int J Med Lab Res 2016, 1(2): 24-28

RESEARCH ARTICLE INTERNATIONAL JOURNAL OF MEDICAL LABORATORY RESEARCH

UTILITY OF LAMP ASSAY IN EARLY DETECTION OF DENGUE VIRUS INFECTION

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Received:22 Nov, 2016/Accepted:3 Dec, 2016

Abstract: In the present day vector born dengue infection has become a major public health concern. Early and accurate detection during the acute phase has crucial for management and prevention of disease. RT-LAMP can be utilized in disease diagnosis as it a highly sensitive and specific method.A genotype specific reverse transcription-loop-mediated isothermal amplification (RT-LAMP) assay was developed in this study and we evaluated its sensitivity and specificity in comparison to NS1 antigen and RT-PCR assay.Serological and RT-LAMP were performed on a total of 343 serum samples of clinically suspected dengue patient. Further RT-LAMP positive serum sample were confirmed by Real Time PCR (RT-PCR) method.A total of 32 % (n=109) dengue positive case, 79 %, 27% and 11% positive for NS1 antigen, IgM and IgG antibody respectively. 83% serum samples were positive for RT-LAMP and 76% was common positive for NS1 Ag and RT-LAMP assay. All RT-LAMP positive samples were also positive for RT-PCR.Developed RT-LAMP assay in this study shows strength of agreement in comparison to others serological assays.It can be utilized in early, rapid, and sensitive detection of dengue infection in resource limited areas of country.

Key words: Reverse Transcription-Loop-Mediated Isothermal Amplification, Dengue shock syndrome, Dengue haemorrhagic fever, Enzyme linked immunosorbent assay.

INTRODUCTION:

In current scenario dengue has becomes a major public health problem in tropical and subtropical countries [1,2]. Every year a very large population of India is affected by dengue virus infection transmitted through Aedes mosquito.Antigenically different four genotypes (DEN 1,2,3 & 4) produce either an asymptomatic or a moderate febrile infection such as dengue fever (DF) or severe fetal stage,dengue haemorrhagic fever (DHF) and dengue shock syndrome (DSS)[1,3]. In this situation, early and accurate diagnosis play a very important role in disease management and patient relief. High grade fever is a first clinical presentation of infection which is followed by a prompt reduction in platelet count which occurs after complete onset of disease. Unavailability of dengue vaccine and specific medication, precise diagnosis become a very important in preparedness and prevention of disease. Virus isolation, serology, antigen and molecular detection methods are available for dengue infection confirmation[4,5]. Various commercially available tests are quite competitive in detection of dengue antibody in human plasma/serum[6,7]. Suggestive diagnosis can be made on the basis of virus specific captured IgM and IgG enzyme linked immunosorbent assay (ELISA) but it requires continuous monitoring of antibody titer from acute phase to convalescent phase of patient sera[9]. Cross reactivity of dengue antibodies with otherflavivirus specific IgG antibodies is yet again a major drawback. Cell

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PROGNOSTIC EXPRESSION OF CD7 AND CD56 WITH THE MOLECULAR ABNORMALITIES AND POST INDUCTION STATUS IN AML

International Journal of Medical Laboratory Research (IJMLR) Dr Sandeep Rai

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PROGNOSTIC EXPRESSION OF CD7 AND CD56 WITH THE MOLECULAR ABNORMALITIES AND POST INDUCTION STATUS IN AML

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Received:1 Oct, 2016/Accepted:20 Nov, 2016

Abstract: Chromosomal abnormalities contribute to the classification of the acute leukemia and important prognostic factor for achievement of complete remission, risk of relapse. leukaemia-associated Immunophenotypes (LAIPs) is useful for a better prognostic evaluation, therapeutic approach and also for MRD studies in AML. Immunophenotypic studies carried out on AML patients demonstrated that several antigens expressed on AML cells as CD7, CD34, CD56 and other represent important independent prognostic factors that affect the clinical outcome of these patients. Prognostic group expression also associated with Complete Remission rates and molecular abnormality. **Aims:** The study correlation between induction status and molecular abnormalities in prognostic groups based on expression of CD7 and CD56. **Material and Method:** 100 patients diagnosed with AML were included out of which 13 cases did not receive any form of treatment. The WBC count, molecular abnormality, FAB diagnosis, MRD data, gender, age, clinical and outcome data were collected for each patient. Response to therapy was assessed according to standardized NCCN criteria. **Result and Conclusion:** It is concluded that immunophenotypically AML can be divided prognostic ally into 4 groups with group CD56+CD7+ showing highest number of complete remission in group 4(CD56- CD7-) while lowest remission in Group 1 (CD56+ CD7+). Molecular and cytogenetic abnormalities also have prognostic effect with the presence of CD56 and CD7. However more data and studies are needed for a significant result.

Keywords: AML, MRD, molecular abnormalities, CD56, CD7.

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CORRELATION OF MRD STATUS AND RELAPSE IN ACUTE MYELOID LEUKEMIA

August 2016

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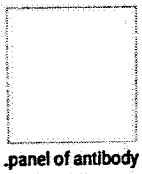
Figures (1)

Abstract and Figures

The presence of minimal residual disease (MRD) after achievement of complete remission (CR) on completion of induction therapy predict relapse in acute myeloid leukemia (AML). These results suggest a correlation between relapse and MRD at the time of morphologic remission. Here we wanted to establish the earlier supported theory whether MRD and relapse provide independent prognostic information. Patients and Methods: Analyzed data from 87 adults with AML who achieved CR after induction therapy were used. Bone marrow samples were collected after achieving complete remission and MRD was determined by 5-color multiparameter flow cytometry. Results: A total of 87 patients achieved morphological CR and 28 of which relapsed or refractory AML. 40 patients (48.2%) had flow Cytometric evidence of MRD out which 16(18.3%) relapsed, while 24(27.5%) didn't relapsed incident rate are more for MRD+ case with higher hazardous ratio. Conclusion: MRD level are linked with the prognostic factor for relapse in AML patients.



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ISSN 2456-4400

Bhardwaj et al., Int J Med Lab Res, 2016, 1(1

Research Article

International Journal of Medical Laboratory Rese

CORRELATION MRD STATUS AND RELAPSE IN ACUTE MYELOID LEUKEM

(PDF) Prognostic significance ki-67 expression in endometrial cancers: a Population-based study

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(PDF) CORRELATION OF MRD STATUS AND RELAPSE IN ACUTE MYELOID LEUKEMIA

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Received:1 June, 2016/Revised:25 June, 2016/Accepted:20 July, 2016

Abstract: The presence of minimal residual disease (MRD) after achievement of complete remission i on completion of induction therapy predict relapse in acute myeloid leukemia (AML). These re suggest a correlation between relapse and MRD at the time of morphologic remission. Here we want establish the earlier supported theory whether MRD and relapse provide independent progn information. **Patients and Methods:** Analyzed data from 87 adults with AML who achieved CR induction therapy were used. Bone marrow samples were collected after achieving complete remission MRD was determined by 5-color multiparameter flow cytometry. **Results:** A total of 87 patients achi morphological CR and 28 of which relapsed or refractory AML. 40 patients (48.2%) had flow Cytom evidence of MRD out which 16(18.3%) relapsed, while 24(27.5%) didn't relapsed incident rate are i for MRD+ case with higher hazardous ratio. **Conclusion:** MRD level are linked with the prognostic f for relapse in AML patients.

Keywords: MRD, flowcytometry, Relapse, RFS

INTRODUCTION:

Acute myeloid leukemia (AML) is a heterogeneous disease with a variable response to therapy and achieved, complete remission (CR) rates range from 20% to 90%. Relapse is the most common event ultimately leading to death, occurs in 10% to 95%.[1-3] Risk stratification is determined by several patients and disease-related factors assessed at diagnosis. Many factors such as age, de novo versus secondary AML, cytogenetics, and aberrations in the molecular abnormalities are of limited predictive value. Not mutually exclusive, an alternative means is to incorporate information gained as treatment has started, such min residual disease (MRD) as measured multiparameter flow cytometry (MFC). The more evidence that MRD level after indu therapy is independently associated with rel and survival.[6-14] The prognostic significanc response to induction therapy has also recognized, with a recent study showing achievement of CR, is independently assoc with longer relapse-free survival (RFS).[15]The described here is a study that correlate relationship between MRD and clinical resp and relapse by flowcytom

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MATERIAL AND METHODS:

Patients

BM and peripheral blood samples were used in all of our studies in this study from patients diagnosed with AML in DRBRAIRCH, AIIMS, New Delhi,

using a bone marrow smear or a peripheral smear from all patients and stained with J Giemsa stain.

Immunophenotyping

For flow cytometric analysis, at least 2(events were acquired at follow up (day 30

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Prognostic significance ki-67 expression in endometrial cancers: a Population-based study

August 2016

Authors:

Parul Sharma | Prof Uma Bhardwaj Srhu | R Sharma | Taiyyaba Hasan

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Abstract

In the patient with endometrial carcinoma, there is a need for improved identification of high-risk groups that may be helpful after postoperative adjuvant therapy. We therefore studied the prognostic impact of markers for cell proliferation, cell-cycle regulation, and angiogenesis among endometrial carcinoma patients in a population-based setting. Patients and methods: patients diagnosed with endometrial carcinoma between 2012-2015 in Aligarh, AMU, were studied. The median follow-up for the surviv ors was 3 years (range 1 to 4 years), with no patient lost because of insufficient follow-up information. Paraffin- embedded tumor tissue were available in 96% of the cases (n = 22), was studied immunohistochemically for expression of KI-67. The importance of this tumor markers was investigated in these patients for survival and prognosis. Results: The majority of cases was significantly associated with the tumor biomarkers. Age, International Federation of Gynecology and Obstetrics (FIGO) stage, histologic type, histologic grade, as well as Ki-67 protein expression, all significantly influenced survival. Age, FIGO stage KI-67 expression, were the only variables with independent prognostic whereas histologic type, histologic grade,and had no independent influence. A group of high-risk patients with more than one unfavorable marker was identified. Conclusion: Ki-67 protein expression showed an independent prognostic impact. Thus, information derived from routine histologic specimens identified a subgroup of high-risk endometrial carcinoma patients in this population-based study.

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Research Article

PROGNOSTIC SIGNIFICANCE KI-67 EXPRESSION IN ENDOMETRIAL CANCERS: A POPULATION-BASED STUDY

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Received: 10 June 2016/Revised: 15 June 2016/Accepted: 26 June 2016

ABSTARCT: in the patient with endometrial carcinoma, there is a need for improved identification of groups that may be helpful after postoperative adjuvant therapy. We therefore studied the prognostic i markers for cell proliferation, cell-cycle regulation, and angiogenesis among endometrial carcinoma pat population-based setting. **Patients and methods:** patients diagnosed with endometrial carcinoma betwe 2015 in Aligarh, AMU, were studied. The median follow-up for the survivors was 3 years (range 1 to 4 ye no patient lost because of insufficient follow-up information. Paraffin-embedded tumor tissue were availabl of the cases (n = 22), was studied immunohistochemically for expression of *Ki-67*. The importance of tl markers was investigated in these patients for survival and prognosis. **Results:** The majority of c significantly associated with the tumor biomarkers. Age, International Federation of Gynecology and ((FIGO) stage, histologic type, histologic grade, as well as *Ki-67* protein expression, all significantly i survival. Age, FIGO stage *Ki-67* expression, were the only variables with independent prognostic whereas l type, histologic grade, and had no independent influence. A group of high-risk patients with more unfavorable marker was identified. **Conclusion:** *Ki-67* protein expression showed an independent prognosti Thus, information derived from routine histologic specimens identified a subgroup of high-risk en carcinoma patients in this population-based study.

Keywords: Endometrial carcinoma, ER, PR, Ki-67

INTRODUCTION:

The endometrial carcinoma is the most found malignancy of the genital tract in female, with an increasing occurrence in socio-economic developed countries[1, 2]. The investigation of the immune markers that are involved in the endometrial carcinogenesis and establishing possible correlations between the studied parameters, may influence the early detection and treatment of these important lesions [3, 4]. The endometrial carcinoma is formed and develops in close relation to the plasma and tissue levels of sex steroidal hormones and their receptors.

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Also, the connection with the endometrial hyperplasia is rec associated with prolonged estrogen stim of endogenous or exogenous origin, n counterweight by progesterone [4, 5]. Ou histological parameters with pr potential, the tumor stage, the tumor gr the extent of myometrial and vascular i proved most useful in this regard purpose of this study was to anal immune-expression of Ki67 in end carcinomas, according to the histo-path parameters with prognostic value.

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ASIAN JOURNAL OF PHARMACEUTICAL AND CLINICAL RESEARCH

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Vol 10, Issue 1, 2017

Online - 2455-3891
Print - 0974-2441

Research Article

RAPID DETECTION OF MULTI DRUG RESISTANCE AMONG MULTI DRUG RESISTANT TUBERCULOSIS SUSPECTS USING LINE PROBE ASSAY

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Received: 27 July 2016, Revised and Accepted: 27 September 2016

ABSTRACT

Objective: GenoType MTBDR*plus* line probe assay (LPA) is developed for performing drug susceptibility testing (DST) for Rifampicin (RIF) and isoniazid in sputum specimens from smear-positive pulmonary tuberculosis (TB) patients and revised national TB control Programme (RNTCP) has endorsed LPA for the diagnosis of multi drug resistant TB (MDR-TB). This study was conducted to assess the potential utility of LPA for MDR-TB patient management.

Methods: MDR-TB suspects under RNTCP PMDT criteria C referred from different districts in Delhi state were included in the study January 2013 to December 2014. Sputum specimens found acid-fast bacilli positive by fluorescent microscopy were processed for LPA.

Results: Out of 3062 specimens, 2055 (67.1%) MDR-TB suspects were read as positive and specimens from 1007 (32.9%) suspects were read as negative in sputum smear microscopy. Out of 2019 specimens valid LPA results, 1427 were found to be pan-sensitive, 280 were MDR-TB, 40 were RIF monoresistant, 183 were Isoniazid (INH) monoresistant, and 89 specimens were found negative for *Mycobacterium tuberculosis*.

Conclusion: Routine use of LPA can substantially reduce the time to diagnosis of RIF and/or INH-resistant TB and can hence potentially enable earlier commencement of appropriate drug therapy and thereby facilitate prevention of further transmission of drug resistant strains.

Keywords: Multi drug resistant tuberculosis, Line probe assay, Rifampicin, Isoniazid.

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INTRODUCTION

Rapid determination of drug resistance can allow a customized approach to treatment early in the course of the disease and can potentially reduce morbidity, mortality, and infectiousness [1]. The World Health Organization and partners have proposed a Global XDR-TB response plan [2], which calls for wide-scale implementation of rapid methods to screen patients at risk of MDR-TB. Rapid tests can provide results within days and thus enable prompt and appropriate treatment, decrease morbidity and mortality and interrupt transmission.

The identification of specific mutations responsible for drug resistance has facilitated the development of novel, rapid molecular tools for drug susceptibility testing (DST). The detection of RIF resistance is traditionally used as a predictor of MDR-TB - its positive predictive value is a function of the sensitivity and specificity of RIF resistance testing and the prevalence of MDR and non-MDR RIF resistance, which is highest among previously treated cases in settings with high MDR prevalence and low non-MDR RIF resistance. Molecular tools are based on nucleic acid amplification in conjunction with electrophoresis, sequencing, or hybridization.

Reverse hybridization-based assays, referred to as line probe assays, represent a useful tool for their superior cost-effectiveness. These tests are based on the hybridization of specific probes for wild-type and mutated sequences of genes involved in drug resistance, and they show high specificity and medium/high sensitivity.

GenoType MTBDR*plus* (Hain Lifescience, Germany) enables the simultaneous molecular genetic identification of the *M. tuberculosis* complex and its resistance to Rifampicin (RIF) and isoniazid from clinical specimens or cultivated samples. The benefits of using GenoType MTBDR*plus* can detect *M. tuberculosis*-specific DNA and genetic mutations associated with drug resistance from smear-positive sputum specimens or culture isolates, after DNA extraction and PCR amplification [3]. The use of LPAs has been recommended by the WHO [4].

Revised national TB control Programme has also endorsed the LPA MTBDR*plus*, Hain Lifesciences, Germany for the diagnosis of MDR-TB. This assay is being used now as screening test across the country for all suspects of MDR-TB.

METHODS

This study was conducted at the Laboratory of New Delhi TB Centre (NDTB), New Delhi from February 2014 to December 2015.

The laboratory is certified by Central TB division, Ministry of Health and Family Welfare, Government of India for conducting liquid, solid culture and DST and LPA.

Study population

All MDR-TB suspects referred to New Delhi TB center, New Delhi during the period from January 2013 to December 2014 from 17 Chest Clinics of Delhi were included in the study.

Specimen collection

Samples from a total of three thousand and sixty two (n=3062) MDR-TB suspects were included in the study. All these cases were enrolled at different chest clinics of Delhi. Two sputum samples (spot and morning) were collected per patient in 50 ml sterile conical centrifuge tubes and were transported on same day along with duly filled request form for Culture and DST to New Delhi TB center. On receipt, these specimens were checked for spillage or leakage. Spilled or leaked specimens, as well as inadequate quantity specimens were rejected, and all others

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Article DOI: 10.21474/IJAR01/5081
DOI URL: http://dx.doi.org/10.21474/IJAR01/5081
ISSN NO. 2320-5407

RESEARCH ARTICLE

THEVETIA PERUVIANA: A MULTIPURPOSE MEDICINAL PLANT- A REVIEW.

***Tabrez Ahmad[1], Abdulhamid Tahir Hamid[2], Anuradha Sharma[1] and Uma Bhardwaj[3].**

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Manuscript Info

Manuscript History

Received: 05 June 2017
Final Accepted: 07 July 2017
Published: August 2017

Key words:-
Thevetia peruviana, Apocynaceae, Cardiac glycosides, Ethanopharmacology

Abstract

Plant based therapeutics play an important role in the public health care system of any nation. The plant *Thevetia peruviana* belongs to the family Apocynaceae. The plant have a significant place in traditional system of medicine of Central and South America and tropical Asia. A number of different classes of secondary metabolites are present in *Thevetia peruviana* including alkaloids, flavonoids, steroids, cardiac glycosides, terpenoids, tannins, saponins etc. Several researchers had identified various pharmacological activities in different parts of the plant viz. seeds, flowers, bark, fruits, leaves. This review covers detailed ethanopharmacology, toxicology and bioactivities of *Thevetia peruviana*.

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Introduction:-

Our planet is home for enormous medicinal plants. Mankind use of medicinal plants is not new rather dates back to thousands of years. In fact, ancient man was very dependent on green plants for his day-to-day needs of medicaments. When a plant is designated as medicinal, it is implied that the said plant is useful as a drug or therapeutic agent or an active ingredient of a medicinal preparation. Recently the demand for plant based therapeutics has increased steeply because of many loopholes in modern system of medicine such as various side effects and high cost. Moreover, increasing knowledge of metabolic process and the effect of plants on human physiology has enlarged the range of application of medicinal plants. The therapeutic properties of medicinal plants are attributed owing to the presence of active principles such as alkaloids, flavonoids, glycosides, terpenoids, tannins, coumarins, saponins etc.

Thevetia peruviana (pers) K Schum is a medicinal plant with wide array of pharmacological properties, but yet not received considerable scientific attention. The plant belongs to the family Apocynaceae and is commonly known as yellow oleander. The plant is native to Central and South America, especially Mexico, Brazil and West Indies but now frequently cultivated throughout the tropical including India and Srilanka as an ornamental plant.

Description of the Plant:-

Taxonomical Classification:

Kingdom	:	Plantae
Subkingdom	:	Tracheobionta
Superdivision	:	Spermatophyta

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with CD34 and CD45 as backbone markers was used for analysis. The antibody panel used is shown in Table 1. The instrument setup was done by Flow Check fluorospheres (BC, Hialeah, FL, USA) for alignment, Flow Set beads (BC, Hialeah, FL, USA) for voltage standardization, and compensation was also done. Alignment was done on a daily basis to ensure precise flow of cells through the laser beam intersection and the fluid stream so that each detector gave maximal and reproducible signals from the standard particles or cells. Electronic standardization (voltage and compensation) also ensured that results were reproducible on a daily basis. The same instrument settings were used for samples.

For data analysis, Boolean logic gating was used to identify the leukemia-associated immunophenotypes (LAIPs) at the time of diagnosis and at the time of MRD quantification in the postinduction marrow. Gating strategy includes the debris exclusion by time gate (for taking continuous sample stream) and then the SYTO 41 was used to exclude the dead cells from nucleated live cells, on which singlet gate was formed to include only single cells not doublets. These singlet cells were further used for analysis. On CD45/SS plot, at intermediate/low side scatter region, a gate was formed, followed by back gating on the CD34+ population and removal of CD19+ hematogones from analysis. These cells with different parameter were used to identify LAIP, and in the study, the percentage variation of these cells was correlated. Cleaning of the instrument is crucial step to reduce background level of noise below the threshold that would interfere the rare events. For identification of rare event accuracy and eliminating background noise, staining buffer was acquired before sample acquisition and number of events noted down, and then test sample stained with AML panel was is acquired for events that are detectable in the region of interest. This exercise should be performed periodically or any time when there is an unexpected result. It is important to acquire a saline or sheath fluid before MRD collection to ensure no carryover is there. The rare event analysis was done on the processed sample for AML MRD after 15 h to check the reduction in the percentage of the rare events noted earlier and also the change in mean fluorescence intensity [MFI] [Figure 1].

Our result is shown in Table 1, shows reduction in MFI and percent loss of cells when samples were processed within 4 hours and after 15 hours. As noted, there was a significant loss of cells and reduction in MFI with time in all plots of CD56/34, CD7/34 and CD14/34. So to conclude, we could advise the feasibility and applicability of MRD estimation by flow cytometry on the fresh sample within 4 hours of reciept as compared to the long standing diagnostic samples to ensure accurate and true results.

Financial support and sponsorship
Nil.

Conflicts of interest
There are no conflicts of interest.

Sandeep Rai, Uma Bhardwaj[1], Saroj Singh, Aroonima Misra

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Effect of processing time on analysis of rare event in minimal residual disease study

Editor,

Rare event analysis was started with the analysis of the fetal red blood cells in maternal circulation in a rare percentage.[1,2] Flow cytometry (FCM) has been used to analyze numerous rare cell populations in blood or bone marrow from circulating endothelial cells to cancer stem cells and became an important means in analysis of blood cancer.[2-7] Initially, FCM was used only for lineage deciding in leukemia; but by years, it was developed for morphological assessment of blood and bone marrow to detect minimal residual disease (MRD), with molecular analysis used in treatment decisions of pediatric B-acute lymphoblastic leukemia and more recently acute myeloid leukemia.[8-13] The FCM is helpful in the detection of small tumor population to the level of 0.01% in lymph proliferative disorders.[9,10] MRD detection has been associated with time to relapse in the acute leukemia;[8,9-11,13] there are several technical and interpretative hurdles that need to be addressed before a laboratory undertakes such an analysis. For acute myeloid leukemia (AML), there are few well-validated protocols, and this is complicated by the fact that this disease is often composed of multiple clones at presentation and can be affected by antigen modulation during treatment.[10,11] In MRD, the time of sample processing in the rare event analysis was important because cells were very less (>0.01%) so it was important to correlate the time to get maximum number of cells and also validate staining procedure and fluorochrome. A total of four AML MRD processed samples were used in the study, previously diagnosed for AML on morphology. Immunophenotyping done at Lab Oncology, Dr. BRAICH, All India Institute of Medical Sciences, New Delhi. For flow cytometric analysis, at least 200,000 were acquired at follow-up in all cases from each tube, and data were stored in list mode. The procedure was repeated after 15 h, and data were collected. For all the specimens, five-color FCM was performed on Coulter FC500 instrument (Beckman Coulter [BC], Hialeah, FL, USA). Combinations of 5 antibodies in 7 different tubes,

Table 1: Loss in percentage and mean fluorescence intensity by the time duration in analysis of rare events in minimal residual disease

Markers	Percentage, median (within 4 h)	S/N ratio	Percentage, median (after 15 h)	S/N ratio (after 15 h)	Loss of cell in percentage	Loss of MFI in percentage
CD117	0.29, 6.72	14.23	0.19 ,6.63	14.21	34.48	1.34
CD33	0.20, 8.64	10.04	0.16, 7.96	9.19	20	7.87
CD56	0.02, 7.89	6.01	0.01, 7.34	4.54	50	6.97
CD36	0.06, 3.74	10	0.03, 3.34	9.52	50	10.70
CD7	0.02, 4.83	5.89	0.01, 4.22	5.66	50	12.63
CD2	0.04, 4.30	5.43	0.02, 3.42	5.26	50	20.47
CD34	0.18, 6.62	37.35	0.10, 6.35	25.46	44.44	4.08
CD64	0.08, 4.72	15.23	0.04, 3.78	9.22	50	19.92

After 15 hours, significant loss in the rare events was observed. S/N ratio: Signal-to-noise ratio; MFI: Mean fluorescence intensity

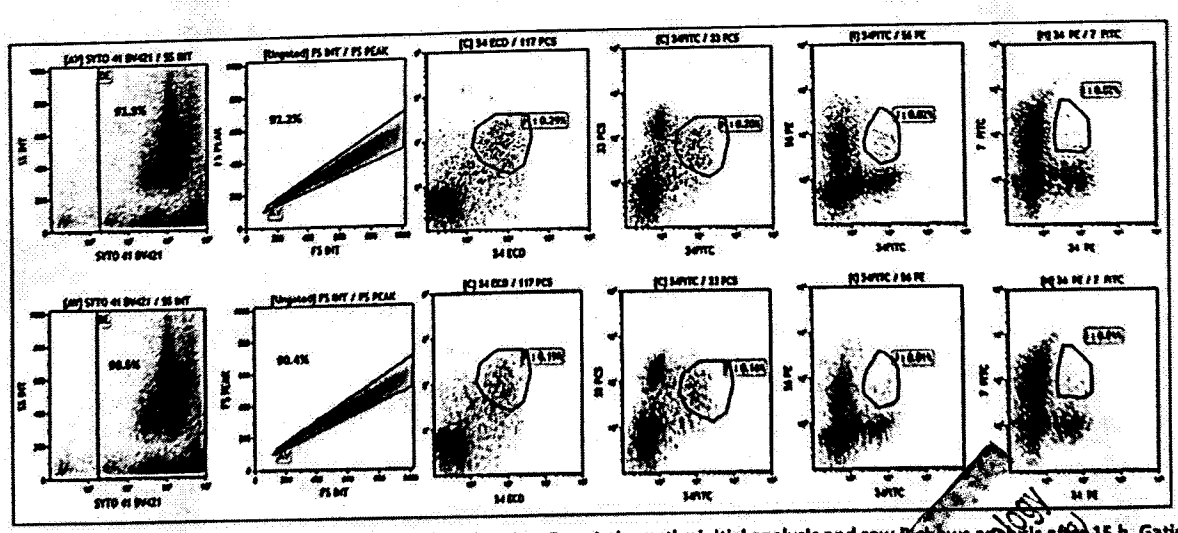

Figure 1: The difference in the events with effect of time duration. Row A shows the initial analysis and row B shows analysis after 15 h. Gating strategy includes exclusion of dead cells and doublets by SYTO 41 and singlet gate

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Conflicts of interest
There are no conflicts of interest.

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28/12/2017
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DOI: 10.1111/ijlh.12809

ISSN 1751-5521 (P) 1751-553X (E)

LETTER TO THE EDITOR

WILEY ISLH International Journal of Laboratory Hematology

Comparison between photostability of Alexa Fluor 448 and Alexa Fluor 647 with conventional dyes FITC and APC by flow cytometry

Sir,

Flow cytometry involves conjugation of an antibody to a fluorochrome and analysis of its expression. The intensity and quality of fluorescence depend on a large number of factors namely antigen density, fluorolabeling techniques, instrument properties, and also on the type of fluorochrome. With the new age of synthetic dyes, better and brighter fluorochromes are constantly added to the existing palette so making the photostaining much simpler. Recent studies have shown that synthetic dyes are brighter and more photostable than the conventional dyes.[1-6] Mahmoudian J et al[7] used mouse anti-human nestin monoclonal antibody conjugated to Alexa Fluor 568 and fluorescein isothiocyanate (FITC) dyes and evaluated their photobleaching and photostability profiles by immunohistochemistry and demonstrated that Alexa Fluor dye had brighter fluorescence and more photostability than its counterpart FITC. We intended to explore the photostability as well as the intensity and resolution of expression of antigens using the conventional dyes and compare these parameters with those of newer synthetic dyes for their prospective use in clinical flow cytometric service.

Peripheral blood was collected in EDTA from healthy subjects (n = 10), and 5 sets of each of the 10 samples were prepared. All the sets were immediately processed by the standard stain-lyse-wash method, and 0.5×10^6 cells were labeled with CD45-conjugated Alexa Fluor 488 (AF488), Alexa Fluor 647 (AF647), FITC, and allophycocyanin (APC) (Beckman Coulter, USA) as per manufacturer's recommendations. Briefly, the samples were incubated for 20 minutes at room temperature in dark followed by lysis with ammonium chloride-based solution and washed twice with phosphate-buffered saline. The cells were finally suspended in 0.5% paraformaldehyde solution. The acquisition and analysis of data were performed on Gallios flow cytometer (10 colors, 4 lasers, Beckman Coulter (BC), Hialeah, FL, USA). For instrument setup, Flow Check fluorospheres (BC, Hialeah, FL, USA) were used for alignment and Flow Set beads (BC, Hialeah, FL, USA) for the voltage setting. One of 5 sets of all samples was run immediately after staining, and analysis was performed using Kaluza software (BC, Hialeah, FL, USA). This reading was taken as reference reading for comparison of loss in mean fluorescent intensity (MFI) and signal-to-noise ratio (SNR) in subsequent runs. The remaining 4 sets of samples were exposed to photo source helium lamp with 36 watts fluorescent light, and 20 000 events were acquired on flow cytometer at 1 hour, 4 hours, 15 hours, and at 24 hours, respectively. The MFI and SNR for CD45 were checked on the gated population of normal lymphocytes. The changes, that is, the % fall in the MFI and % fall in the SNR with respect to different fluorochromes and time, were compared using Friedman's multiple comparison test using $CD45^+$ normal lymphocytes at 0-hour time point as reference.

The photostability of FITC and AF488, APC, and AF647 was analyzed at different time points and is shown in Table 1. The % loss in MFI with respect to 0-hour time point ranged from 8.19% to 63.64% and 1.19% to 33.05% in FITC and AF488, and this difference was statistically significant ($P = .0006$). Similarly, the % loss in MFI ranged from 37.14% to 71.97% for APC and 17.29% to 54.85% for AF647, respectively, over a period of 24 hours and was statistically significant ($P \leq .0001$; Table 1). The % fall in SNR with respect to 0-hour time point ranged from 5.54 to 68.6 for FITC and 4.15 to 38.74 for AF488, and this difference was statistically significant ($P \leq .0001$). Similarly, the % fall in SNR ranged from 21.94 to 62.62 for APC and 21.64 to 47.40 for AF647, respectively, over a period of 24 hours and was statistically significant ($P \leq .0001$; Table 1). Thus, AF488- and AF647-conjugated antibodies had better photostability in terms of lower % fall in MFI at all the four time points; wherein, although the MFI gradually decreased with time, the fall was more pronounced in FITC and APC resulting in higher % fall in MFI (Figure 1). In addition, AF488- and AF647-conjugated antibodies were demonstrated to exhibit better resolution in terms of higher SNR at all the time points evaluated in this study where the background signals were constant but signal intensity decreased with time more in FITC and APC resulting in lower SNR (Figure 1).

We have demonstrated that the synthetic dyes namely AF488- and AF647-conjugated antibodies had better resolution and photostability than APC- and FITC-labeled antibodies. Thus, the samples labeled with antibodies tagged to synthetic dyes can withstand some time delay and accidental exposure to light prior to acquisition on a flow cytometer. Alternatively, these antibodies tagged to synthetic dyes with better photostability and resolution offer better logistic solutions to transportation, storage, and reporting in high throughput laboratories.

CONFLICT OF INTEREST

None.

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TABLE 1 Comparison of percentage fall in mean fluorescent intensity (MFI) and signal-to-noise ratio (SNR) over time in different fluorochromes, that is, FITC vs AF488 and APC vs AF647

	0h		2h			4h			6h			24h			P value: 2h Fall MFI/2h Fall SNR
	MFI	SNR	MFI	2h Fall MFI	2h Fall SNR	MFI	4h Fall MFI	4h Fall SNR	MFI	6h Fall MFI	6h Fall SNR	MFI	24h Fall MFI	24h Fall SNR	
FITC	36.49	56.73	33.50	8.19	53.59	5.54	29.01	20.51	54.23	4.40	20.27	44.44	57.93	40.45	.0006/<.0001
AF488	38.72	79.84	38.26	1.19	76.53	4.15	33.29	14.03	70.91	11.19	29.30	24.33	49.03	61.15	
APC	139.89	83.05	87.94	37.14	64.83	21.94	72.17	46.41	57.83	30.36	58.85	57.93	51.30	40.45	<.0001/<.0001
AF647	232.62	96.62	192.39	17.29	75.71	21.64	158.54	31.85	65.57	32.14	118.57	49.03	36.72	61.15	

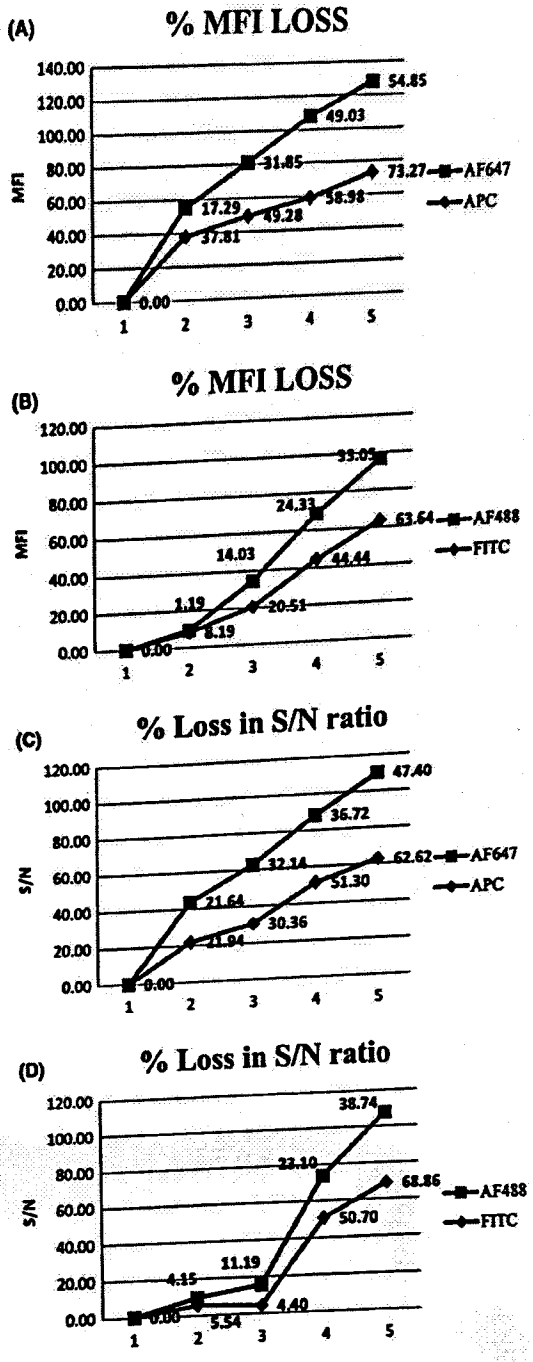

FIGURE 1 Comparative analysis of percentage fall in mean fluorescent intensity (MFI; A & B) and signal-to-noise ratio (SNR; C & D) over time in FITC vs AF488 and APC vs AF647, respectively [Colour figure can be viewed at wileyonlinelibrary.com]

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17/12/2021 ANTIBACTERIAL ACTIVITY AND HPLC ANALYSIS OF THEVETIA PERUVIANA LEAF EXTRACTS

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ANTIBACTERIAL ACTIVITY AND HPLC ANALYSIS OF THEVETIA PERUVIANA LEAF EXTRACTS

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Ahmad and Bhardwaj, IJP, 2018; Vol. 5(1): 69-73. E- ISSN: 2348-3962, P-ISSN: 2394-5583

IJP (2018), Vol. 5, Issue 1 (Research Article)

IJP International Journal of Pharmacognosy

Received on 22 May 2017; received in revised form, 23 July 2017; accepted, 27 August 2017; published 01 January 2018

ANTIBACTERIAL ACTIVITY AND HPLC ANALYSIS OF *THEVETIA PERUVIANA* LEAF EXTRACTS

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Keywords:

Thevetia peruviana, Antimicrobial activity, HPLC analysis, Phytosterols

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ABSTRACT: *Thevetia Peruviana* (or *Cascabela thevetia*) belongs to the family Apocynaceae and commonly called as Yellow Oleander. The leaves of this significant medicinal plant were subjected to antibacterial investigation and HPLC analysis. Hexane, acetone, and methanol were used as organic solvents. Four different concentrations (200 mg/ml, 100 mg/ml, 50 mg/ml and 25 mg/ml) of each extract *i.e.* hexane, acetone and methanol were prepared for antibacterial activity by dissolving them in 100% DMSO. The leaf extracts were subjected to test the antibacterial activity by agar well diffusion method. The methanol extract of leaves showed significant antibacterial activity against *Pseudomonas aeruginosa* and poor activity against *Micrococcus luteus* and *Shigella flexneri*. Acetone extract showed moderate activity against the tested micro-organisms *viz. Pseudomonas aeruginosa, Micrococcus luteus* and *Shigella flexneri*. Hexane extract showed moderate activity against *Micrococcus luteus* and poor activity against *Pseudomonas aeruginosa* and *Shigella flexneri* at different concentrations. HPLC analysis of methanol leaves extract was performed which showed that plant leaf contains different types of phytosterols. *Thevetia peruviana* leaves a promising possibility of developing a new drug of pharmaceutical interest.

INTRODUCTION: The use of medicinal plants as a source of relief from illness can be traced back over five millennia to written documents of the early civilization in China, India and the Near East. The potential of higher plants as a source for new drugs is still largely unexplored. Among the estimated 250,000 - 500,000 plant species, only a small percentage has been investigated phytochemically, and the fraction submitted to biological or pharmacological screening is even smaller. Historically pharmacological screening of compounds of natural or synthetic origin has been a source of innumerable therapeutic agents. Random screening as a tool in discovering new biologically active molecules has been most productive in the area of antibiotics. Plant-based antimicrobials represent a vast untapped source for medicines. They are effective in the treatment of infectious diseases while simultaneously mitigating some of the side effects of synthetic antimicrobials. They may act as lead compounds for the pharmaceutical industry or as the base for the development of new antimicrobials.

Thevetia peruviana (yellow oleander) belongs to the family Apocynaceae and is an evergreen Indian tropical shrub that bears orange-yellow flowers.

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Article

Investigation of Precise Molecular Mechanistic Action of Tobacco-Associated Carcinogen 'NNK' Induced Carcinogenesis: A System Biology Approach

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Received: 14 June 2019; Accepted: 24 July 2019; Published: 26 July 2019

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Abstract: Cancer is the second deadliest disease listed by the WHO. One of the major causes of cancer disease is tobacco and consumption possibly due to its main component, 4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone (NNK). A plethora of studies have been conducted in the past aiming to decipher the association of NNK with other diseases. However, it is strongly linked with cancer development. Despite these studies, a clear molecular mechanism and the impact of NNK on various system-level networks is not known. In the present study, system biology tools were employed to understand the key regulatory mechanisms and the perturbations that will happen in the cellular processes due to NNK. To investigate the system level influence of the carcinogen, NNK rewired protein–protein interaction network (PPIN) was generated from 544 reported proteins drawn out from 1317 articles retrieved from PubMed. The noise was removed from PPIN by the method of modulation. Gene ontology (GO) enrichment was performed on the seed proteins extracted from various modules to find the most affected pathways by the genes/proteins. For the modulation, Molecular COmplex DEtection (MCODE) was used to generate 19 modules containing 115 seed proteins. Further, scrutiny of the targeted biomolecules was done by the graph theory and molecular docking. GO enrichment analysis revealed that mostly cell cycle regulatory proteins were affected by NNK.

Keywords: NNK; cancer; systems biology; protein-protein interaction network; topological analysis; gene ontology

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Topological and system-level protein interaction network (PIN) analyses to deduce molecular mechanism of curcumin

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Curcumin is an important bioactive component of turmeric and also one of the important natural products, which has been investigated extensively. The precise mode of action of curcumin and its impact on system level protein networks are still not well studied. To identify the curcumin governed regulatory action on protein interaction network (PIN), an interectome was created based on 788 key proteins, extracted from PubMed literatures, and constructed by using STRING and Cytoscape programs. The PIN rewired by curcumin was a scale-free, extremely linked biological system. MCODE plug-in was used for sub-modulization analysis, wherein we identified 25 modules; ClueGo plug-in was used for the pathway's enrichment analysis, wherein 37 enriched signalling pathways were obtained. Most of them were associated with human diseases groups, particularly carcinogenesis, inflammation, and infectious diseases. Finally, the analysis of topological characteristic like bottleneck, degree, GO term/pathways analysis, bio-kinetics simulation, molecular docking, and dynamics studies were performed for the selection of key regulatory proteins of curcumin-rewired PIN. The current findings deduce a precise molecular mechanism that curcumin might exert in the system. This comprehensive in-silico study will help to understand how curcumin induces its anti-cancerous, anti-inflammatory, and anti-microbial effects in the human body.

Naturally derived compounds possess enormous potential for medicinal and therapeutic actions for the management of diseases and curcumin is one of the most suitable examples among them. Curcumin is a yellowish-orange polyphenolic compound of turmeric/haldi (*Curcuma longa*), a herb often found in curry powder. The reason for the selection of curcumin for this study is, it is one of the important and thoroughly investigated naturally occurring bioactive compound, but its precise mode of action is still unclear. The global curcumin market was valued at $58.4 million in 2019 and is projected to reach $104.19 million by 2025. (https://www.alliedmarketresearch.com/press-release/curcumin-market.html & https://www.grandviewresearch.com/industry-analysis/turmeric-extract-curcumin-market). Earlier studies clearly exhibit the highly pleiotropic actions of curcumin as anti-cancerous[1,2], anti-inflammatory[2,3], anti-microbial[4], anti-oxidant[5], cardio-protective[6], radio-protective[7] and many more that makes it an ideal ingredient in different medical and food applications. Curcumin's market is expected to witness a huge development due to growth in consumer awareness regarding its therapeutic properties, and that's why an intense scientific study are urgently needed to explore the precise mechanistic action of curcumin. Many research studies have been published in the past dealing with the mode of action of curcumin yet inconclusive, and still the puzzle remains unsolved. This pleiotropic potential of curcumin can be endorsed to its capability to interact with a huge interactome of biomolecular targets of cellular system that participate

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Chemosphere 284 (2021) 131273

Contents lists available at ScienceDirect

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Synergistic role of bacterial consortium to biodegrade toxic dyes containing wastewater and its simultaneous reuse as an added value

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ARTICLE INFO

Handling Editor: Eldon R Rene

Keywords:
Bioremediation
Biodegradation
Bacterial mix consortium
Toxicity
Azo dyes
Sorghum bicolor

ABSTRACT

The current environmental research has fascinated the sustainable exploitation of mix bacterial consortium to biodegrade the environmentally-related toxic compounds, including hazardous synthetic dyes. Based on the existing literature evidence, textile and other industrial waste effluents pollute the natural water bodies. Textile effluent contains synthetic dyes which are liberated in the environment without proper treatment. The presence of toxic dyes added to the textile effluents undoubtedly affects the flora and fauna as that untreated water is used for irrigation by local farmers. Many conventional and biological methods are in action for the treatment of wastewater. Physical and chemical processes are expensive as compared to microbial treatments. The use of microbial consortia generates efficient results. Wastewater is a valuable resource, however, up to 80% of wastewater is released to different water matrices. This discernment needs to change for a better tomorrow. In this context, herein, we present a robust microbial-assisted treatment and simultaneously reuse of the treated wastewater as an added value to induce plant growth. Thus, the microbial approach for textile waste treatment release by-product after degradation should be non-toxic for the environment. In the present study, the toxicity of synthetic textile dye named Reactive Red 120, Reactive Orange 122, Reactive Yellow 160, and Reactive Blue 19 was investigated using a bioassay method with plant species namely *Sorghum bicolor*. Plate and Pot experiment was conducted with respect to untreated Azo dyes, degraded metabolites obtained from single bacteria, and consortium. Efficient Seed germination (89%), shoot length (12.4 cm), root length (15.6 cm) of the plants were observed for bacterial consortium degraded metabolites exposed seeds after comparing with the control. The degraded metabolite also increases protein (45.56 mg/g) and sugar (3.15 mg/g) contents. Bioremediation of various textile industrial effluents saves the ecosystem from the harmful effects of hazardous dyes. The biological decolorization of the textile azo dyes was investigated under co-metabolic conditions. The degraded metabolites can be used to enhance crop productivity and for commercial application. This mandates the current and future research to develop economically feasible and environmentally sustainable wastewater treatment practices.

1. Introduction

Globally, the decline of water quality has become a serious concern. The rise in population has increased the demand for basic needs (food, water, and clothes), which rapidly increase industrialization (Mishra and Maiti, 2019). As industrialization increase, the significant usage of synthetic Azo dye increased (Pokharia and Ahluwalia, 2015). When applied to any surface, substances of dye adhere with substrate either by the covalent bond formation, salts complexion, mechanical retention, or adsorption. Dyes are used in the tanning and leather industry, food industry, paper industry, textile industry, photo-electrochemical cells, hair coloring, and cosmetics. Hazardous components present in dyes remain challenging to be degraded effectively (Fernandes et al., 2020; Kishor et al., 2021). Therefore, their presence indicates toxicity in water and causes serious health concerns. The textile industry is one of the major sectors for using synthetic dyes and consumes large volumes of water (Pandey et al., 2007; Dhanve et al., 2008; Khan and Joshi, 2020). Unfortunately, water bodies are used as sinks for wastewater from domestic and textile industries release significant quantities of hazardous effluents, which cause substantial threats to the environment, and the

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https://doi.org/10.1016/j.chemosphere.2021.131273
Received 14 December 2020; Received in revised form 9 June 2021; Accepted 15 June 2021
Available online 28 June 2021
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IJPSR (2022), Volume 13, Issue 4 (Review Article)

INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES AND RESEARCH

Received on 26 May 2021; received in revised form, 27 August 2021; accepted, 29 August 2021; published 01 April 2022

TOWARDS FURTHER UNDERSTANDING THE MECHANISM OF BIOSORPTION THROUGH VARIOUS BIOSORBENTS

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Keywords:

Heavy metals, Biosorption, Herbal plants, Bio sorbent, sorbate

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ABSTRACT: Biosorption is a cure to atmosphere containing heavy metals and also an alternative to physical and chemical methods used for heavy metal removal. The main aim of this review is to highlight the various mechanisms of biosorption by using various biosorbent *viz.* microorganisms, no-living biomass, herbal plants for the removal of heavy metals. Industrialization, globalization has provided an ease to humans, but every comfort has its own disadvantages, in this case, it will increase heavy metal pollution which threatens the life of human, animals, and plants. Bio sorption used bio sorbent to remove heavy metal or sorbate and is economical. Nowadays, the natural biological material is used to remove heavy metals like vegetable waste and fruit peels. Herbal medicinal plants are also used to remove heavy metals.

INTRODUCTION: Rapid modernization, industrialization, and urbanization are the main roots due to which heavy metal pollution is on its peak. There is a huge growth in human potentials with the development in science and technology because heavy metals pollution increases, which threatens humans, animals, plants, and aquatic life. Heavy metal pollution disturbs our ecosystem's balance, affects our normal lifestyles, and gives rise to human illnesses. Heavy metals are important in various industries and in many technologies also, but pollution due to them is one of the major concerns because heavy metals are non-degradable and get accumulated in nature [1, 2]. Some heavy metals are required in little amount by plants and living organisms like copper, zinc but in spite of that their excessive level in body is dangerous due to their toxic and accumulative nature [3]. Various physical and chemical methods like ion exchange, ultrafiltration, and chemical precipitationetcare used to remove heavy metals to neutralize its adverse effects from the environment, but these methods do not provide the best results and are very costly. Inevitably these are replaced with biological methods like biosorption and bioaccumulation, which are productive in heavy metal removal from the contaminated environment.

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DOI: 10.13040/IJPSR.0975-8232.13(4).1000-15

This article can be accessed online on www.ijpsr.com

DOI link: http://dx.doi.org/10.13040/IJPSR.0975-8232.13(4).1000-15

In these methods, the biological material is used, which adsorb the heavy metal ions on their surface. Bioaccumulation occurs with living cells and is an active process, while biosorption occurs with dead biomass and is a passive process [4]. This review focuses on the aptitude of different biological

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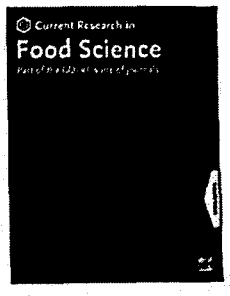

2-(phenyl)-4H-chromen-4-ones: Green synthesis, characterization, in vitro antifungal evaluation and molecular docking approach toward *Aspergillus fumigatus*

Ahanthem Priyanca Devi, Naveen Dhingra, Uma Bhardwaj, R.S. Chundawat, Chetan K. Joshi, Shivendra Singh, Keshav Lalit Ameta

PII: S2666-0865(21)00181-8

DOI: https://doi.org/10.1016/j.crgsc.2021.100234

Reference: CRGSC 100234

To appear in: *Current Research in Green and Sustainable Chemistry*

Received Date: 9 October 2021

Revised Date: 15 November 2021

Accepted Date: 4 December 2021

Please cite this article as: A.P. Devi, N. Dhingra, U. Bhardwaj, R.S. Chundawat, C.K. Joshi, S. Singh, K.L. Ameta, 2-(phenyl)-4H-chromen-4-ones: Green synthesis, characterization, in vitro antifungal evaluation and molecular docking approach toward *Aspergillus fumigatus*, *Current Research in Green and Sustainable Chemistry* (2022), doi: https://doi.org/10.1016/j.crgsc.2021.100234.

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28/12/2021

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TO EXPLORE THE FACTORS THAT GOVERN THE CLOTHING CHOICE OF WORKING AND NON-WORKING INDIAN WOMEN

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Abstract

The objective of this paper is to identify the changing perception and comparison of buying behaviour related to clothing for working and non-working Indian women .To achieve the objectives of the study total 100 women respondents have been selected .A well-structured questionnaire has been drafted to get the information regarding the factors affecting clothing buying behaviour of Indian women .The study reveals that women are price, quality and brand conscious and highly influenced by the others in shopping.

Introduction

The working women segment has significantly influenced the modern marketing concept. The objective of this paper is to identify the changing perception and comparison of buying behaviour of clothing for working and non-working women in India.

Now-a-days women are not only playing role of hardcore 'housewives', they are also playing a different role of 'chief purchasing officer' & controlling 85% of buying decisions. In today's world, they are working as multi-tasker by playing a role of house maker as well as professional women with their hard work.

It suggests that their multiple roles influence their own and of their family members' buying behaviour. The study also reveals that working women are price, quality and brand conscious and highly influenced by the others in shopping.

Over the years, Indian economy is undergoing through certain changes. Competition has ushered in an altogether new marketing environment in the country. Marketing has become a necessity for survival of business firms. Price, competitiveness, quality assurance and customer service has become vital components of marketing and most business firms are realizing that if they do not have competitive strength, they cannot survive. A business cannot succeed by supplying products and services that are not properly designed to serve the needs of the customers .The term consumer behaviour refers to the behaviour that consumers display in searching for, purchasing, using evaluating and disposing of products and services that they expect will satisfy their needs. The consumer preference change rapidly and are affected by multiplicity of factors at a given point of time which are difficult to analyze. To understand the consumer behaviour into consumer motivations, believes, attitudes, learning's, perceptions, emotions and opinion is essential. Demographic variables such as age, occupation and annual income does play an important factor responsible for shopping decision .Woman's role as the family purchasing agent, however, seems to be changing, due primarily to the large increase in the number of working women in recent decades. Therefore, working women has developed as an important segment for the marketers.

28/12/2021

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Indian Journal of Natural Sciences www.tnsroindia.org.in ©IJONS

Vol.12 / Issue 69 / December / 2021 *International Bimonthly (Print)* *ISSN: 0976 – 0997*

RESEARCH ARTICLE

To Study of the Different Influences of Color on Aspects of Human Behavior

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Received: 03 Aug 2021 Revised: 25 Sep 2021 Accepted: 29 Oct 2021

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ABSTRACT

The meaning of color varies depending on one's culture, race, gender and even age .So, it isn't just the selection of color in general but also which color to use with your target customers. For instance ,white is often associated with wedding in north America and evokes the feeling of innocence in eastern cultures, white also signifies death .An exporter of white wedding gown to china would go broke in no time .It seems hard to believe that colors can have an impact on our body and mind .However ,scientists know colors can influence our body's physiology and mental states .The science of color has been used by market researchers to determine how to apply this knowledge to influence human businesses ,psychology and health .The power of color stimulate our nerves system and evokes emotional states. The color of over environment travels through our eyes to our brain causing various hormonal releases. Artists and interior designers have long understood how colors can dramatically affect moods, feelings and emotions. It is a powerful communication tool and can be used to signal action, influence mood and cause physiological reactions. Certain colors can raise blood pressure, increase metabolism or cause eyestrain .Of course, your feeling about colors can also be deeply personal and are often rooted in your own experience or culture .Color is such a powerful force in our lives, our bodies and minds.

While perception of color are somewhat subjective ,these are some color effects that have universal meaning .Colors in the red area of the color spectrum are known as warm colors and include red ,Orange ,yellow .These color evoke emotions ranging from feelings of warmth and comfort to feelings of anger and hostility .Color on the blue side of the spectrum are known as cool colors and include blue ,purple and green. These colors are often described as calm, but can also call to mind feelings of sadness or indifference. The reason behind it is that the awareness of the consumer regarding this subject is less than the affect of astrological symbols or color choice on human behavior. The above facts depict the specialties of every color along with color choice. The textile designer, fashion designer, and architect

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29/12/2021

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Indian Journal of Natural Sciences www.tnsroindia.org.in ©IJONS

Vol.12 / Issue 69 / December / 2021 *International Bimonthly (Print)* *ISSN: 0976 – 0997*

RESEARCH ARTICLE

A Study on Effect of Modern Day to Day Technology on Human Lifestyle

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Received: 25 Aug 2021 Revised: 20 Sep 2021 Accepted: 13 Oct 2021

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ABSTRACT

Modern living impacts us in many ways, destroying of moral values, Health aspects, physical, mental, moral developments, environment and cultural values and also restructuring business, thinking process with life style. In my views, people are becoming more Technologically advanced but some disadvantages that are because of ,pollution is increasing adversely, global warming, people are suffering from a lots of diseases, especially are respiratory diseases, heart diseases, skin diseases or cancer etc. There is Increase high-level of stresses in daily life living. Mobile phone cause harm to human brain activity. Researchers found that human brain is sensitive to the magnetic field of the phones antenna. They found that the brain activity was affected after the use of mobile phone. And although there are clear and calculated implications that this may have for health, study shows definitively that exposure to electromagnetic radiation emitted by mobile phones have direct and measurable effect on the brain. So from this study we can come to a conclusion that, modern living, modernisation , westnigation, and high technological development has made the people of our country unhealthy, weak destroying of moral values and disease prone. In this study try to highlights the recent facts with research analysis of the technology on human health and life, also try to present mental or physical health aspects.

Keywords: Modernisation Bisophenol A (BPA), Radiation, Abnormalities, Heart Disease and Materialistic.

INTRODUCTION

Modern living and technologies influence us in many ways; these are both advantages and disadvantages. Advantages are modern life ,people are becoming more technologically advanced and they can come to know about many things which they didn't know before advancement some disadvantages are there because of pollution ,global warming, people are suffering from a lot of diseases such as –heart disease, high cholesterol, brain cancer ,asthma,

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28/12/2021

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Current Research in Green and Sustainable Chemistry 5 (2022) 100234

Contents lists available at ScienceDirect

Current Research in Green and Sustainable Chemistry

journal homepage: www.elsevier.com/journals/current-research-in-green-and-sustainable-chemistry/2666-0865

2-(phenyl)-4H-chromen-4-ones: Green synthesis, characterization, in vitro antifungal evaluation and molecular docking approach toward *Aspergillus fumigatus*

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ARTICLE INFO

Keywords:
Chalcones
2-(phenyl)-4H-chromen-4-ones
Antifungal activity
Molecular docking
Chitinase

ABSTRACT

An effective and greener method for the synthesis of 2-(phenyl)-4H-chromen-4-ones has been developed by reacting 2-hydroxychalcones and *tert*-butyl hydroperoxide (TBHP) in the presence of a base via ultrasonic irradiation. Ultrasonic irradiation is used to replace conventional energy sources in synthesis. In terms of energy conservation and waste reduction, ultrasonic irradiations are increasingly being used as eco-friendly, green, and clean solutions in organic processes. Antifungal activity of all the synthesized compounds was evaluated against three fungi strains. Compound **4d** showed the highest activity against *A. fumigatus*, *R. stolonifer* and *M. mucedo* with the values of 20 ± 0.47 mm, 19 ± 0.46 mm and 22 ± 0.49 mm respectively. Compound **4d** also showed highest moldock score and formed H-bond with active amino acids. Compounds bearing lipophilic electron withdrawing groups showed more potent activity compared to compounds having electron donating groups.

1. Introduction

2-(phenyl)-4H-chromen-4-one, which is commonly known as flavones belong to the class flavonoids and are widely spread in plant kingdom. Flavones are different from other flavonoids due to the presence of double bond between C_2 and C_3 in their skeleton and also there is no substituents present at C_3 position (Fig. 1) [1].

Some of the flavones are usually found in fruits and vegetables such as apigenin, tangeritin, luteolin and chrysin (Fig. 2). Flavones display an incredible variety in their pharmacological activities because of their extraordinary capacity to balance different enzyme frameworks. Flavones execute numerous bacterial stains, restrain significant viral compounds like reverse transcriptase and protease and annihilate a few pathogenic protozoans. The flavonoid compounds show wide range of natural and physiological activities [2,3]. The most encouraging activities are anticancer [4], anti-TB [5], antibacterial [6], anti-inflammatory [7], antimalarial [8], HIV inhibitory [9]. Flavonoids play an important role in colouration of flowers and are considered as natural sources of pigments and dyes [10].

Chalcone is an aromatic ketone found in plants abundantly. Chalcones are used as a precursor for the synthesis of many heterocyclic compounds. Chalcones contribute the central moiety of various important medicinal compounds [11]. Both naturally occurring and synthetic chalcones have shown wide range of pharmacological activities with clinical potentials against many diseases [12].

Continuous developments in organic transformations and synthesis have contributed incalculably to chemical preparation efficiency by employing cost-effective synthetic synthons and catalysts throughout the last two centuries, enhancing certain aspects of greenness. In order to achieve sustainability, many fields of chemistry require different greener approaches. Green chemistry has encouraged the development of cleaner measures as alternatives to standard synthetic processes and transformations, such as the atom economy and the E-factor [13]. In organic synthesis, ultrasonic irradiation is utilized to replace for the conventional energy assets. Ultrasonic irradiations are progressively utilized as eco-friendly, green and clean strategies in organic reactions in respect of energy preservation and waste reduction [14]. Ultrasonic activation found on cavitation impacts prompting mass exchange improvement, is extensively utilized these days to assist organic synthesis [15]. The procedure is utilized broadly in materials science, for instance, it has been

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https://doi.org/10.1016/j.crgsc.2021.100234
Received 9 October 2021; Received in revised form 15 November 2021; Accepted 4 December 2021
Available online 13 December 2021
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