



Pune District Education Association's  
**Annasaheb Magar Mahavidyalaya**  
**Hadapsar, Pune- 411028**

Affiliated to Savitribai Phule Pune University, Pune



## Self Study Report: 2024 (4<sup>th</sup> Cycle)



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# **Research Paper**

## **A.Y-2023**

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**Author Name: Dr. Ghorpade N. L.**

**1. Title of Paper: Role of Transformational Leadership on Innovation in Higher Education: A Review of Literature**



**SHODHASAMHITA**  
**शोधसंहिता**

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UGC CARE Group I

**ROLE OF TRANSFORMATIONAL LEADERSHIP ON INNOVATION IN HIGHER EDUCATION: A REVIEW OF LITERATURE**

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**Abstract:**

The need for Transformational Leadership and innovation is increasing in Higher Education with the implementation of the National Education Policy 2020, where educational institutions' emphasis should be on outcome-based education, innovative curriculum and pedagogy with learner and industry engagement, research and development, employability and entrepreneurship with continuous evaluation for the learning outcomes. The researcher through the existing literature tries to find out whether Transformational Leadership has a significant role in innovation in the Higher Education Sector. The existing literature shows that there is a significant relationship between Transformational Leadership and innovation. Transformational leaders promote creative ideas and effectively use idealized influence, inspirational motivation, intellectual stimulation, and individual consideration which are critical for organizational innovation. The researcher also observed that the development and execution of innovation in higher education has a bearing on all the system elements such as components, relationships, and functions. This study is limited to secondary data from the Review of existing Literature.

**Keywords:** Transformational Leadership, Innovation, Higher Education

**Introduction:**

Every organization has to innovate to survive and grow in the competitive world and so also educational institutions. Social and industrial revolutions have forced the education system to revolutionize itself to get ready for the changes with new skill sets and a great sense of responsibility. It starts from the curriculum design with emphasis on research and innovation, innovative pedagogy, assessment tools, learner engagement, and industry-academia linkage which bring out the best in the teacher and the learner, and enhance their employability and entrepreneurship skills. The success of innovation demands Transformational Leadership right from the management, and heads of the institutions to teachers.

**Statement of the Problem:**

India needs Transformational Leadership in higher education to promote innovation and thereby become Atma Nirbhar, improve and sustain its global ranking. The entire process of innovation in the education system needs intellectual stimulation which is one of the four key components of Transformational Leadership. Transformative leaders in education with their idealized influence and individual focus can motivate their followers to explore new ideas, and new opportunities and thereby create more and more entrepreneurs. Therefore, the researcher felt the need for studying the 'Role of Transformational Leadership on Innovation in Higher Education'.

**Objectives of the Study:**

- To understand the relationship between Transformational Leadership in organizations
- To identify the relationship between Transformational Leadership and innovation

**Name of the Author: Dr. Kulkarni S. S.**

**2 Title of Paper: Studies of Soil and Water Quality Parameter in Relation to Agricultural Practices and Cropping Pattern in Chambali River Basin in Purandar Tehsil, Maharashtra**

**Studies of Soil and Water Quality Parameter in Relation to Agricultural Practices and Cropping Pattern in Chambali River Basin in Purandar Tehsil, Maharashtra**

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**Abstract:**

The majority of the country's population depends on agriculture for their livelihood. Agriculture is the source of food and it is source for raw material for industry. Although agriculture is major contributor in Indian economy still it faces many challenges. Dependency on rainfall, land ownership, fragmentation of holding, land tenure, labours, manures, fertilizers and biocides, meagre irrigation facilities, lack of mechanisation, agricultural marketing, transport facilities, decreasing production are the challenges faced by Indian agriculture. In which agriculture production mainly affects due to agricultural practices and cropping pattern. To know the agricultural system in the area Soil and water samples from Chambali river basin in Purandar are collected. With the help of questionnaire and interviews information about the farming practices in the area is collected.

**Keywords:** Agricultural Practices, Cropping Pattern, Soil Samples, Water Samples

**Introduction:**

India is known for its agricultural economy and it plays a crucial role in Indian economy which provides employment opportunities to rural agricultural and non-agricultural labourers. The majority of the country's population depends on agriculture for their livelihood.

The Indian Economy holds the sixth position in the world's top economies. Agriculture has major contribution to the country's GDP. It provides employment and it is largest employee sector. Agriculture is the source of food and it is source for raw material for industry. Agro-products such as tea, coffee, sugar, cashew nuts, spices, etc., which are edible and textile products such as jute, cotton, and others contribute 50% and 20% respectively to the total export of the total country. Agriculture is the most significant source of income for the central and state governments. it is clear that agricultural growth is a necessary precondition for sectoral diversity and economic development.

Although agriculture is major contributor in Indian economy still it faces many challenges. Dependency on rainfall, land ownership, fragmentation of holding, land



Author Name: Prof. Dr. Auti S. S.

### 3 Title of Paper: Issues & Possibilities in Marketing of Agricultural Commodities

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#### ISSUES AND POSSIBILITIES IN MARKETING OF AGRICULTURAL COMMODITIES

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#### Abstract

The study discusses the challenges and opportunities of rural marketing in India. The rural market in the Indian economy is divided into two basic divisions. Rural markets have grown in importance in recent years, as economic expansion has resulted in a significant increase in rural people's purchasing power, and rural people's preferences are changing. As a result, every marketing player wants to invest in rural areas. Though there are enormous potential and large growth opportunities in rural markets, there are several issues that have created barriers to accessing rural markets. This study advances the exploration of numerous rural marketing strategies as well as the existing rural marketing ecosystem, highlighting major difficulties and suggestions linked to rural marketing.

**Keyword:** Rural marketing, marketing issues in rural areas, rural marketing potentials

#### Introduction:

Agricultural marketing is broadly the exchange or bartering of agricultural produce. To form such exchanges possible various processes viz., processing, storage, transportation, grading, inspection, pricing, advertising, wholesale and retail sale etc are included. From the purpose of view of the govt, the function of Agriculture Marketing is to link the assembly of agricultural commodities with sustainable supply and trade that's economically beneficial. At the government level, the government can provide services to the farmers by fixing marketing intelligence, i.e. the market value of agricultural products and a system that builds barriers in terms of cultivation. Government can encourage farmers by creating policies to make different options regarding supply chain. Farmers employed farm sector inputs like local seeds and farmyard manure within the past. These inputs were easily accessible to them; farmers' market purchases of crop inputs were low. Farm inputs, like improved seeds, fertilizers, insecticides and pesticides, farm machinery, implements, and financing, are increasingly important within the production of farm products in recent years. The new farming technology responds to input. Product and input marketing must be included within the scope of agricultural marketing.

#### Objective of Study

Objective of Study Rural markets offer unrealized potential as a component of any economy. Several challenges confront the search to thoroughly explore rural markets. The concept of agricultural markets in India, also as in several other countries like China, remains growing, and therefore the sector presents variety of issues, including understanding the dynamics of rural markets and developing methods to provide and satisfy rural consumers.

#### Research methodology

This research article attempts to provide a deeper understanding of the function of rural marketing in economic development. The study also intends to investigate the issues confronting rural marketing in the current context. The descriptive research approach is utilised in this study for this goal, which is based on the utilisation of secondary sources of data acquired from books, Journals, periodical publications, government publications, articles, newspapers, and websites, among other things.

#### Rural marketing concept

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#### 4. Title of Paper: The 2020 New Education Policy's Effect on Higher Education

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M.S. University of Baroda

#### The 2020 New Education Policy's Effect on Higher Education

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#### ABSTRACT

*In light of the issues brought on by the Covid-19 pandemic, the Government of India's New Education Policy (NEP 2020) was a welcome move and piece of fresh news. For many, hearing about NEP 2020 was an absolute shock. Many educators did not foresee the changes that NEP 2020 has recommended. Although the education policy has an impact on both high school and college education, this article focuses mostly on NEP 2020 and its influence on higher education. This essay also discusses the key NEP components and examines how they impact the current educational system.*

**(Keywords: New Education Policy, Higher Education, Covid-19.)**

#### I. INTRODUCTION

The Indian government created the National Policy on Education (NPE) to encourage education among its citizens. The policy encompasses both rural and urban India's primary and secondary education through colleges. Prime Minister Indira Gandhi issued the country's first NPE in 1968; Prime Minister Rajiv Gandhi issued the second in 1986; and Prime Minister Narendra Modi issued the third in 2020.

The aim for India's future educational system is described in the National Education Policy 2020 (NEP 2020), which was adopted by the Indian Union Cabinet on July 29, 2020. The new policy has taken the place of the previous one, which was published in 1986. The strategy

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Author Name: Prof. Mane A. C.

## 5. Title of Paper: Impact of National Education Policy -2020

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UGC CARE Group 1

### **IMPACT OF NATIONAL EDUCATION POLICY-2020 ON HIGHER EDUCATION**

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**Abstract:** - The National Education Policy announced by Government of India (NEP 2020) was a welcoming change and surprising Nationals to all of us surrounding the world due to the challenges posed by Covid19 pandemic. The announcement of NEP 2020 was purely surprising to all. The changes that NEP 2020 has recommended were something that many educationists never saw coming. Though the education policy has impacted school and college education equally, this paper mainly focuses on NEP 2020 and its impact on Higher Education. This paper also focuses on important features of NEP and analyses how they affect the existing education system.

**Keywords:** Challenges, Education, National Education Policy.

**Introduction:** - Education is fundamental for achieving full human potential, developing an equitable and just society, and Promoting National Development providing equal access to quality education. India will have the highest population of young people in the world over the next decade, and our ability to provide high –quality educational opportunities to them will determine the future of our country. The world is undergoing rapid changes in the knowledge landscape. Education Policy lays particular emphasis on the development of the creative potential of each individual. It is based on the principle that education must develop not only cognitive capacities both the ‘foundational capacities of literacy and numeracy and higher –order’ cognitive capacities, such as critical thinking and problem solving – but also social, ethical, and emotional capacities and dispositions.

The main problems faced by the Indian higher education system includes enforced separation of qualifications, early specialization and student streaming into restricted research areas, less focus on research at most universities and schools, and lack of competitive peer-reviewed academic research funding and large affiliated universities leading to low levels of undergraduate education. Institutional restructuring and consolidation aim to end the fragmentation of higher education by transforming higher education institutions into large multidisciplinary, creating well-rounded and innovative individuals, and transforming other countries educationally and economically, increasing the gross enrolment ratio in higher education, including vocational training, from 26.3% (2018) to 50% by 2035.

Holistic and multidisciplinary education should strive in an integrated way to improve all human capacities-mental, cultural, social, physical, emotional, and moral. In the long term, such a comprehensive education shall be the method for all undergraduate programs, including those in medical, technical, and vocational disciplines. Optimal learning environments and support for students offer a particular approach including adequate curriculum, interactive pedagogy, consistent formative assessment, and adequate support for students.

**Previous Policies:** - The implementation of previous policies on education has focused largely on issues of access and equity. The unfinished agenda of the National Policy on Education 1986, modified in 1992 (NPE 1986/92), is appropriately dealt with in this Policy. A major development since the last Policy of 1986/92 has been the Right of Children to Free and Compulsory Education Act 2009, which laid down legal underpinnings for achieving universal elementary education.

Author Name: Prof. Dr. Patil N. N.

6. Title of Paper: Studies on Biodegradation of Acetaminophen by *Bacillus subtilis* subsp. *subtilis* NCIB 3610 (T)

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**Studies on Biodegradation of Acetaminophen by *Bacillus subtilis* subsp. *subtilis* NCIB 3610(T)**

**WAGHMODE MEGHMALA SHESHRAO<sup>1\*</sup>, LENDE SNEHAL BALU<sup>1</sup>, GAIKWAD PRANALI RATNAKAR<sup>1</sup>, PATIL NEHA NITIN<sup>1</sup> and KHISTI UJWALA VINAYAK<sup>1</sup>**

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**Abstract**

Acetaminophen (paracetamol) has been classified as one of the emerging organic pollutants due to its entrance into the water bodies. Removal of pharma micropollutants using microorganisms or synthetic systems from the environment is desirable. In this study, acetaminophen degrading microorganism was isolated from Pharmaceutical industrial wastewater. Identification of the isolate was carried out using morphological, biochemical, and 16s rRNA sequencing. *Bacillus subtilis* subsp. *subtilis* NCIB 3610(T) showed 73.2% degradation of paracetamol (2500 ppm) based on colorimetric and reverse phase high performance liquid chromatography analysis. Based on the Computer Assisted Kinetic Evaluation (CAKE) program, it can be concluded that the strain exhibits Simple first-order model (SFO). The degradative product was identified as 4-aminophenol based on High Resolution Mass Spectrometry method. The chemotaxis assay reported that the strain under study was found to be suitable for the bioaugmentation purposes.

**Article History**

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**Keywords**

4 Aminophenol;  
Acetaminophen;  
*Bacillus Subtilis*;  
Biodegradation.

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**Introduction**

The presence of pharmaceutical contaminants in the aquatic environment has become a subject of emerging concern.<sup>1</sup> The pharmaceuticals contaminants comprising drugs, heavy metals, dyes, and personal care products have been considered emerging environmental contaminants due to their occurrence in water bodies.<sup>2,3</sup> Now, many of these compounds are perceived worldwide ranging from ng/L to µg/L but due to their biologically active potential, it could affect the ecosystem. With the increased production and consumption, micropollutants and personal care products are occurring in the environment.

One of the most frequently detected pharmaceutical painkillers in treated and untreated waste water is acetaminophen (APAP, paracetamol, N-acetyl-para-aminophenol).<sup>4</sup> Acetaminophen is a heavily demanded over the counter medicine. Paracetamol

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Author Name: Dr. Giramkar S. V.

7 Title of Paper: Checklist of Animal Diversity in Pirangut of Mulshi Tehsil, Ms India

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CHECKLIST OF ANIMAL DIVERSITY IN PIRANGUT OF MULSHI TEHSIL, M/S, INDIA

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**Abstract:**

Pirangut village of Mulshi tehsil is about 30 km west of Pune District, Maharashtra, at an altitude of about 640 m. Mulshi is located centrally in northern Western Ghats and it is about 70 kms West to Pune District M/S, India. The Western Ghats Mountain range is one of the biodiverse tropical wet evergreen rainforests with unique and endemic species diversity. Animal survey was carried out, observed animals were photographed and identified by using identification keys. A checklist of 70 animals was prepared by a walking survey method. Out of these, 31 animals belong to 22 families of Phylum Arthropoda while 39 animals belong to 33 families of Phylum Chordata. Around 24 bird species were recorded in the Pirangut village. It indicates the importance of the village as an ecosystem.

**Keywords:** Pirangut, Animal survey, Biodiversity, Western Ghats, Birds, Insects, Animals

**Introduction:**

Area selected for study was Pirangut village and its surrounding area of Mulshi Tehsil, Dist: Pune (M/S, India). The study area is in northern Western Ghats (18.5115° N, 73.6801° E) about 30 km west of Pune District, Maharashtra, at an altitude of about 640 m (Giramkar, 2017). This area is subject to habitat modifications for social forestry, urbanization, and industrialization. Mulshi forms the crest line of Western Ghats, with hill ranges and gently sloping part bordering the Deccan Plateau and has a total area of 250km (Gaonkar, 1996). The common animals recorded in this region are scorpions, leopard, rabbit, Indian rat snake, uncommon migratory birds etc. To safeguard these areas and market them as tourism attractions, the state has made appropriate steps to establish numerous wildlife parks and sanctuaries. Biodiversity is necessary for all species living on Earth, including humans, to function properly. Animal biodiversity is essential to maintain the stability of the ecosystem. To protect the diversity, there is a need to generate a checklist of animals. Hence the objective of the present study was to prepare a checklist of animal diversity in the study area.

**Materials and methods:**

**a. Study area:**

Pirangut village of Mulshi tehsil of Dist: Pune (M/S, India) is selected for study, it is in western portion of Pune city (18.5115° N, 73.6801° E). This area is subject to habitat modifications for social forestry, urbanization, and industrialization. Limited knowledge is available about the animal diversity in western portion of Pune. Selected survey site comprises different ecosystems such as agricultural, hilly area, water bodies and domestic areas. Economic activities observed in this village were related with agricultural activity, poultry, dairy and tourism.

**b. Data collection:**

Animal biodiversity was documented by walking surveys and photographs. Survey was conducted from February 2022 to January 2023. Walking survey was conducted along all pathways of the village. To study the seasonal patterns and diversity, the entire year is divided into three seasons namely pre-Monsoon (February to May), Monsoon (June to September) and Post-Monsoon (October to January). The study area was visited twice in each season during the study period. The selected sites were surveyed mainly between 7.00 am to 1.00 pm. Animal species were identified directly in the field visually with the help of field guides followed by photography. Photographs are taken with Sony cyber-shot DSC-W230 12 MP Digital Camera with 4x Optical Zoom. Statistical analysis of the data was carried out using Ecological Analysis Package- Biodiversity Pro.

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**Author Name: Dr. Gaikwad S. S.**

**8 Title of Paper: Studies of Soil and Water Quality Parameter in Relation to Agricultural Practices and Cropping Pattern in Chambali River Basin in Purandar Tehsil, Maharashtra**

**Studies of Soil and Water Quality Parameter in Relation to  
Agricultural Practices and Cropping Pattern in Chambali River  
Basin in Purandar Tehsil, Maharashtra**

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**Abstract:**

The majority of the country's population depends on agriculture for their livelihood. Agriculture is the source of food and it is source for raw material for industry. Although agriculture is major contributor in Indian economy still it faces many challenges. Dependency on rainfall, land ownership, fragmentation of holding, land tenure, labours, manures, fertilizers and biocides, meagre irrigation facilities, lack of mechanisation, agricultural marketing, transport facilities, decreasing production are the challenges faced by Indian agriculture. In which agriculture production mainly affects due to agricultural practices and cropping pattern. To know the agricultural system in the area Soil and water samples from Chambali river basin in Purandar are collected. With the help of questionnaire and interviews information about the farming practices in the area is collected.

**Keywords:** Agricultural Ppractices, Cropping Pattern, Soil Samples, Water Sampls

**Introduction:**

India is known for its agricultural economy and it plays a crucial role in Indian economy which provides employment opportunities to rural agricultural and non-agricultural labourers. The majority of the country's population depends on agriculture for their livelihood.

The Indian Economy holds the sixth position in the world's top economies. Agriculture has major contribution to the country's GDP. It provides employment and it is largest employee sector. Agriculture is the source of food and it is source for raw material for industry. Agro-products such as tea, coffee, sugar, cashew nuts, spices, etc., which are edible and textile products such as jute, cotton, and others contribute 50% and 20% respectively to the total export of the total country. Agriculture is the most significant source of income for the central and state governments. it is clear that agricultural growth is a necessary precondition for sectoral diversity and economic development.

Although agriculture is major contributor in Indian economy still it faces many challenges. Dependency on rainfall, land ownership, fragmentation of holding, land

Author Name: Dr. Khisti U.V.

9. Title of Paper: Studies on Biodegradation of Acetaminophen by *Bacillus subtilis* subsp. *subtilis* NCIB 3610 (T)



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### Studies on Biodegradation of Acetaminophen by *Bacillus subtilis* subsp. *subtilis* NCIB 3610(T)

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**Abstract**  
Acetaminophen (paracetamol) has been classified as one of the emerging organic pollutants due to its entrance into the water bodies. Removal of pharma micropollutants using microorganisms or synthetic systems from the environment is desirable. In this study, acetaminophen degrading microorganism was isolated from Pharmaceutical industrial wastewater. Identification of the isolate was carried out using morphological, biochemical, and 16s rRNA sequencing. *Bacillus subtilis* subsp. *subtilis* NCIB 3610(T) showed 73.2% degradation of paracetamol (2500 ppm) based on colorimetric and reverse phase high performance liquid chromatography analysis. Based on the Computer Assisted Kinetic Evaluation (CAKE) program, it can be concluded that the strain exhibits Simple first-order model (SFO). The degradative product was identified as 4-aminophenol based on High Resolution Mass Spectrometry method. The chemotaxis assay reported that the strain under study was found to be suitable for the bioaugmentation purposes.



**Article History**  
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**Keywords**  
4-Aminophenol;  
Acetaminophen;  
*Bacillus Subtilis*;  
Biodegradation.

**Introduction**  
The presence of pharmaceutical contaminants in the aquatic environment has become a subject of emerging concern.<sup>1</sup> The pharmaceuticals contaminants comprising drugs, heavy metals, dyes, and personal care products have been considered emerging environmental contaminants due to their occurrence in water bodies.<sup>2,3</sup> Now, many of these compounds are perceived worldwide ranging from ng/L to µg/L but due to their biologically active potential, it could affect the ecosystem. With the increased production and consumption, micropollutants and personal care products are occurring in the environment.

One of the most frequently detected pharmaceutical painkillers in treated and untreated waste water is acetaminophen (APAP, paracetamol, N-acetyl-para-aminophenol).<sup>4</sup> Acetaminophen is a heavily demanded over the counter medicine. Paracetamol

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Author Name: Dr. Shelke P. N.

## 10 Title of Paper: Morphological & Elemental Analysis of Termites Mound & Ant Nest in Agriculturally Prominent Area

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Research Article



### Morphological and elemental analysis of termite mound and ant nest in agriculturally prominent area

Pandit Shelke<sup>1</sup>, Meghmala Waghmode<sup>1\*</sup>, Ravindra Mene<sup>1</sup>, Apama Gunjal<sup>2</sup>, Neha Patil<sup>1</sup>, Namdeo Bhujbal<sup>1</sup>, Urmila Dhangar<sup>1</sup>, Shital Jagtap<sup>1</sup>, Shubhangi Shinde<sup>1</sup>

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(Received: 15 August 2022; Revised: 22 March 2023; Accepted: 16 May 2023)

#### Abstract

Soil management is important for the farmers to improve the crop yield. In nature some invertebrates serve as bioindicators and biomonitors. Biogenic structure built by insects is important for controlling soil erosion and water reserves. Ants and termites nest architecture along with the elemental analysis was studied to evaluate soil health and possible threats imposed by heavy metals in the area. The soil samples were collected and analyzed for various parameters. Systematic study of porosity, composition, and nutritional values of soil in ant nest and termite mound were done. The Atomic Absorption Spectrophotometer and Inductively Coupled Plasma Mass Spectrophotometer studies showed that ant nest and termite mound samples were found to contain elements viz., zinc, selenium, lead, cadmium, nickel drought and chromium. Based on Scanning Electron Microscope-Energy Dispersive Analysis of X-rays, the size of soil samples collected from ant nest and termite were found to be 27.77 nm and 25.56 nm, respectively. The corrosion resistant zirconium and titanium metals were detected in 0.68 and 0.39% concentration in ant nest and termite mound samples, respectively, representing the insect house as a possible source of rich metals. The ant nest and termite mound materials contain quartz, microcline, kaolinite, and clay minerals. Ant nests and termite mounds can thus be used as hydrological indicators to address the problems of soil erosion.

**Keywords:** Bioindicators, economical, heavy metal, minerals, soil, toxicity

#### Introduction

Soil functioning is important considering its role in ecosystem management (Wall et al., 2012). Soil health is getting disturbed due to soil erosion and some anthropogenic activities. Termites build their mound by the combination of quartz grains with their natural secretions (humidifying agent), vegetable debris and clay minerals (plasticizer) (Echezona et al., 2012). To evaluate the soil ecosystem, bioindicators and biomonitoring functioning is very important. In nature, some species of invertebrates have been recognized as bioindicators and biomonitors of ecology. Soil ecosystems can be assessed using sentinel species as bioindicators (Amiard-Triquet et al., 2012). Based on the changes in the ecosystem affected by natural calamities (e.g., wasps' famine, soil erosion, heavy rainfall) or anthropogenic activities, bioindicator organisms change their communal behavior (Medhi et al., 2020). Reports are available on the role of termite communities in reflecting the soil conditions including macro aggregation of soil, chemical extensive richness, biodiversity, and soil hydrological functions (Duran-Bautista et al., 2020). Bioindicators include honeybees, drosophila, wasp, termites, and ants (Chowdhury et al., 2023). Role of arthropods as bioindicators is attributed to their community-based structure, nature of predator and possibility of statistical analysis (Medhi et al., 2020). Insects which have the capacity to serve as ecological biomarkers can be studied to find the ecotoxicity of that area (Amiard-Triquet et al., 2012). The insects as

bioindicators with their mechanism to combat environmental stress are represented in Table 1.

Biomonitoring is based on the finding changes in the ecosystem by using the biodiversity data of keystone species and natural inhabitants (Ma et al., 2018). The wasps are chemicaresidents of rural as well urban areas and have been reported to serve as biomonitors due to their potential to accumulate metals. *Polistes dominulus* (paper wasps) larval fecal mass are found to contain lead which indicates that wasp has good heavy metal excretion mechanism (Urbini et al., 2006).

#### Ant nests

The role of ants as ecological indicator is attributed to their nest building potential using local resources (Okrutniak and Grzesi, 2021; Sorvari, 2009). Ant's nest is one of the widely studied homes in context of their composition (metal accumulation), architecture (as per the environmental factors and insects' own interest), foraging behavior and ecosystem management (Fagundes et al., 2020). The way ant finds their place to build the nest or new home after the destruction or threat imposed on their nest, the journey of nest relocation, is done by scout ants which uses "one-pass" or "two pass" strategy which relies upon pheromones (Marshall et al., 2003). Scouts use Buffon's needle for the evaluation of nest size. Reports are available, which suggest ant nest size and its architecture are dependent upon the local environmental

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## 11. Title of Paper: Bioremediation of Azo Dyes by Microbial Consortia Isolated from Textile

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CODEN: BEPLAD



ORIGINAL ARTICLE

OPEN ACCESS

### Bioremediation of Azo dyes by microbial consortia isolated from textile effluent contaminated soil.

Dhangar U. S.<sup>1\*</sup>, Shinde S. R.<sup>1</sup>, Patil N. N.<sup>1</sup>, Ghule A.V.<sup>1</sup>, and Moundekar A. A.<sup>1</sup>.

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#### ABSTRACT:

Congo red (CR) and Methylene blue (MB) are one of the best known azo dyes which has azo bond (-N=N-) hard to break. They are commonly use as indicator dyes of Azo dyes in textile industries. The current work scrutinized the de colorization of these azo dyes in distilled water using microbial consortia. The fungal and bacterial isolates were screened for de colorization of MB and CR at different concentrations. Cultural, Morphological and Biochemical characterization of isolates shows the presence of *Aspergillus* spp. and *Acinetobacter* spp. *Acinetobacter* spp. able to decolorize Congo red 42.3% and Methylene blue 45.41% at 0.5% concentration of respective dyes. *Aspergillus* spp. decolorized 59.53% Congo red and 38.00% methylene blue at 0.5% concentration of respective dyes. UV-Spectroscopy and FTIR analysis of samples before and after growth of *Aspergillus* spp. at respective concentration of MB shows de colorization of MB is by absorption of MB dye on the surface of *Aspergillus* spp. The overall study showed de colorization of MB and CR dye present as indicator dye in textile effluent by simple microbial absorption method. This method is found more applicable for removal of toxic dyes from textile effluent. Phytotoxicity of the dye solution resulting from this treatment on Zeamaizeshows lower toxic nature compared to untreated solution of the respective dyes.

**Key words:** Methylene Blue (MB), Congo red(CR), *Aspergillus* spp., Bio-absorption, Azo dye, *Acinetobacter* spp.

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Revised 23.11.2022

Accepted 10.12.2022

#### 1. INTRODUCTION:

##### 1.1 Review of literature:

Azo dyes are widely used in textile, paper and pulp industries. Azo dyes produce bright, high-intensity colors, have fair to good stronghold properties, are economical to produce and account for more than half of all commercial dyes used. Use of Azo dyes are increasing this is in turn would increase wastewater generation from dyeing industrial activities [1]. Dye waste water is usually characterized by high COD, BOD, TSS, TDS as lots of synthetic dyes, bases, acids, salts, oxidants, reductants, many chemical substances and metal ions. [2]. Azo dye contain antimicrobial activity was discovered by Gerhardt Domagk. Azo reduction can be accomplished by skin micro flora, human intestinal micro flora, environmental microorganisms, to a lesser extent by human liver azo reductase, and by non-biological means. [3].

Azo dyes do not degrade under natural environmental conditions. When the waste water has been released from industry, it will bio-accumulate in the environment, released poisoning issues not only in the water, but also affecting the entireness of the ecosystem. Azo dyes which are banned by the European Commission. [4]. Incompetence in dyeing process, poor hold of spent effluent and inadequate treatment of wastes from dyestuff industries lead to dye pollution in soil and natural water bodies [18]. There should be economical and eco-friendly method that produces a considerably lesser amount of intermediate toxic compounds. Use of different microorganisms like fungi, bacteria, yeast, algae for remediation of dyes from textile effluent by degradation, absorption and accumulation of dyes found more applicable. [5].

##### 1.2 Effect of azo dye:

Synthetic azo dyes are widely used in industries. The antimicrobial effect of red azo dye Prontosil was caused product sulfanilamide by the reductively cleaved (Azo reduction). The significance of azo reduction is thus revealed. [6].

**Author Name:** Prof. Sherkar S. D.

**12 Title of Paper: Nanotoxicological Study of Cu-Doped TiO<sub>2</sub> Nanoparticles on Gram Positive Bacteria *Bacillus amyloliquifaciens*** Title of the Paper: Isolation, and Characterization of *Cladosporium alboflavescens* for Acetaminophen Biodegradation

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**ORIGINAL ARTICLE**

**OPEN ACCESS**

## **Nanotoxicological study of Cu-doped TiO<sub>2</sub> nanoparticles on Gram positive bacteria *Bacillus amyloliquifaciens***

**Seema D. Sherkar<sup>1\*</sup>, Meghmala S. Waghmode<sup>1</sup>, Karan V. Khaldkar<sup>1</sup>, Avishkar R. Patil<sup>1</sup>, and Ujwala V. Khisti**

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### **ABSTRACT**

Titanium dioxide is being one of technologically important material in the field of nanotechnology. Titanium dioxide doped with copper nanoparticles are widely used because of its thermodynamic stability, anticorrosion, high photo catalytic activity, wide band gap, high transmittance in visible and infrared spectral range. In the present study, TiO<sub>2</sub> doped with copper nanoparticles was synthesized from Titanium isopropoxide as a precursor using by hydrothermal method and sol-gel technique. Cu doped TiO<sub>2</sub> nanoparticles were characterized by Fourier-transform infrared spectroscopy (FTIR), UV-Visible spectroscopy, and scanning electron microscopy with Energy Dispersive X-ray Spectroscopy (SEM / EDX). The Cu doped TiO<sub>2</sub> nanoparticles were found to be spherical, ellipsoidal and irregular in shape. Individual nanoparticles as well as a few aggregates are found having the size of 5-20 nm. The biocompatibility of the Cu doped TiO<sub>2</sub> nanoparticles with their photo catalytic activity make them future candidate for the development of sustainable environmental remediation technologies. To assess bioremoval of the Cu doped nanoparticles on the microorganisms, this study was undertaken. In this study growth of *Bacillus amyloliquifaciens* was checked against various concentration of nanoparticles prepared by the both methods (2, 3, 4 and 5w/v %). It was seen that the microorganism has ability to grow in presence of nanoparticles with increase in the total protein content. The 5% concentration of Cu doped TiO<sub>2</sub> enhanced the cell mass protein of *Bacillus amyloliquifaciens* by 3.63 times.

**Keywords:** *Bacillus amyloliquifaciens*, Cu doped TiO<sub>2</sub>, Sol Gel, and Bioremediation

Received 20.11.2022

Revised 30.11.2022

Accepted 25.12.2022

### **1) INTRODUCTION:**

Due to the enormous applications of nanotechnology, the environmental and ecological effects of nanomaterials have to be considered. Changes of nanomaterials will not only help ensure the safety of Nano technological applications, but also help design functional materials that have minimal adverse effects [3]. Titanium dioxide (TiO<sub>2</sub>) has been widely used in many fields [2]. To enhance the functional properties and applicability of titanium dioxide, doped versions of TiO<sub>2</sub> are benignly synthesized to enhance catalytic activity for light harvesting applications [5]. Many researchers have conducted studies to evaluate if nano-scale titanium dioxide would have biological impacts [1]. TiO<sub>2</sub> NPs have been reported to have antimicrobial activities due to the reactive oxygen species formation. On the other hand, copper NPs appear to have higher cytotoxicity than copper ions because they may penetrate the cell membrane and release copper ions inside the cell [15]. However, it is still not clear whether there is synergistic effect when TiO<sub>2</sub> NPs are doped with CuO. Also, very few studies have examined the natural remediation of toxic metal NPs from the environment [17], which can be another important consideration of NPs; ecological impact. This study employed a model bacterial species: *Bacillus amyloliquifaciens* a Gram-positive bacterium and a model strain for the study of Nano toxicology. The objectives of this study are: 1) to determine the toxicity of Cu-doped TiO<sub>2</sub> NPs; and 2) to investigate bacterial responses to NPs.

### **2) MATERIALS AND METHODS**

#### **2.1) Synthesis of Cu doped Nanoparticles:**

**Cu doped NP s are Synthesized by two methods i) Hydrothermal Method ii) Sol gel Method**

##### **2.1.1) Hydrothermal Method:**

The term hydrothermal process is defined as performing chemical reaction in solvent contained in sealed vessels in which the temperature of solvent can be brought to around their critical points via heating



Author Name: Prof. Dr. Patil N. N.

### 13 Title of Paper: Isolation & Characterization of *Cladosporium alboflavescens* for Acetaminophen Biodegradation

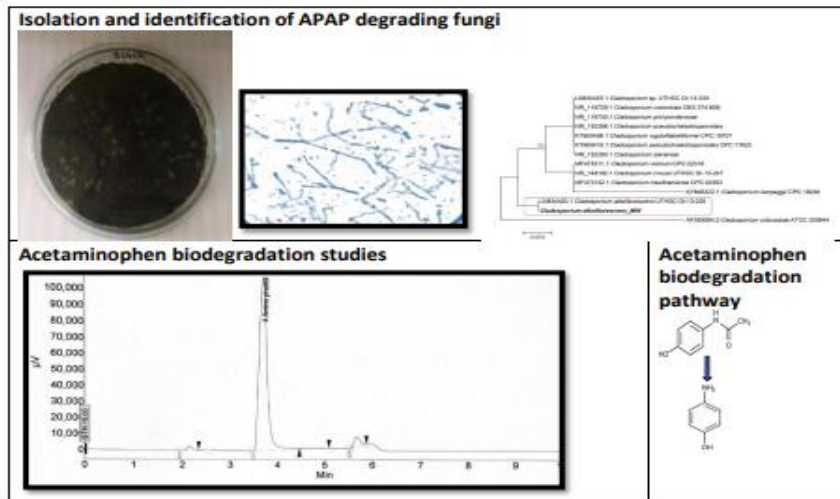
Waghmode et al/ Current Scientia 26 No.02 (2023) 18-25

#### Isolation, and characterization of *Cladosporium alboflavescens* for Acetaminophen biodegradation

Meghmala Waghmode<sup>1</sup> \* and Neha Patil<sup>1</sup>

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Date Received: 30-05-2023 Date Accepted: 24-12-2023



#### Abstract

One of the pharmaceutical micropollutants with a detrimental effect on the environment is paracetamol. Mycoremediation of the pollutants is a widely accepted concept based on cost and eco-friendly nature. Fungi isolated from pharmaceutical industry effluent have been used to target the biodegradation of paracetamol. The fungus's internal transcribed spacer (ITS 1) sequencing matched that of *Cladosporium alboflavescens* (GenBank accession number OQ977005) by 99.81%. The strain demonstrated 89% biodegradation of paracetamol (1000 ppm) after 96 hours of incubation with 4-aminophenol as the predominant biodegradative metabolite, according to the spectrophotometric and high-performance liquid chromatographic analysis. The half-life of 1.44 days and simple first order kinetics were proposed by the Computer Assisted Kinetic Evaluation (CAKE) tool used to examine the biodegradation kinetics.

**Key words:** Acetaminophen, 4-aminophenol, *Cladosporium*, Mycoremediation

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**14: Title of Paper: Bioremediation of Acetaminophen Mediated by *Klebsiella pneumoniae* subsp. *pneumoniae* DSM 30104 subsp. *pneumoniae*) 04 (T)**

IJEP 43 (7) : 579-587 (2023)

(ISSN : 0253-7141)

**Bioremediation of Acetaminophen Mediated by *Klebsiella pneumoniae* subsp. *pneumoniae* DSM 30104 (T)**

Meghmala Waghmode<sup>1</sup>, Neha Patil<sup>1\*</sup> and Aparna Gunjal<sup>2</sup>

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Acetaminophen is one of the widely used over-the-counter drugs. Its residual concentration has been detected in pharmaceutical industry wastewater, effluent treatment plant and surface water. Eco-toxicological effects of paracetamol have been reported on seed germination, fish and algae. Drug resistance in pathogenic micro-organisms has been attributed to the overuse or continuous exposure of pathogens to drugs. The work was conducted from February 2022 to July 2022. Current study was carried out on the acetaminophen (paracetamol) degradation potential of *Klebsiella pneumoniae* subsp. *pneumoniae* DSM 30104(T) which was isolated from effluent of pharma industry. Identification was done using 16S rRNA sequencing technique. Isolate was found to degrade 82.8% of acetaminophen (2500 ppm) after five days of incubation. Based on the analytical techniques high resolution mass spectrometry (HRMS) and proton nuclear magnetic spectroscopy (1H NMR) study, 4-aminophenol was found to be biodegradative metabolite. *Klebsiella pneumoniae* subsp. *pneumoniae* DSM 30104(T) can degrade paracetamol through biological approach. Compared to paracetamol, its biodegradative product 4-aminophenol has more toxicity against algae. The paracetamol biodegradation potential of *Klebsiella pneumoniae* subsp. *pneumoniae* DSM 30104(T) was studied and could be used as microbial candidate for remediation of paracetamol contaminated sites.

**KEYWORDS**

Acetaminophen, Biodegradation, Pathogens, Phylogenetics, Wastewater

**1. INTRODUCTION**

With the emergence of diseases and multidrug resistant properties in micro-organisms, drug usage has increased. Pharmaceutical industrial wastewater is a mixture of antibiotics, raw materials, surfactants, variety of medicines and cosmetic products [1]. Release of pharma micropollutants in the aquatic environment is attributed to domestic, industrial and hospital activities [2,3]. In Indian environmental matrices, besides pesticides and persistent organic pollutants, pharmaceutical residues have been considered as developing environmental contaminant due to their negative impact on aquatic life [4]. Occurrence of pharmaceutical drugs and personal care products in water is mainly influenced by type, seasonal variation, concentration, etc. In Ganges river, fifteen pharmaceuticals and per-

sonal care products (PPCPs) were detected in which caffeine, tetracycline, acetaminophen and triclosan were the most abundant compounds [5]. Cholesterol lowering drug (clofibrilic acid), analgesics (diclofenac), psychiatric drugs (diazepam, carbamazepine, nordiazepam) and antibiotics has been reported in treated wastewater of Europe, Asia and United States [6]. During pandemic period of SARS Covid-19, consumption of hydroxychloroquine and paracetamol was increased based on wastewater epidemiological studies [7]. Persistence of drug in environment is attributed to their high solubility and little biodegradability which could affect microbial community [8]. Discharge of drugs into environment is leading to development of antimicrobial resistance (AMR) in pathogens *Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, *Enterobacter* collectively called 'ESKAPE pathogens' [9].

Release of drugs into environment is causing adverse effects on non-target organisms, like bacteria, algae

Table 1. Occurrence of paracetamol in water

Location	Water type	Paracetamol conc.	Reference
Kuwait	Wastewater	0.101-20.86 µg/L	[27]
United Kingdom	Tyne river	65 µg/L	[28]
France	Well supplying drinking water	0.211 µg/L	[6]
India	Yamuna river	0.157-1.708 µg/L	[29]
	Ganga river	6.81-247 µg/L	[5]
	Sewage treatment plant Udipi	9 µg/L	[30]
	Nag and Pili rivers, influent and effluent of sewage treatment plant	11.50 µg/L	[31]
California	Public drinking water supply	1.89 µg/L	[32]
Australia	73 river sites	7150 µg/L	[33]

Author Name Dr. Mene R. U.

## 15 Title of Paper: Morphological & Elemental Analysis of Termites Mound & Ant Nest in Agriculturally Prominent Area

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Research Article



### Morphological and elemental analysis of termite mound and ant nest in agriculturally prominent area

Pandit Shelke<sup>1</sup>, Meghmala Waghmode<sup>1\*</sup>, Ravindra Mene<sup>1</sup>, Apama Gunjal<sup>2</sup>, Neha Patil<sup>1</sup>, Namdeo Bhujbal<sup>1</sup>, Urmila Dhangar<sup>1</sup>, Shital Jagtap<sup>1</sup>, Shubhangi Shinde<sup>1</sup>

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(Received: 15 August 2022; Revised: 22 March 2023; Accepted: 16 May 2023)

#### Abstract

Soil management is important for the farmers to improve the crop yield. In nature some invertebrates serve as bioindicators and biomonitors. Biogenic structure built by insects is important for controlling soil erosion and water reserves. Ants and termites nest architecture along with the elemental analysis was studied to evaluate soil health and possible threats imposed by heavy metals in the area. The soil samples were collected and analyzed for various parameters. Systematic study of porosity, composition, and nutritional values of soil in ant nest and termite mound were done. The Atomic Absorption Spectrophotometer and Inductively Coupled Plasma Mass Spectrophotometer studies showed that ant nest and termite mound samples were found to contain elements viz., zinc, selenium, lead, cadmium, nickel, drought and chromium. Based on Scanning Electron Microscope-Energy Dispersive Analysis of X-rays, the size of soil samples collected from ant nest and termite were found to be 27.77 nm and 25.56 nm, respectively. The corrosion resistant zirconium and titanium metals were detected in 0.68 and 0.39% concentration in ant nest and termite mound samples, respectively, representing the insect house as a possible source of rich metals. The ant nest and termite mound materials contain quartz, microcline, kaolinite, and clay minerals. Ant nests and termite mounds can thus be used as hydrological indicators to address the problems of soil erosion.

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#### Introduction

Soil functioning is important considering its role in ecosystem management (Wall et al., 2012). Soil health is getting disturbed due to soil erosion and some anthropogenic activities. Termites build their mound by the combination of quartz grains with their natural secretions (humidifying agent), vegetable debris and clay minerals (plasticizer) (Echezona et al., 2012). To evaluate the soil ecosystem, bioindicators and biomonitoring functioning is very important. In nature, some species of invertebrates have been recognized as bioindicators and biomonitors of ecology. Soil ecosystems can be assessed using sentinel species as bioindicators (Amiard-Triquet et al., 2012). Based on the changes in the ecosystem affected by natural calamities (e.g., wasps' famine, soil erosion, heavy rainfall) or anthropogenic activities, bioindicator organisms change their communal behavior (Medhi et al., 2020). Reports are available on the role of termite communities in reflecting the soil conditions including macro aggregation of soil, chemical extensive richness, biodiversity, and soil hydrological functions (Duran-Bautista et al., 2020). Bioindicators include honeybees, drosophila, wasp, termites, and ants (Chowdhury et al., 2023). Role of arthropods as bioindicators is attributed to their community-based structure, nature of predator and possibility of statistical analysis (Medhi et al., 2020). Insects which have the capacity to serve as ecological biomarkers can be studied to find the ecotoxicity of that area (Amiard-Triquet et al., 2012). The insects as

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## 16. Title of Paper: Microbial Formulation of Bio-Briquettes using Lignocellulosic and Floral Biomass

Journal of Solid Waste Technology and Management

<http://doi.org/10.5276/jswtm/iswmaw/492/2023.162>

### **MICROBIAL FORMULATION OF BIO-BRIQUETTES USING LIGNOCELLULOSIC AND FLORAL BIOMASS**

**M Prajakta Prakash Karale, Akash Ankush Shivankar, Meghmala Sheshrao Waghmode\*, Neha Nitin Patil, Ravindra U. Mene**

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#### **ABSTRACT**

Considering the cost of fuel, it is the need of the hour for the utilization of waste as a fuel source. Leaf litter waste and floral waste biomass present in the surrounding serve as potential materials in bio-briquettes formulation. Leaf litter wastes (Almond leaves, Ashoka leaves, Cluster fig leaves), and floral wastes such as (Marigold, Tuberoses, and Rose) was used for the study. The waste was microbially treated using *Lactobacillus plantarum* ATCC 8014 and *Lactobacillus brevis* ATCC 14869 for rapid decomposition of wastes. The briquettes were formulated using wet briquetting, manual pressure, and cylindrical mould methods. Paper pulp along with wheat bran at a 35:5 ratio was used as an artificial binding agent. The preliminary analysis includes the contents of moisture, volatile matter, ash, fixed carbon, etc. Bio briquettes were ultimately analyzed by FESEM, FT-IR, TGA, Density, and Calorific values. Comparisons were done using untreated lignocellulosic biomass-based briquettes and commercially available briquettes. Briquettes made from waste that has undergone microbial processing have a calorific value of 5968.20w kJ/Kg, a density of 0.26 kg/cm<sup>3</sup>, 8.4% moisture content, 10% volatile matter content, 13.65% ash content, 67.95% fixed carbon content, a maximum burning time of 17 minutes, and a minimum ignition time of 3 minutes. While the briquettes made from untreated waste have calorific value of 4205.10 kJ/Kg, density of 0.20 kg/cm<sup>3</sup>, 10.8% moisture content, 15% volatile matter content, 15.11% ash content, 59.05% fixed carbon content. This comparative study shows microbially treated bio briquettes can offer good agriculture waste management and new fuel opportunities.

**Keywords:** Bio-briquettes, floral waste, Leaf litter waste, Wet briquetting.

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#### **1. Introduction: -**

Energy is notably essential in improvement, national and local environmental protection (Mohammed et al., 2020, Oladeji and Oyetunji, 2013). The issue of an energy crisis is raised by the depletion of natural resources (Anggono et al., 2017). Fossil fuel is currently the primary energy source utilised to produce everyday fuels like kerosene and cooking gas (Demirbas 2007). The prices of fuel are influenced by declining energy sources. Due to a large market's demands and scarce supplies, fuel prices will rise. Production and proper use of energy are very essential and to address these

concerns and lead to sustainable improvement various new methods are used (Ajimotokan et al., 2019, Pandey and Regmi, 2013). Biomass has been taken into consideration as an amazing capacity renewable energy source, both for the richer countries and for the developing world (Demirbas 2007, Demirbas 2001). Biomass is considered the third-largest energy source in the world, after coal, oil, and other fuels (Anggono et al., 2017, Bapat et al., 1997). Floral waste has been reported to have the potential to serve as the source as value added products (Waghmode et al., 2018). The briquettes made from turning low bulk-density biomass into high bulk-density fuel are known as biomass briquettes. The unconventional energy source

Author Name: Dr. Shinde S. R.

## 17. Title of Paper: Bioremediation of Azo Dyes by Microbial Consortia Isolated from Textile

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ORIGINAL ARTICLE

OPEN ACCESS

### Bioremediation of Azo dyes by microbial consortia isolated from textile effluent contaminated soil.

Dhangar U. S<sup>1\*</sup>, Shinde S. R<sup>1</sup>, Patil N. N<sup>1</sup>, Ghule A.V<sup>1</sup>, and Moundekar A. A.<sup>1</sup>.

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#### ABSTRACT:

Congo red (CR) and Methylene blue (MB) are one of the best known azo dyes which has azo bond (-N=N-) hard to break. They are commonly use as indicator dyes of Azo dyes in textile industries. The current work scrutinized the de colorization of these azo dyes in distilled water using microbial consortia. The fungal and bacterial isolates were screened for de colorization of MB and CR at different concentrations. Cultural, Morphological and Biochemical characterization of isolates shows the presence of *Aspergillus* spp. and *Acinetobacter* spp. *Acinetobacter* spp. able to decolorize Congo red 42.3% and Methylene blue 45.41% at 0.5% concentration of respective dyes. *Aspergillus* spp. decolorized 59.53% Congo red and 38.00% methylene blue at 0.5% concentration of respective dyes. UV-Spectroscopy and FTIR analysis of samples before and after growth of *Aspergillus* spp. at respective concentration of MB shows de colorization of MB is by absorption of MB dye on the surface of *Aspergillus* spp. The overall study showed de colorization of MB and CR dye present as indicator dye in textile effluent by simple microbial absorption method. This method is found more applicable for removal of toxic dyes from textile effluent. Phytotoxicity of the dye solution resulting from this treatment on *Zea mays* shows lower toxic nature compared to untreated solution of the respective dyes.

**Key words:** Methylene Blue (MB), Congo red (CR), *Aspergillus* spp., Bio-absorption, Azo dye, *Acinetobacter* spp.

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#### 1. INTRODUCTION:

##### 1.1 Review of literature:

Azo dyes are widely used in textile, paper and pulp industries. Azo dyes produce bright, high-intensity colors, have fair to good stronghold properties, are economical to produce and account for more than half of all commercial dyes used. Use of Azo dyes are increasing this is in turn would increase wastewater generation from dyeing industrial activities [1]. Dye waste water is usually characterized by high COD, BOD, TSS, TDS as lots of synthetic dyes, bases, acids, salts, oxidants, reductants, many chemical substances and metal ions. [2]. Azo dye contain antimicrobial activity was discovered by Gerhardt Domagk. Azo reduction can be accomplished by skin micro flora, human intestinal micro flora, environmental microorganisms, to a lesser extent by human liver azo reductase, and by non-biological means. [3].

Azo dyes do not degrade under natural environmental conditions. When the waste water has been released from industry, it will bio-accumulate in the environment, released poisoning issues not only in the water, but also affecting the entireness of the ecosystem. Azo dyes which are banned by the European Commission. [4]. Incompetence in dyeing process, poor hold of spent effluent and inadequate treatment of wastes from dyestuff industries lead to dye pollution in soil and natural water bodies [18]. There should be economical and eco-friendly method that produces a considerably lesser amount of intermediate toxic compounds. Use of different microorganisms like fungi, bacteria, yeast, algae for remediation of dyes from textile effluent by degradation, absorption and accumulation of dyes found more applicable. [5].

##### 1.2 Effect of azo dye:

Synthetic azo dyes are widely used in industries. The antimicrobial effect of red azo dye Prontosil was caused product sulfanilamide by the reductively cleaved (Azo reduction). The significance of azo reduction is thus revealed. [6].



Author Name: Dr. Bhujbal N.N.

18. Title of Paper: Chemicals Synthesis and Biological Evaluation of 9-aryl-1,8-dioxo-octahydro Xanthene Derivatives as Antileishmanial Agents

ISSN:2211-7156

**Synthesis and biological evaluation of 9-aryl-1,8-dioxo-octahydroxanthene derivatives as antileishmanial agents**

Kamlesh Lodha<sup>1</sup>, Deepak Wavhal<sup>1</sup>, Namdeo Bhujbal<sup>2</sup>, Priyanka Mazire<sup>3</sup>, Sneha Bhujbal<sup>4</sup>, Ashlesha Korde<sup>4</sup>, Kamini Bagul<sup>4</sup>, Amit Roy<sup>3</sup>, Rohan Meshram<sup>4\*</sup>, Vaishali Shinde<sup>1\*</sup>

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**Abstract**

In the current research, we designed and synthesized various derivatives of 9-aryl-1,8-dioxo-octahydroxanthene using flow chemistry technique and explored *in vitro* study for antileishmanial activity against the promastigote as well as amastigote form of *Leishmania donovani* strain. Among the tested analogs by various cell viability assays, six compounds exhibited antileishmanial activity with IC<sub>50</sub> value ranging from 24.81 to 52.33 μM. Further, the functional dynamics study sheds light on the structural role of various functional groups presents in the xanthene derivatives for defining the actual antileishmanial activity. Molecular dynamics simulation data presented here attempts to provide a structural and mechanistic explanation of threonine synthase inhibition against *Leishmania donovani* by xanthene derivatives. Described structure-activity-relation advocates for further modification of the xanthene scaffolds for the accomplishment of challenging antileishmanial drugs.

**Key words:** Antileishmanial activity, Continuous flow chemistry, 1,8-Dioxo-octahydroxanthene, Molecular dynamics simulations, Threonine synthase inhibition.

**Introduction**

Leishmaniasis is produced by the single-celled intracellular parasite of the genus *Leishmania* and transmitted by sandfly bites. Cutaneous, mucocutaneous and visceral leishmaniasis are endemic in tropical and subtropical areas [1]. Visceral leishmaniasis, also referred to as kala-azar, is a lethal form of leishmaniasis caused by the protozoan parasite, *Leishmania donovani* and communicated by the bite of the vector sand fly, *Phlebotomus argentipes* [2]. More than 90 species of sand flies are known to transmit the leishmanial parasite [3]. It has been reported that visceral leishmaniasis, if left untreated, can lead to 95% fatality or result in post-kala-azar dermal complication [4]. It is estimated that about one

Author Name: Prof. Jagtap S. R.

19. Title of the Paper: Green Synthesis of Pyrazole Derivatives employing 1,3-Dipolar Cycloaddition Reaction using Phenyl Hydrazones and Benzoquinone under Basic Condition

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**Green Synthesis of Pyrazole Derivatives employing 1,3-Dipolar  
Cycloaddition Reaction using Phenyl hydrazones and  
Benzoquinone under basic condition**

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D.O.I: 10.56201/ijccp.v9.no1.2023.pg44.47

**Abstract**

*The present study depicts the green synthesis of different Pyrazole derivatives from Phenyl hydrazones. The 1,3-dipolar cycloaddition reaction of Phenyl hydrazones with Benzoquinone is carried out under mild basic condition using bases like Pyridine and Triethyl amine. The reaction is conducted at room temperature so the unwanted by products are not formed. The work-up is also easy and can be accomplished by pouring the reaction mixture on ice and filtration of the solid product formed in the reaction. The crude products are further purified by the Column chromatography or recrystallisation techniques. The purified products are characterized by IR and <sup>1</sup>H NMR spectroscopy.*

**Keywords:** Cycloaddition, Benzoquinone, Phenyl hydrazones, Triethyl amine, Pyridine

**Introduction**

Pyrazoles are the important class of organic compounds possessing various biological activities including anti-cancer activity. The synthetic approaches for designing these derivatives have been reported by various researchers. Multicomponent pyrazole synthesis from alkynes, nitriles and Titanium imido complexes have been achieved<sup>1</sup>. Pharmacologically important pyrazoles are synthesized by different approach<sup>2</sup>. A sonication method for pyrazole synthesis is reported recently in the literature<sup>3</sup>.

Copper catalysed pyrazole synthesis in continuous flow is clean and rapid one<sup>4</sup>. Synthesis and molecular docking of thiazoyl - pyrazole derivatives and their anti-cancer property has been reported<sup>5</sup>. Silica coated catalyst was employed for the synthesis of pyrazole derivatives<sup>6</sup>. Some pyrazole derivatives also possess the herbicidal properties and were successfully synthesized<sup>7</sup>. Synthesis and anti-cancer activity of some 1,3,5-Trialkyl-1H-Pyrazoles have been successfully accomplished<sup>8</sup>. Pyrazoles are synthesized under solvent free condition<sup>9</sup>. Alkenylchalciones are used as a precursors for the synthesis of pyrazoles involving cyclisation approach with hydrazine. Multisubstituted synthesis of pyrazoles is known to involve (3+2) cycloaddition approach<sup>11</sup>. Amphibolic reactivity of hydrazine has been used for the synthesis of pyrazoles. New 2-(4,5-dihydro-1H-Pyrazyl) triazole derivatives were synthesized in a one-pot and multistep way has been reported<sup>12</sup>. Synthesis

Author Name: Prof. Deshpande M.V.

## 20. Title of Paper: Production of Chitinase Enzyme from Fish Waste

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# Production Of Chitinase Enzyme From Fish Waste

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Department of Microbiology, PDEA s AnnasahebMagarMahavidyalaya, Pune, India

## ABSTRACT

Fishery processing industries generate large amounts of products. The disposal of these waste represents an increasing environmental and health problem. To avoid wasting of these by products, various disposal methods have been applied including insulation, fermentation hydrolysate and fish oil production. Fish by products provide an excellent nutrient source for microbial growth useful in enzyme production process, which is largely governed by the cost related to growth media. Recently environmental regulations are becoming stricter, requiring new disposal methods based on fact that fish waste may considered as an important of protein, lipids and material with high biological value. In this current study, fish waste was prepared and tested as growth substrate for microbial enzymes production. Three isolates were isolated from soil which produced chitinase enzyme. Chitinase enzyme was purified and activity which was confirmed by standard enzyme assays and thin layer chromatography.

Keywords: chitin, enzyme assay, thin layer chromatography

## Introduction: <sup>[1]</sup> <sup>[5]</sup> <sup>[10]</sup> <sup>[14]</sup> <sup>[15]</sup> <sup>[16]</sup>

India is a major producer of fish. India holds second ranks in the world after China; contributing to 5.68% of global fish production. The country has a long coastline of 8118 km and inland fishery resource include 1.96 lakh km stretch of rivers and canals, 29.07 lakh hector reservoirs 24.40 lakh hector ponds and tanks . In recent years, total fish production is 9.58 million metric tons with a contribution of 6.14 million metric tons from inland sector and 3.44 million metric tons from marine sector respectively .

Approximately 131 (85%) million tonnes of fish were directly utilized as food and the rest (15%) was underutilized as live bait for fishing, ornamental products (pearls and shells), feed for carnivorous farmed species and marine worm. The production of fish in China Indonesia, India and Russia has increased while fish production decreased in other countries over the ten year period. About 75% fish resource was used for human



## 21. Title of Paper: Morphological & Elemental Analysis of Termites Mound & Ant Nest in Agriculturally Prominent Area

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Research Article

### Morphological and elemental analysis of termite mound and ant nest in agriculturally prominent area

Pandit Shelke<sup>1</sup>, Meghmala Waghmode<sup>1,\*</sup>, Ravindra Mene<sup>1</sup>, Apama Gunjal<sup>2</sup>, Neha Patil<sup>1</sup>, Namdeo Bhujbal<sup>1</sup>, Urmila Dhangar<sup>1</sup>, Shital Jagtap<sup>1</sup>, Shubhangi Shinde<sup>1</sup>

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(Received: 15 August 2022; Revised: 22 March 2023; Accepted: 16 May 2023)

#### Abstract

Soil management is important for the farmers to improve the crop yield. In nature some invertebrates serve as bioindicators and biomonitors. Biogenic structure built by insects is important for controlling soil erosion and water reserves. Ants and termites nest architecture along with the elemental analysis was studied to evaluate soil health and possible threats imposed by heavy metals in the area. The soil samples were collected and analyzed for various parameters. Systematic study of porosity, composition, and nutritional values of soil in ant nest and termite mound were done. The Atomic Absorption Spectrophotometer and Inductively Coupled Plasma Mass Spectrophotometer studies showed that ant nest and termite mound samples were found to contain elements viz., zinc, selenium, lead, cadmium, nickel, drought and chromium. Based on Scanning Electron Microscope-Energy Dispersive Analysis of X-rays, the size of soil samples collected from ant nest and termite were found to be 27.77 nm and 25.56 nm, respectively. The corrosion resistant zirconium and titanium metals were detected in 0.68 and 0.39% concentration in ant nest and termite mound samples, respectively, representing the insect house as a possible source of rich metals. The ant nest and termite mound materials contain quartz, microcline, kaolinite, and clay minerals. Ant nests and termite mounds can thus be used as hydrological indicators to address the problems of soil erosion.

**Keywords:** Bioindicators, economical, heavy metal, minerals, soil, toxicity

#### Introduction

Soil functioning is important considering its role in ecosystem management (Wall et al., 2012). Soil health is getting disturbed due to soil erosion and some anthropogenic activities. Termites build their mound by the combination of quartz grains with their natural secretions (humidifying agent), vegetable debris and clay minerals (plasticizer) (Echezona et al., 2012). To evaluate the soil ecosystem, bioindicators and biomonitoring functioning is very important. In nature, some species of invertebrates have been recognized as bioindicators and biomonitors of ecology. Soil ecosystems can be assessed using sentinel species as bioindicators (Amiard-Triquet et al., 2012). Based on the changes in the ecosystem affected by natural calamities (e.g., wasps' famine, soil erosion, heavy rainfall) or anthropogenic activities, bioindicator organisms change their communal behavior (Medhi et al., 2020). Reports are available on the role of termite communities in reflecting the soil conditions including macro aggregation of soil, chemical extensive richness, biodiversity, and soil hydrological functions (Duran-Bautista et al., 2020). Bioindicators include honeybees, drosophila, wasp, termites, and ants (Chowdhury et al., 2023). Role of arthropods as bioindicators is attributed to their community-based structure, nature of predator and possibility of statistical analysis (Medhi et al., 2020). Insects which have the capacity to serve as ecological biomarkers can be studied to find the ecotoxicity of that area (Amiard-Triquet et al., 2012). The insects as

bioindicators with their mechanism to combat environmental stress are represented in Table 1.

Biomonitoring is based on the finding changes in the ecosystem by using the biodiversity data of keystone species and natural inhabitants (Ma et al., 2018). The wasps are chemicaresidents of rural as well urban areas and have been reported to serve as biomonitors due to their potential to accumulate metals. *Polistes dominulus* (paper wasps) larval fecal mass are found to contain lead which indicates that wasp has good heavy metal excretion mechanism (Urbini et al., 2006).

#### Ant nests

The role of ants as ecological indicator is attributed to their nest building potential using local resources (Okrutniak and Grześ, 2021; Sorvari, 2009). Ant's nest is one of the widely studied homes in context of their composition (metal accumulation), architecture (as per the environmental factors and insects' own interest), foraging behavior and ecosystem management (Fagundes et al., 2020). The way ant finds their place to build the nest or new home after the destruction or threat imposed on their nest, the journey of nest relocation, is done by scout ants which uses "one-pass" or "two pass" strategy which relies upon pheromones (Marshall et al., 2003). Scouts use Buffon's needle for the evaluation of nest size. Reports are available, which suggest ant nest size and its architecture are dependent upon the local environmental

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## 22 Title of the Paper: Bioelectricity Production from River Waste Water

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ORIGINAL ARTICLE

OPEN ACCESS

### "Bioelectricity Production from River Waste Water"

Seema D. Sherkar<sup>1\*</sup>, Pratik D. Kamthe<sup>2</sup>, Ujwala V. Khisti<sup>3</sup>, Neha N. Patil<sup>4</sup>

<sup>1</sup> Department of Microbiology, PDEA's Annasaheb Magar Mahavidyalaya, Hadapsar, Pune-411028, Maharashtra, India

Corresponding author: Seema D. Sherkar\*sherkar1988@gmail.com

#### ABSTRACT:

Bioelectricity is one of the major non conventional forms of the energy. The aim of this systematic study was to update the current state of research and to evaluate biological effects of static electric field. Developmental bioelectricity refers to the regulation of cell, tissue, and organ-level patterning and behaviour as the result of endogenous electrically mediated signaling. Cells and tissues of all types use ion fluxes to communicate electrically. The charge carrier in bioelectricity is the ion (charged atom), and an electric current and field is generated whenever a net ion flux occurs. Endogenous electric currents and fields, ion fluxes, and differences in resting potential across tissues comprise an ancient and highly conserved communicating and signaling system. In this current study MFC (Microbial Fuel Cell) from river waste water was prepared. These MFC contain copper wire (2.0 mm) as anode and aluminum plates as the cathode. When consistently water quality indices were checked, we found 10 % reduction in the values of BOD and COD. In this study we can see the continuous production of potential difference of 2 volts. It was also observed that Potential difference was increased after addition of 5% Methyl Orange within the river waste water. The 5 days of Incubation period, increase in the potential difference was observed. Current study of the isolates confirmed that they have ability to convert organic matter of river waste water to nitrate and nitrite by nitrification process. In further study, the fish toxicity assay was performed using the selected *Cyprinus carpio* (Common carp) and *Poecilia reticulata* (Gappi) and found to have zero mortality rates after treatment.

**Keywords:** Bioelectricity, Nitrification process, Fish toxicity, Water quality indices.

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#### INTRODUCTION:

Our regular life is totally dependent on electricity. Be it Lights, Fans, escalators, vehicles on the road, water supply to home; almost everything requires energy-"The electrical energy". Now a days electricity has reached to remote areas. Thus resultant requirement of electricity is very high. Alongwith conventional production ,bioproduction of electricity is very essential [12]. A way has been studied towards Green Energy . Bioelectricity is produced by the different phenomenon like electron transport chain reaction and glycolysis. Microorganisms also show potential to produce bioelectricity. Bacterial cultures also have ability to produce potential difference. For this Purpose we need to accessorize the bacteria with MFC ( Microbial Fuel Cell).MFC is nothing but the apparatus which required to collect the electrons. The study of MFC was first used by [1][2] to generate electricity the *E. coli* and electrodes. Biochemical fuel system generate electric current by diverting electrons produced in redox reaction. In MFC the anodes perform as electron donar and oxidizes compound and the cathodes perform as oxidizing agent or electron acceptor. MFCs can be grouped into two general categories: Mediated and Unmediated. In early 20 th century, Mediated MFCs were common.

The mediator used for this was chemicals. Unmediated MFCs emerged in the 1970 in this type of MFCs bacteria are mediators and typically have electrochemical activity due to redox proteins such as Cytochrome on their outer membrane. In the 21<sup>st</sup> century MFC have started to find commercial use in waste water treatment. For the preparation of MFC reuse able plastic containers were used. Then these containers are attached with cathode (aluminum sheet) and anode (copper wire 2.0 mm). Then MFCs are connected in series to complete the circuit along with multimeter. The first reading of the sample was noted as  $\pm 1.019$  m volt. Microbial fuel cells (MFC) are having operational or functional advantages over the technologies currently used for generating energy from waste water. This study showed that production of large amount of electricity can be produce which can be used for household or small scale use. The bioelectricity production can be future project to be a good solution over a big problem of shortage of electricity and waste water management [5].



Author Name: Prof. Dr. Patil N. N.

## 23. Title of Paper: Bioremediation of Azo Dyes by Microbial Consortia Isolated from Textile

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ORIGINAL ARTICLE

OPEN ACCESS

### Bioremediation of Azo dyes by microbial consortia isolated from textile effluent contaminated soil.

Dhangar U. S<sup>1\*</sup>, Shinde S. R<sup>1</sup>, Patil N. N<sup>1</sup>, Ghule A. V<sup>1</sup>, and Moundekar A. A.<sup>1</sup>.

<sup>1</sup>Department of Microbiology, Faculty of Science, PDEA'S Annasaheb Magar Mahavidyalaya, Hadapsar, Pune 411028, State-Maharashtra, India.

\*Corresponding author: [banshulganeshdhangar@gmail.com](mailto:banshulganeshdhangar@gmail.com)

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Azo dyes do not degrade under natural environmental conditions. When the waste water has been released from industry, it will bio-accumulate in the environment, released poisoning issues not only in the water, but also affecting the entireness of the ecosystem. Azo dyes which are banned by the European Commission. [4]. Incompetence in dyeing process, poor hold of spent effluent and inadequate treatment of wastes from dyestuff industries lead to dye pollution in soil and natural water bodies [18]. There should be economical and eco-friendly method that produces a considerably lesser amount of intermediate toxic compounds. Use of different microorganisms like fungi, bacteria, yeast, algae for remediation of dyes from textile effluent by degradation, absorption and accumulation of dyes found more applicable. [5].

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Author Name: Prof. Waghmode M. S.

## 24. Title of Paper: Nanotoxicological Study of Cu-Doped TiO<sub>2</sub> Nanoparticles on Gram Positive Bacteria *Bacillus amyloliquifaciens*

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ORIGINAL ARTICLE

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### Nanotoxicological study of Cu-doped TiO<sub>2</sub> nanoparticles on Gram positive bacteria *Bacillus amyloliquifaciens*

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#### ABSTRACT

Titanium dioxide is being one of technologically important material in the field of nanotechnology. Titanium dioxide doped with copper nanoparticles are widely used because of its thermodynamic stability, anticorrosion, high photo catalytic activity, wide band gap, high transmittance in visible and infrared spectral range. In the present study, TiO<sub>2</sub> doped with copper nanoparticles was synthesized from Titanium isopropoxide as a precursor using by hydrothermal method and sol-gel technique. Cu doped TiO<sub>2</sub> nanoparticles were characterized by Fourier-transform infrared spectroscopy (FTIR), UV-Visible spectroscopy, and scanning electron microscopy with Energy Dispersive X-ray Spectroscopy (SEM / EDX). The Cu doped TiO<sub>2</sub> nanoparticles were found to be spherical, ellipsoidal and irregular in shape. Individual nanoparticles as well as a few aggregates are found having the size of 5-20 nm. The biocompatibility of the Cu doped TiO<sub>2</sub> nanoparticles with their photo catalytic activity make them future candidate for the development of sustainable environmental remediation technologies. To assess bioremoval of the Cu doped nanoparticles on the microorganisms, this study was undertaken. In this study growth of *Bacillus amyloliquifaciens* was checked against various concentration of nanoparticles prepared by the both methods (2, 3, 4 and 5w/v %). It was seen that the microorganism has ability to grow in presence of nanoparticles with increase in the total protein content. The 5% concentration of Cu doped TiO<sub>2</sub> enhanced the cell mass protein of *Bacillus amyloliquifaciens* by 3.63 times.

**Keywords:** *Bacillus amyloliquifaciens*, Cu doped TiO<sub>2</sub>, Sol Gel, and Bioremediation

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#### 1) INTRODUCTION:

Due to the enormous applications of nanotechnology, the environmental and ecological effects of nanomaterials have to be considered. Changes of nanomaterials will not only help ensure the safety of Nano technological applications, but also help design functional materials that have minimal adverse effects [3]. Titanium dioxide (TiO<sub>2</sub>) has been widely used in many fields [2]. To enhance the functional properties and applicability of titanium dioxide, doped versions of TiO<sub>2</sub> are benignly synthesized to enhance catalytic activity for light harvesting applications [5]. Many researchers have conducted studies to evaluate if nano-scale titanium dioxide would have biological impacts [1]. TiO<sub>2</sub> NPs have been reported to have antimicrobial activities due to the reactive oxygen species formation. On the other hand, copper NPs appear to have higher cytotoxicity than copper ions because they may penetrate the cell membrane and release copper ions inside the cell [15]. However, it is still not clear whether there is a synergistic effect when TiO<sub>2</sub> NPs are doped with CuO. Also, very few studies have examined the natural remediation of toxic metal NPs from the environment [17], which can be another important consideration of NPs; ecological impact. This study employed a model bacterial species: *Bacillus amyloliquifaciens*, a Gram-positive bacterium and a model strain for the study of Nano toxicology. The objectives of this study are: 1) to determine the toxicity of Cu-doped TiO<sub>2</sub> NPs; and 2) to investigate bacterial responses to NPs.

#### 2) MATERIALS AND METHODS

##### 2.1) Synthesis of Cu doped Nanoparticles:

Cu doped NPs are synthesized by two methods i) Hydrothermal Method ii) Sol gel Method

##### 2.1.1) Hydrothermal Method:

The term hydrothermal process is defined as performing a chemical reaction in a solvent contained in sealed vessels in which the temperature of the solvent can be brought around their critical points via heating.



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## नागराजचा 'वैकुंठ' ; स्मशानातील सोन



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समकालीन सामाजिक परिस्थितीवर भाष्य करण्यासाठी वेगळ्या पठडीतील आशय-विषय घेऊन नागराज मंजुळे निर्मिती करतो. जात, धर्म, वर्ग, लिंगभाव जाणिवेतून

कोरोना काळात कोरोनाबाधित मृतांच्या अंत्यसंस्कारासंदर्भातला अतिशय संवेदनशील विषय, हे अंत्यसंस्कार करणाऱ्या माणसांची दयनीय स्थिती नुकत्याच ऑनलाईन प्रदर्शित झालेल्या 'अनर्पाईड : नया सफर' मधील 'वैकुंठ' या लघुपटात नागराज मंजुळे-सुधीर कुलकर्णी लिखित कथा नागराज मंजुळे यांनी चित्रित केली आहे. या लघुपटात मुख्य भूमिकेत स्वतः नागराज मंजुळे यांनी काम केले आहेत तर सोबतीला अर्जुन करचे व हनुमंत भंडारी यांच्या भूमिका आहेत.

कोरोनानं माणसाला माणसातून उठवलं अन् मसनवाट्यात बसवलं अशी वाक्य कानावर पडणाऱ्या या काळात स्मशानभूमीत काम करणाऱ्या इक्याला (विकास चव्हाण) घर मालकाने खोली सोडायला भाग पाडल्यावर लहान मुलगा अब्बाला (अविनाश) सोबत घेऊन स्मशानभूमीतच राहायला जातो. इक्याचे वडील दादा (तुकाराम चव्हाण) जनहित हॉस्पिटलमधील कोव्हिड वार्डमध्ये एंडमिट असतात. दादाची घरी येण्याची वाट पाहणाऱ्या बाप लेकाची हृदयाला पिळवटून टाकणारी, मनाला सुन्न करणारी छोटीशी कथा 'वैकुंठ'मध्ये पेटणाऱ्या प्रेतांच्या पार्श्वभूमीवर घडत जाते. प्रेतांच्या रांगा...सरणावरची पेटती प्रेतं... बेसूर रडण्याचा आवाज... चिता रचत असणारी माणसं... स्मशानभूमीतील वास्तव.

कोरोनाच्या महासंकटाच्या काळात होणारे मृत्यू आणि मृतदेहाची विल्हेवाट हा एक प्रश्न निर्माण झाला होता. कोरोना बाधित मृतदेह ताब्यात घेण्यापासून ते मृतदेहाची ओळख पटवणे, अंत्यसंस्कार करण्यापर्यंत असे अनेक जटिल प्रश्न निर्माण झाले होते. दुसऱ्या लाटेत, रुग्णवाहिकांचा आवाज आणि कोविड-१९ ने मरण पावलेल्या रूग्णांच्या बातम्या, अंत्यसंस्काराची दृश्य टीव्हीच्या पडद्यावर दिसत असायची. कोरोनाच्या भीतीने मुलगा वडिलांना अग्नी देऊ शकत नव्हता. नातेवाईकही अस्ति सुध्दा निर्जंतुकिकरण (सॅनिटायझर फवारून) ताब्यात घेत असत. अंत्यसंस्कारालाही जवळची माणसं उपस्थित राहू शकत नाहीत यापेक्षा माणसाची दयनीय अवस्था काय असावी. यातून अनेक सामाजिक, आर्थिक, धार्मिक, सांस्कृतिक असे गुंतागुंतीचे आणि जटील प्रश्न उपस्थित झाले. या भीषण वास्तवाला नागराज मंजुळे यांचा कॅमेरा मोठ्या धाडसाने भिडतो. इथं पत्रांपेक्षा कॅमेरा जास्त बोलतो. आणि आगीत तेल ओतावे तसे पार्श्वभूमीवर येणारे भेसूर रडण्याचे आवाज आणि संगीत प्रसंगाची भीषणता वाढवत जातात. स्मशानभूमीच्या दृश्यांमध्ये पुढे जाणारी ही कथा अतिशय वास्तववादी आहे.

कोरोनाच्या दुसऱ्या लाटेत स्मशानभूमीत येणारे मृतदेह, मृतदेहाची

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## 26 Title of Paper: Morphological & Elemental Analysis of Termites Mound & Ant Nest in Agriculturally Prominent Area

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Research Article



### Morphological and elemental analysis of termite mound and ant nest in agriculturally prominent area

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#### Abstract

Soil management is important for the farmers to improve the crop yield. In nature some invertebrates serve as bioindicators and biomonitors. Biogenic structure built by insects is important for controlling soil erosion and water reserves. Ants and termites nest architecture along with the elemental analysis was studied to evaluate soil health and possible threats imposed by heavy metals in the area. The soil samples were collected and analyzed for various parameters. Systematic study of porosity, composition, and nutritional values of soil in ant nest and termite mound were done. The Atomic Absorption Spectrophotometer and Inductively Coupled Plasma Mass Spectrophotometer studies showed that ant nest and termite mound samples were found to contain elements viz., zinc, selenium, lead, cadmium, nickel, drought and chromium. Based on Scanning Electron Microscope-Energy Dispersive Analysis of X-rays, the size of soil samples collected from ant nest and termite were found to be 27.77 nm and 25.56 nm, respectively. The corrosion resistant zirconium and titanium metals were detected in 0.68 and 0.39% concentration in ant nest and termite mound samples, respectively, representing the insect house as a possible source of rich metals. The ant nest and termite mound materials contain quartz, microcline, kaolinite, and clay minerals. Ant nests and termite mounds can thus be used as hydrological indicators to address the problems of soil erosion.

**Keywords:** Bioindicators, economical, heavy metal, minerals, soil, toxicity

#### Introduction

Soil functioning is important considering its role in ecosystem management (Wall et al., 2012). Soil health is getting disturbed due to soil erosion and some anthropogenic activities. Termites build their mound by the combination of quartz grains with their natural secretions (humidifying agent), vegetable debris and clay minerals (plasticizer) (Echezona et al., 2012). To evaluate the soil ecosystem, bioindicators and biomonitoring functioning is very important. In nature, some species of invertebrates have been recognized as bioindicators and biomonitors of ecology. Soil ecosystems can be assessed using sentinel species as bioindicators (Amiard-Triquet et al., 2012). Based on the changes in the ecosystem affected by natural calamities (e.g., wasps' famine, soil erosion, heavy rainfall) or anthropogenic activities, bioindicator organisms change their communal behavior (Medhi et al., 2020). Reports are available on the role of termite communities in reflecting the soil conditions including macro aggregation of soil, chemical extensive richness, biodiversity, and soil hydrological functions (Duran-Bautista et al., 2020). Bioindicators include honeybees, drosophila, wasp, termites, and ants (Chowdhury et al., 2023). Role of arthropods as bioindicators is attributed to their community-based structure, nature of predator and possibility of statistical analysis (Medhi et al., 2020). Insects which have the capacity to serve as ecological biomarkers can be studied to find the ecotoxicity of that area (Amiard-Triquet et al., 2012). The insects as


bioindicators with their mechanism to combat environmental stress are represented in Table 1.

Biomonitoring is based on the finding changes in the ecosystem by using the biodiversity data of keystone species and natural inhabitants (Ma et al., 2018). The wasps are chemicaresidents of rural as well urban areas and have been reported to serve as biomonitors due to their potential to accumulate metals. *Polistes dominulus* (paper wasps) larval fecal mass are found to contain lead which indicates that wasp has good heavy metal excretion mechanism (Urbini et al., 2006).

#### Ant nests

The role of ants as ecological indicator is attributed to their nest building potential using local resources (Okrutniak and Grześ, 2021; Sorvaň, 2009). Ant's nest is one of the widely studied homes in context of their composition (metal accumulation), architecture (as per the environmental factors and insects' own interest), foraging behavior and ecosystem management (Fagundes et al., 2020). The way ant finds their place to build the nest or new home after the destruction or threat imposed on their nest, the journey of nest relocation, is done by scout ants which uses "one-pass" or "two pass" strategy which relies upon pheromones (Marshall et al., 2003). Scouts use Buffon's needle for the evaluation of nest size. Reports are available, which suggest ant nest size and its architecture are dependent upon the local environmental

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## 27. Title of Paper: Microbial Formulation of Bio-Briquettes using Lignocellulosic and Floral Biomass

Journal of Solid Waste Technology and Management

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### **MICROBIAL FORMULATION OF BIO-BRIQUETTES USING LIGNOCELLULOSIC AND FLORAL BIOMASS**

**M Prajakta Prakash Karale, Akash Ankush Shivankar, Meghmala Sheshrao Waghmode\*, Neha Nitin Patil, Ravindra U. Mene**

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#### **ABSTRACT**

Considering the cost of fuel, it is the need of the hour for the utilization of waste as a fuel source. Leaf litter waste and floral waste biomass present in the surrounding serve as potential materials in bio-briquettes formulation. Leaf litter wastes (Almond leaves, Ashoka leaves, Cluster fig leaves), and floral wastes such as (Marigold, Tuberoses, and Rose) was used for the study. The waste was microbially treated using *Lactobacillus plantarum* ATCC 8014 and *Lactobacillus brevis* ATCC 14869 for rapid decomposition of wastes. The briquettes were formulated using wet briquetting, manual pressure, and cylindrical mould methods. Paper pulp along with wheat bran at a 35:5 ratio was used as an artificial binding agent. The preliminary analysis includes the contents of moisture, volatile matter, ash, fixed carbon, etc. Bio briquettes were ultimately analyzed by FESEM, FT-IR, TGA, Density, and Calorific values. Comparisons were done using untreated lignocellulosic biomass-based briquettes and commercially available briquettes. Briquettes made from waste that has undergone microbial processing have a calorific value of 5968.20w kJ/Kg, a density of 0.26 kg/cm<sup>3</sup>, 8.4% moisture content, 10% volatile matter content, 13.65% ash content, 67.95% fixed carbon content, a maximum burning time of 17 minutes, and a minimum ignition time of 3 minutes. While the briquettes made from untreated waste have calorific value of 4205.10 kJ/Kg, density of 0.20 kg/cm<sup>3</sup>, 10.8% moisture content, 15% volatile matter content, 15.11% ash content, 59.05% fixed carbon content. This comparative study shows microbially treated bio briquettes can offer good agriculture waste management and new fuel opportunities.

**Keywords:** Bio-briquettes, floral waste, Leaf litter waste, Wet briquetting.

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#### **1. Introduction: -**

Energy is notably essential in improvement, national and local environmental protection (Mohammed et al., 2020, Oladeji and Oyetunji, 2013). The issue of an energy crisis is raised by the depletion of natural resources (Anggono et al., 2017). Fossil fuel is currently the primary energy source utilised to produce everyday fuels like kerosene and cooking gas (Demirbas 2007). The prices of fuel are influenced by declining energy sources. Due to a large market's demands and scarce supplies, fuel prices will rise. Production and proper use of energy are very essential and to address these

concerns and lead to sustainable improvement various new methods are used (Ajimotokan et al., 2019, Pandey and Regmi, 2013). Biomass has been taken into consideration as an amazing capacity renewable energy source, both for the richer countries and for the developing world (Demirbas 2007, Demirbas 2001). Biomass is considered the third-largest energy source in the world, after coal, oil, and other fuels (Anggono et al., 2017, Bapat et al., 1997). Floral waste has been reported to have the potential to serve as the source as value added products (Waghmode et al., 2018). The briquettes made from turning low bulk-density biomass into high bulk-density fuel are known as biomass briquettes. The unconventional energy source

## 28 Title of the Paper: Bioelectricity Production from River Waste Water

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### "Bioelectricity Production from River Waste Water"

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#### ABSTRACT:

Bioelectricity is one of the major non conventional forms of the energy. The aim of this systematic study was to update the current state of research and to evaluate biological effects of static electric field. Developmental bioelectricity refers to the regulation of cell, tissue, and organ-level patterning and behaviour as the result of endogenous electrically mediated signaling. Cells and tissues of all types use ion fluxes to communicate electrically. The charge carrier in bioelectricity is the ion (charged atom), and an electric current and field is generated whenever a net ion flux occurs. Endogenous electric currents and fields, ion fluxes, and differences in resting potential across tissues comprise an ancient and highly conserved communicating and signaling system. In this current study MFC (Microbial Fuel Cell) from river waste water was prepared. These MFC contain copper wire (2.0 mm) as anode and aluminum plates as the cathode. When consistently water quality indices were checked, we found 10 % reduction in the values of BOD and COD. In this study we can see the continuous production of potential difference of 2 volts. It was also observed that Potential difference was increased after addition of 5% Methyl Orange within the river waste water. The 5 days of Incubation period, increase in the potential difference was observed. Current study of the isolates confirmed that they have ability to convert organic matter of river waste water to nitrate and nitrite by nitrification process. In further study, the fish toxicity assay was performed using the selected *Cyprinus carpio* (Common carp) and *Poecilia reticulata* (Gappi) and found to have zero mortality rates after treatment.

**Keywords:** Bioelectricity, Nitrification process, Fish toxicity, Water quality indices.

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#### INTRODUCTION:

Our regular life is totally dependent on electricity. Be it Lights, Fans, escalators, vehicles on the road, water supply to home; almost everything requires energy-"The electrical energy". Now a days electricity has reached to remote areas. Thus resultant requirement of electricity is very high. Alongwith conventional production, bioproduction of electricity is very essential [12]. A way has been studied towards Green Energy. Bioelectricity is produced by the different phenomenon like electron transport chain reaction and glycolysis. Microorganisms also show potential to produce bioelectricity. Bacterial cultures also have ability to produce potential difference. For this Purpose we need to accessorize the bacteria with MFC ( Microbial Fuel Cell).MFC is nothing but the apparatus which required to collect the electrons. The study of MFC was first used by [1][2] to generate electricity the *E. coli*. and electrodes. Biochemical fuel system generate electric current by diverting electrons produced in redox reaction. In MFC the anodes perform as electron donor and oxidizes compound and the cathodes perform as oxidizing agent or electron acceptor. MFCs can be grouped into two general categories: Mediated and Unmediated. In early 20 th century, Mediated MFCs were common. The mediator used for this was chemicals. Unmediated MFCs emerged in the 1970 in this type of MFCs bacteria are mediators and typically have electrochemical activity due to redox proteins such as Cytochrome on their outer membrane. In the 21 st century MFC have started to find commercial use in waste water treatment. For the preparation of MFC reuse able plastic containers were used. Then these containers are attached with cathode (aluminum sheet) and anode (copper wire 2.0 mm). Then MFCs are connected in series to complete the circuit along with multimeter. The first reading of the sample was noted as  $\pm 1.019$  m volt. Microbial fuel cells (MFC) are having operational or functional advantages over the technologies currently used for generating energy from waste water. This study showed that production of large amount of electricity can be produce which can be used for household or small scale use. The bioelectricity production can be future project to be a good solution over a big problem of shortage of electricity and waste water management [5].

## 29. Title of the Paper: Bioelectricity Production from Algal Water Sample Using Microbial Fuel Cells

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**ORIGINAL ARTICLE**      **OPEN ACCESS**

### Bioelectricity Production from Algal Water Sample Using Microbial Fuel Cells

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**ABSTRACT:**

Renewable energy source is a need of developing countries to fulfill their present and future energy requirements. Microbial fuel cell technology represents a new form of renewable energy by generating electricity from algal sample. The demand for electrical energy to some extent can be fulfilled by this technology. Biomass is a good choice of electricity and algae are the most easily available source of biomass. The present study was aimed to find out the potency of bioelectricity produced by microalgae based microbial fuel cell (MFC) technology using algal water sample. This technology produces energy with maximum efficiency and minimum cost. The work was focused on the feasibility and potential generation of bioelectricity from algal water sample. The bioelectricity production was carried by using six chamber systems and it was found to generate up to 3 volts of energy. The scale up studies on this in future may lead to the fulfillment of electric energy needs by green earth initiatives and achievement of sustainability in energy production.



**Graphical Abstract**

**Keywords:** Algae, Microbial Fuel Cell (MFCs), Bioelectricity, Energy.

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**1. INTRODUCTION:**

Conventional methods of electrical energy generation are posing threat to Green Earth. Hence, there is a dire need for Green Earth initiatives and achievements of sustainable energy as evident from the recently held discussions during United Nations Climate Change Conference 2022 (COP27, Egypt, November 2022). Study on application of Microbial Fuel Cell (MFCs) employing algal biomass could be answer for

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### 30. Title of Paper: Morphological & Elemental Analysis of Termites Mound & Ant Nest in Agriculturally Prominent Area

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Research Article



## Morphological and elemental analysis of termite mound and ant nest in agriculturally prominent area

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### Abstract

Soil management is important for the farmers to improve the crop yield. In nature some invertebrates serve as bioindicators and biomonitors. Biogenic structure built by insects is important for controlling soil erosion and water reserves. Ants and termites nest architecture along with the elemental analysis was studied to evaluate soil health and possible threats imposed by heavy metals in the area. The soil samples were collected and analyzed for various parameters. Systematic study of porosity, composition, and nutritional values of soil in ant nest and termite mound were done. The Atomic Absorption Spectrophotometer and Inductively Coupled Plasma Mass Spectrophotometer studies showed that ant nest and termite mound samples were found to contain elements viz., zinc, selenium, lead, cadmium, nickel, drought and chromium. Based on Scanning Electron Microscope-Energy Dispersive Analysis of X-rays, the size of soil samples collected from ant nest and termite were found to be 27.77 nm and 25.56 nm, respectively. The corrosion resistant zirconium and titanium metals were detected in 0.68 and 0.39% concentration in ant nest and termite mound samples, respectively, representing the insect house as a possible source of rich metals. The ant nest and termite mound materials contain quartz, microcline, kaolinite, and clay minerals. Ant nests and termite mounds can thus be used as hydrological indicators to address the problems of soil erosion.

**Keywords:** Bioindicators, economical, heavy metal, minerals, soil, toxicity

### Introduction

Soil functioning is important considering its role in ecosystem management (Wall et al., 2012). Soil health is getting disturbed due to soil erosion and some anthropogenic activities. Termites build their mound by the combination of quartz grains with their natural secretions (humidifying agent), vegetable debris and clay minerals (plasticizer) (Echezona et al., 2012). To evaluate the soil ecosystem, bioindicators and biomonitoring functioning is very important. In nature, some species of invertebrates have been recognized as bioindicators and biomonitors of ecology. Soil ecosystems can be assessed using sentinel species as bioindicators (Amiard-Triquet et al., 2012). Based on the changes in the ecosystem affected by natural calamities (e.g., wasps' famine, soil erosion, heavy rainfall) or anthropogenic activities, bioindicator organisms change their communal behavior (Medhi et al., 2020). Reports are available on the role of termite communities in reflecting the soil conditions including macro aggregation of soil, chemical extensive richness, biodiversity, and soil hydrological functions (Duran-Bautista et al., 2020). Bioindicators include honeybees, drosophila, wasp, termites, and ants (Chowdhury et al., 2023). Role of arthropods as bioindicators is attributed to their community-based structure, nature of predator and possibility of statistical analysis (Medhi et al., 2020). Insects which have the capacity to serve as ecological biomarkers can be studied to find the ecotoxicity of that area (Amiard-Triquet et al., 2012). The insects as

bioindicators with their mechanism to combat environmental stress are represented in Table 1.

Biomonitoring is based on the finding changes in the ecosystem by using the biodiversity data of keystone species and natural inhabitants (Ma et al., 2018). The wasps are chemicaresidents of rural as well urban areas and have been reported to serve as biomonitors due to their potential to accumulate metals. *Polistes dominulus* (paper wasps) larval fecal mass are found to contain lead which indicates that wasp has good heavy metal excretion mechanism (Urbini et al., 2006).

### Ant nests

The role of ants as ecological indicator is attributed to their nest building potential using local resources (Okrutniak and Grześ, 2021; Sorvari, 2009). Ant's nest is one of the widely studied homes in context of their composition (metal accumulation), architecture (as per the environmental factors and insects' own interest), foraging behavior and ecosystem management (Fagundes et al., 2020). The way ant finds their place to build the nest or new home after the destruction or threat imposed on their nest, the journey of nest relocation, is done by scout ants which uses "one-pass" or "two pass" strategy which relies upon pheromones (Marshall et al., 2003). Scouts use Buffon's needle for the evaluation of nest size. Reports are available, which suggest ant nest size and its architecture are dependent upon the local environmental

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31 Title of Paper: Nanotoxicological Study of Cu-Doped TiO<sub>2</sub> Nanoparticles on Gram Positive Bacteria *Bacillus amyloliquifaciens* Title of the Paper: Isolation, and Characterization of *Cladosporium alboflavescens* for Acetaminophen Biodegradation

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ORIGINAL ARTICLE

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### Nanotoxicological study of Cu-doped TiO<sub>2</sub> nanoparticles on Gram positive bacteria *Bacillus amyloliquifaciens*

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#### ABSTRACT

Titanium dioxide is being one of technologically important material in the field of nanotechnology. Titanium dioxide doped with copper nanoparticles are widely used because of its thermodynamic stability, anticorrosion, high photo catalytic activity, wide band gap, high transmittance in visible and infrared spectral range. In the present study, TiO<sub>2</sub> doped with copper nanoparticles was synthesized from Titanium isopropoxide as a precursor using hydrothermal method and sol-gel technique. Cu doped TiO<sub>2</sub> nanoparticles were characterized by Fourier-transform infrared spectroscopy (FTIR), UV-Visible spectroscopy, and scanning electron microscopy with Energy Dispersive X-ray Spectroscopy (SEM / EDX). The Cu doped TiO<sub>2</sub> nanoparticles were found to be spherical, ellipsoidal and irregular in shape. Individual nanoparticles as well as a few aggregates are found having the size of 5-20 nm. The biocompatibility of the Cu doped TiO<sub>2</sub> nanoparticles with their photo catalytic activity make them future candidate for the development of sustainable environmental remediation technologies. To assess bioremoval of the Cu doped nanoparticles on the microorganisms, this study was undertaken. In this study growth of *Bacillus amyloliquifaciens* was checked against various concentration of nanoparticles prepared by the both methods (2, 3, 4 and 5w/v %). It was seen that the microorganism has ability to grow in presence of nanoparticles with increase in the total protein content. The 5% concentration of Cu doped TiO<sub>2</sub> enhanced the cell mass protein of *Bacillus amyloliquifaciens* by 3.63 times.

**Keywords:** *Bacillus amyloliquifaciens*, Cu doped TiO<sub>2</sub>, Sol Gel, and Bioremediation

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#### 1) INTRODUCTION:

Due to the enormous applications of nanotechnology, the environmental and ecological effects of nanomaterials have to be considered. Changes of nanomaterials will not only help ensure the safety of Nano technological applications, but also help design functional materials that have minimal adverse effects [3]. Titanium dioxide (TiO<sub>2</sub>) has been widely used in many fields [2]. To enhance the functional properties and applicability of titanium dioxide, doped versions of TiO<sub>2</sub> are benign synthesized to enhance catalytic activity for light harvesting applications [5]. Many researchers have conducted studies to evaluate if nano-scale titanium dioxide would have biological impacts [1]. TiO<sub>2</sub> NPs has been reported to have antimicrobial activities due to the reactive oxygen species formation. On the other hand, copper NPs appear to have higher cytotoxicity than copper ions because they may penetrate the cell membrane and release copper ions inside the cell [15]. However, it is still not clear whether there is synergistic effect when TiO<sub>2</sub> NPs are doped with CuO. Also, very few studies have examined the natural remediation of toxic metal NPs from the environment [17], which can be another important consideration of NPs; ecological impact. This study employed a model bacterial species: *Bacillus amyloliquifaciens* a Gram-positive bacterium and a model strain for the study of Nano toxicology. The objectives of this study are: 1) to determine the toxicity of Cu-doped TiO<sub>2</sub> NPs; and 2) to investigate bacterial responses to NPs.

#### 2) MATERIALS AND METHODS

##### 2.1) Synthesis of Cu doped Nanoparticles:

Cu doped NP s are Synthesized by two methods i) Hydrothermal Method ii) Sol gel Method

##### 2.1.1) Hydrothermal Method:

The term hydrothermal process is defined as performing chemical reaction in solvent contained in sealed vessels in which the temperature of solvent can be brought to around their critical points via heating



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## 32. Title of Paper: Evaluation of in Vitro Mutagenic Activity of Difenconazole Technical Mancozeb Technical and Triciclazole Technical by AMES Salmonella Microsome Assay

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ORIGINAL ARTICLE

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### EVALUATION OF IN VITRO MUTAGENIC ACTIVITY OF DIFENOCONAZOLE TECHNICAL, MANCOZEB TECHNICAL AND TRICYCLAZOLE TECHNICAL BY AMES SALMONELLA MICROSOME ASSAY

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#### ABSTRACT:

Fungicides are agrochemicals used in crop protection. Fungal infection to the crop significantly impact on crop yield and quality. For crop management fungicides are used to control disease during establishment and development of crop to increase the productivity. Mutagenic potential of three fungicides systemic with preventive and curative fungicide-Difenconazole Technical, contact fungicide-Mancozeb Technical and systemic fungicide-Tricyclazole Technical was evaluated by using Ames's test. The mutagenicity was evaluated by study of its ability to induce reverse mutation on selected histidine loci in strains of *Salmonella typhimurium* viz. TA1535, TA97a, TA98, TA100 and TA102 with/without S9. A Preliminary Cytotoxicity Test was performed at 5000, 2500, 1250, 625, 312.5, 156.25, 78.125 and 39.0625 µg/plate in TA98 and TA100 strains. The fungicides were found to be non-cytotoxic in Preliminary Cytotoxicity Test at and up to 5000 µg/plate. Therefore, the doses selected for main study were half log difference ( $\sqrt{10}$ ) interval, which were 5000, 1500, 500, 150, and 50 µg /plate in  $\pm$ S9. The main study was performed as Trial I by plate incorporation method with 5% S9 and without S9. Trial II conducted by pre-incubation method using with 10% S9 and without S9. Results indicated that the revertant frequencies at all concentrations of fungicides in strains TA1535, TA97a, TA98, TA100, and TA102 in  $\pm$ S9 were comparable to the revertant counts observed in the concurrent DMSO control. Difenconazole Technical, Mancozeb Technical and Tricyclazole Technical are non-mutagenic at and up to 5000 µg/plate in all the strains of *Salmonella typhimurium*.

**Key words:** Fungicides, Mutagenicity, Cytotoxicity, *Salmonella typhimurium*

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#### INTRODUCTION:

Plant pathogenic fungi cause devastating damage to crop production worldwide. Fungicides are essential components of crop protection and have played a significant role in managing several devastating crop diseases and realizing optimum crop yields (11, 18). Their use has assumed importance in the control of more damaging plant pathogens against which host resistance is not easily available or is unstable, such as polycyclic oomycete pathogens. In some cases, the benefit gained through fungicide use is more critical to the extent that certain crops, such as potato, melons, and grapes, to name a few which cannot be cultivated in the absence of disease control that remains heavily dependent on the use of fungicides.

Most of the fungicides have low to moderate toxicity. However, several fungicides, such as alkyl dithiocarbamic acid (manganese, zinc, and ammonium salts), halogenated substituted monocyclic aromatics (dinocap), carbamic acid derivatives (maneb and zineb metabolites and ethylene ethiurammonosulfide) acid derivatives. More than 80% of all oncogenic risk from the use of pesticides derives from a few fungicides; only a small number of pesticide-related deaths from fungicides have been reported (1, 6, 14). Some fungicides are known to disrupt the endocrine system and may lead to reproductive and developmental abnormalities. Based on the pre-natal toxicity, several fungicides have been deregistered or banned in many countries but are still used in other, less regulated areas of the world.

Fungicides based on their translocation mode in plant, can either be contact (Mancozeb Technical) (6), translaminar (Tricyclazole Technical) (15) or systemic (Difenconazole Technical) (14, 18). A systemic fungicide is the one which is taken up by a plant and is then translocated within the plant system, it can then protect the plant from infections and restrict/control the further growth of existing fungal infection. Contact fungicides doesn't enter the plant, but controls the fungi when it comes in contact with



### 33. Title of the Paper: Bioelectricity Production from River Waste Water

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**ORIGINAL ARTICLE** **OPEN ACCESS**

#### "Bioelectricity Production from River Waste Water"

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Corresponding author: Seema D. Sherkar\*[sherkars1988@gmail.com](mailto:sherkars1988@gmail.com)

**ABSTRACT:**  
*Bioelectricity is one of the major non conventional forms of the energy. The aim of this systematic study was to update the current state of research and to evaluate biological effects of static electric field. Developmental bioelectricity refers to the regulation of cell, tissue, and organ-level patterning and behaviour as the result of endogenous electrically mediated signaling. Cells and tissues of all types use ion fluxes to communicate electrically. The charge carrier in bioelectricity is the ion (charged atom), and an electric current and field is generated whenever a net ion flux occurs. Endogenous electric currents and fields, ion fluxes, and differences in resting potential across tissues comprise an ancient and highly conserved communicating and signaling system. In this current study MFC (Microbial Fuel Cell) from river waste water was prepared. These MFC contain copper wire (2.0 mm) as anode and aluminum plates as the cathode. When consistently water quality indices were checked, we found 10 % reduction in the values of BOD and COD. In this study we can see the continuous production of potential difference of 2 volts. It was also observed that Potential difference was increased after addition of 5% Methyl Orange within the river waste water. The 5 days of Incubation period, increase in the potential difference was observed. Current study of the isolates confirmed that they have ability to convert organic matter of river waste water to nitrate and nitrite by nitrification process. In further study, the fish toxicity assay was performed using the selected *Cyprinus carpio* (Common carp) and *Poecilia reticulata* (Guppy) and found to have zero mortality rates after treatment.*

**Keywords:** Bioelectricity, Nitrification process, Fish toxicity, Water quality indices.  
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**INTRODUCTION:**  
Our regular life is totally dependent on electricity. Be it Lights, Fans, escalators, vehicles on the road, water supply to home; almost everything requires energy-"The electrical energy". Now a days electricity has reached to remote areas. Thus resultant requirement of electricity is very high. Alongwith conventional production ,bioproduction of electricity is very essential [12]. A way has been studied towards Green Energy . Bioelectricity is produced by the different phenomenon like electron transport chain reaction and glycolysis. Microorganisms also show potential to produce bioelectricity. Bacterial cultures also have ability to produce potential difference. For this Purpose we need to accessorize the bacteria with MFC ( Microbial Fuel Cell).MFC is nothing but the apparatus which required to collect the electrons. The study of MFC was first used by [1][2] to generate electricity the *E. coli*. and electrodes. Biochemical fuel system generate electric current by diverting electrons produced in redox reaction. In MFC the anodes perform as electron donar and oxidizes compound and the cathodes perform as oxidizing agent or electron acceptor. MFCs can be grouped into two general categories: Mediated and Unmediated. In early 20 th century, Mediated MFCs were common. The mediator used for this was chemicals. Unmediated MFCs emerged in the 1970 in this type of MFCs bacteria are mediators and typically have electrochemical activity due to redox proteins such as Cytochrome on their outer membrane. In the 21<sup>st</sup> century MFC have started to find commercial use in waste water treatment. For the preparation of MFC reuse able plastic containers were used. Then these containers are attached with cathode (aluminum sheet) and anode (copper wire 2.0 mm). Then MFCs are connected in series to complete the circuit along with multimeter. The first reading of the sample was noted as ± 1.019 m volt. Microbial fuel cells (MFC) are having operational or functional advantages over the technologies currently used for generating energy from waste water. This study showed that production of large amount of electricity can be produce which can be used for household or small scale use. The bioelectricity production can be future project to be a good solution over a big problem of shortage of electricity and waste water management [5].

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### 34. Title of Paper: Morphological & Elemental Analysis of Termites Mound & Ant Nest in Agriculturally Prominent Area

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Research Article



## Morphological and elemental analysis of termite mound and ant nest in agriculturally prominent area

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Soil management is important for the farmers to improve the crop yield. In nature some invertebrates serve as bioindicators and biomonitors. Biogenic structure built by insects is important for controlling soil erosion and water reserves. Ants and termites nest architecture along with the elemental analysis was studied to evaluate soil health and possible threats imposed by heavy metals in the area. The soil samples were collected and analyzed for various parameters. Systematic study of porosity, composition, and nutritional values of soil in ant nest and termite mound were done. The Atomic Absorption Spectrophotometer and Inductively Coupled Plasma Mass Spectrophotometer studies showed that ant nest and termite mound samples were found to contain elements viz., zinc, selenium, lead, cadmium, nickel, drought and chromium. Based on Scanning Electron Microscope-Energy Dispersive Analysis of X-rays, the size of soil samples collected from ant nest and termite were found to be 27.77 nm and 25.56 nm, respectively. The corrosion resistant zirconium and titanium metals were detected in 0.68 and 0.39% concentration in ant nest and termite mound samples, respectively, representing the insect house as a possible source of rich metals. The ant nest and termite mound materials contain quartz, microcline, kaolinite, and clay minerals. Ant nests and termite mounds can thus be used as hydrological indicators to address the problems of soil erosion.

**Keywords:** Bioindicators, economical, heavy metal, minerals, soil, toxicity

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Soil functioning is important considering its role in ecosystem management (Wall et al., 2012). Soil health is getting disturbed due to soil erosion and some anthropogenic activities. Termites build their mound by the combination of quartz grains with their natural secretions (humidifying agent), vegetable debris and clay minerals (plasticizer) (Echezona et al., 2012). To evaluate the soil ecosystem, bioindicators and biomonitoring functioning is very important. In nature, some species of invertebrates have been recognized as bioindicators and biomonitors of ecology. Soil ecosystems can be assessed using sentinel species as bioindicators (Amiard-Triquet et al., 2012). Based on the changes in the ecosystem affected by natural calamities (e.g., wasps' famine, soil erosion, heavy rainfall) or anthropogenic activities, bioindicator organisms change their communal behavior (Medhi et al., 2020). Reports are available on the role of termite communities in reflecting the soil conditions including macro aggregation of soil, chemical extensive richness, biodiversity, and soil hydrological functions (Duran-Bautista et al., 2020). Bioindicators include honeybees, drosophila, wasp, termites, and ants (Chowdhury et al., 2023). Role of arthropods as bioindicators is attributed to their community-based structure, nature of predator and possibility of statistical analysis (Medhi et al., 2020). Insects which have the capacity to serve as ecological biomarkers can be studied to find the ecotoxicity of that area (Amiard-Triquet et al., 2012). The insects as

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Biomonitoring is based on the finding changes in the ecosystem by using the biodiversity data of keystone species and natural inhabitants (Ma et al., 2018). The wasps are chemicaresidents of rural as well urban areas and have been reported to serve as biomonitors due to their potential to accumulate metals. *Polistes dominulus* (paper wasps) larval fecal mass are found to contain lead which indicates that wasp has good heavy metal excretion mechanism (Urbini et al., 2006).

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## 35. Title of Paper: Safety Assessment of Libirite Capsule (a Polyherbal Formulation) in experimental Animals (Sprague Dawley rats and Swiss Albino Mice)

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Original Article

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### Safety assessment of Libirite capsule (a polyherbal formulation) in experimental animals (Sprague Dawley rats and Swiss albino mice)

Vasant E. Narke<sup>1</sup>, Sanjay U. Nipanikar<sup>2</sup>, Ujwala V. Khisti<sup>1</sup>, Sachin A. Upasani<sup>2</sup>

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**Abstract**

**BACKGROUND:** Libirite capsule (LC) is a polyherbal formulation, developed to treat erectile dysfunction and loss of libido.

**OBJECTIVE:** Acute oral toxicity studies in Swiss Albino mice and Sprague Dawley rats, and repeated dose subchronic 90-day toxicity study were performed to assess the safety of LC.

**MATERIALS AND METHODS:** In an acute study, LC was orally administered at 2000 mg/kg to the animals as per organization for economic cooperation and development-423 guidelines. In a repeated dose oral toxicity study, LC was administered through oral gavage in a dose of 250, 500, and 1000 mg/kg for 90 days and compared with control groups as per organization for economic cooperation and development-408 guidelines. Posttreatment changes in food consumption, body weight, and biochemical, hematological, and laboratory parameters were observed. No significant changes in the histopathological examination were observed in any group.

**RESULTS:** LC did not produce any adverse or mortality events in animals during acute studies. In a 90-day toxicity study, rats exhibited no toxicity symptoms or death. No significant changes were found in hematological and biochemical parameters. No significant alteration was seen in organ and body weight. Microscopic findings were incidental and identical for control and treated animals at 1000 mg/kg. LC did not produce any histopathological changes in target organs. No change in the recovery group was observed when compared with the control group animals, which indicated a complete reversal.

**CONCLUSIONS:** Median lethal dose<sub>50</sub> of LC was observed to be more than 2000 mg/kg. No observed adverse effect level of LC was considered 1000 mg/kg.

**Keywords:**  
Acute, libido, Libirite capsule, erectile dysfunction, polyherbal, subchronic, toxicity

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### Introduction

Erectile dysfunction (ED) or male impotence is an inappropriate penile erection sufficiently required for sexual activity.<sup>[1]</sup> Various studies reported that around 15%–20% of men described some sexual problems.<sup>[2,3]</sup> About 80% of cases of ED have an organic etiological factor behind them, which was once considered psychogenic.<sup>[2-4]</sup> Androgen deficiency, atherosclerosis, hypertension, diabetes mellitus, hyperlipidemia, prostate issues, cardiac disorders, spinal cord injuries, penis anatomical deformity, social and psychological reasons, stress, and depression can cause male impotency.<sup>[5,4]</sup>

The management of male sexual impotence includes, but is not limited to, oral phosphodiesterase type 5 inhibitor drugs such as sildenafil citrate and intracorporeal agents with vasodilatory effects.<sup>[5]</sup> However, prolonged usage of many of these drugs can cause major side effects, including

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## 36 Title of the Paper- C: ZnO Composites for Improving Catalytic Activity of Zn



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### C: ZnO Composites for Improving Catalytic Activity of ZnO

Prathamesh Kadam,<sup>1,2</sup> Kisan Gadave,<sup>2</sup> Sandesh Jadkar,<sup>1</sup> Vishal Kadam<sup>1</sup> and Chaitali Jagtap<sup>1,\*</sup>

#### Abstract

Nowadays industries are letting out many reactive dyes making them waste and causing many serious environmental and ecological problems. Many researchers are working on the appropriate method to remove pollutants and impurities from different industries. ZnO is considered as important photocatalyst, due to its excellent properties, including non-toxicity, high redox potential, low cost, and environmentally friendly features. Activated carbon, due to its high surface area and pore volume, is considered the most efficient adsorbent in pollutant removal. It is considered an important adsorbent having a unique structure related to its functional properties. Kinetic studies of dye adsorption on activated carbon and its modified forms are widely studied by many researchers. We have synthesized ZnO by reflux method followed by doping various concentrations (2:1), (1:1) and (1:2) of activated carbon into ZnO. The Photocatalytic experiment is performed with Methylene Blue, Eosin-Y Dye, and Rose Bengal dye. The synthesized ZnO powder and ZnO composite with activated carbon are characterized by various characterization techniques such as UV-Visible Spectra, X-Ray diffraction, and Scanning Electron Microscopy. The band calculated was observed for (a), (b), (c) and (d) respectively to be nearly equal to 3.2 eV. Well-distributed activated carbon attached to the surface of ZnO is observed. The composition of zinc (Zn) and oxygen (O) peaks approves the purity of ZnO nanoparticles. Further, Photocatalytic dye degradation of Methylene Blue dye was observed in 14 min.

**Keywords:** ZnO; Composite; Activated Carbon; Photodegradation.

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Article type: Research article.

#### 1. Introduction

Nowadays industries are letting out many reactive dyes making them waste and causing many serious environmental and ecological problems. This dye-containing wastewater is very harmful to aquatic life and ecology.<sup>[1]</sup> Many researchers are working on the appropriate method to remove pollutants and impurities from different industries.<sup>[2]</sup> There are many physical and chemical methods used to remove dye.<sup>[3,4]</sup> Contaminants from waste water leads to skin ulcers, many skin diseases, damage to respiratory and digestive systems and other countless side effects.<sup>[5]</sup> Photocatalytic treatment of organic pollutants requires photo-excitabile semiconductor material like ZnO, TiO<sub>2</sub>, ZrO<sub>2</sub>, WO<sub>3</sub>, etc.<sup>[6]</sup> Recently photocatalytic dye degradation is extensively used for the removal of dyes from wastewater by many scientists over the world.<sup>[7,8]</sup> Semiconductor photocatalysis is a powerful and cutting-edge approach to wastewater remediation, thereby

offering the huge possibility of harnessing naturally available sunlight.<sup>[9]</sup> ZnO has attracted many researchers due to its low cost,<sup>[10]</sup> high level of photocatalytic activity,<sup>[11]</sup> non-toxic nature,<sup>[12]</sup> chemical stability,<sup>[13]</sup> and optical properties.<sup>[14]</sup> The increased degradation efficiency of the carbon source was the main contribution for the improved decolorization of the sludge adding with conductive Polyaniline.<sup>[15]</sup> When illuminated with an appropriate light source, the photocatalyst generates electron/hole pair with free electrons produced in the empty conduction band leaving positive holes in the valence band. These electron/hole pairs are capable of initiating a series of chemical reactions that eventually mineralize the pollutants.<sup>[16]</sup> ZnO can be synthesized by various methods such as the hydrothermal method,<sup>[17]</sup> Sol-Gel,<sup>[18]</sup> Precipitation method,<sup>[19]</sup> Pyrolysis method,<sup>[20]</sup> Solvothermal method,<sup>[21]</sup> Spray pyrolysis,<sup>[22]</sup> Reflux method.<sup>[23]</sup> ZnO has various applications such as gas sensors,<sup>[24]</sup> photocatalysis.<sup>[25]</sup>

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### 37. Title of Paper: Morphological & Elemental Analysis of Termites Mound & Ant Nest in Agriculturally Prominent Area

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Research Article

## Morphological and elemental analysis of termite mound and ant nest in agriculturally prominent area

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**Abstract**  
Soil management is important for the farmers to improve the crop yield. In nature some invertebrates serve as bioindicators and biomonitors. Biogenic structure built by insects is important for controlling soil erosion and water reserves. Ants and termites nest architecture along with the elemental analysis was studied to evaluate soil health and possible threats imposed by heavy metals in the area. The soil samples were collected and analyzed for various parameters. Systematic study of porosity, composition, and nutritional values of soil in ant nest and termite mound were done. The Atomic Absorption Spectrophotometer and Inductively Coupled Plasma Mass Spectrophotometer studies showed that ant nest and termite mound samples were found to contain elements viz., zinc, selenium, lead, cadmium, nickel, drought and chromium. Based on Scanning Electron Microscope-Energy Dispersive Analysis of X-rays, the size of soil samples collected from ant nest and termite were found to be 27.77 nm and 25.56 nm, respectively. The corrosion resistant zirconium and titanium metals were detected in 0.68 and 0.39% concentration in ant nest and termite mound samples, respectively, representing the insect house as a possible source of rich metals. The ant nest and termite mound materials contain quartz, microcline, kaolinite, and clay minerals. Ant nests and termite mounds can thus be used as hydrological indicators to address the problems of soil erosion.

**Keywords:** Bioindicators, economical, heavy metal, minerals, soil, toxicity

**Introduction**  
Soil functioning is important considering its role in ecosystem management (Wall et al., 2012). Soil health is getting disturbed due to soil erosion and some anthropogenic activities. Termites build their mound by the combination of quartz grains with their natural secretions (humidifying agent), vegetable debris and clay minerals (plasticizer) (Echezona et al., 2012). To evaluate the soil ecosystem, bioindicators and biomonitoring functioning is very important. In nature, some species of invertebrates have been recognized as bioindicators and biomonitors of ecology. Soil ecosystems can be assessed using sentinel species as bioindicators (Amiard-Triquet et al., 2012). Based on the changes in the ecosystem affected by natural calamities (e.g., wasps' famine, soil erosion, heavy rainfall) or anthropogenic activities, bioindicator organisms change their communal behavior (Medhi et al., 2020). Reports are available on the role of termite communities in reflecting the soil conditions including macro aggregation of soil, chemical extensive richness, biodiversity, and soil hydrological functions (Duran-Bautista et al., 2020). Bioindicators include honeybees, drosophila, wasp, termites, and ants (Chowdhury et al., 2023). Role of arthropods as bioindicators is attributed to their community-based structure, nature of predator and possibility of statistical analysis (Medhi et al., 2020). Insects which have the capacity to serve as ecological biomarkers can be studied to find the ecotoxicity of that area (Amiard-Triquet et al., 2012). The insects as bioindicators with their mechanism to combat environmental stress are represented in Table 1.

Biomonitoring is based on the finding changes in the ecosystem by using the biodiversity data of keystone species and natural inhabitants (Ma et al., 2018). The wasps are chemicaresidents of rural as well urban areas and have been reported to serve as biomonitors due to their potential to accumulate metals. *Polistes dominulus* (paper wasps) larval fecal mass are found to contain lead which indicates that wasp has good heavy metal excretion mechanism (Urbini et al., 2006).

**Ant nests**  
The role of ants as ecological indicator is attributed to their nest building potential using local resources (Okrutniak and Grześ, 2021; Sorvari, 2009). Ant's nest is one of the widely studied homes in context of their composition (metal accumulation), architecture (as per the environmental factors and insects' own interest), foraging behavior and ecosystem management (Fagundes et al., 2020). The way ant finds their place to build the nest or new home after the destruction or threat imposed on their nest, the journey of nest relocation, is done by scout ants which uses "one-pass" or "two pass" strategy which relies upon pheromones (Marshall et al., 2003). Scouts use Buffon's needle for the evaluation of nest size. Reports are available, which suggest ant nest size and its architecture are dependent upon the local environmental

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## 38. Title of Paper: Pd (II)-Complexes of Telluro-substituted Schiff Base Ligands: Effect of the Pendant alkyl Group on Suzuki and Heck Coupling through in situ Generated Palladium nanoparticles

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**Pd(II)-complexes of telluro-substituted Schiff base ligands: Effect of the pendant alkyl group on Suzuki and Heck coupling through in situ generated palladium nanoparticles**

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Homogenous or heterogenous catalysis

**ABSTRACT**

Two telluro-substituted Schiff bases L1/L2 having different pendant carbon chains (-Me in L1 and -C<sub>10</sub>H<sub>21</sub> in L2) and their corresponding square planar Pd(II)-complexes (1/2) have been synthesized and their structural characterization has been carried out using multinuclear NMR and elemental analysis. The ligand L2 showed a Smectic liquid crystalline phase and melts at 81 °C into isotropic liquid whereas L1 and complexes (1/2) did not show any liquid crystalline property. The square planar Pd(II)-complexes (1/2) have been formed through the coordination of ligands (L1/L2) respectively in mono-anionic tridentate mode (Te,N,O<sup>-</sup>) and the fourth coordination sphere at the palladium center is occupied with chloride ion. Both complexes 1/2 (1 to 2 mol%) have been examined as a catalyst for Suzuki and Heck coupling reactions and their activity depends significantly on the length pendant alkyl chain. The results obtained from Hg-/PPh<sub>3</sub>-poisoning and three phase test on Suzuki-Miyaura coupling indicate the participation of both homogeneous as well as heterogeneous palladium species protected with the ligand or its fragment.

**1. Introduction**

The element "tellurium", belongs to the chalcogen family, is a metalloid and molecules containing tellurium can behave as Lewis-acid/-base [1,2]. The ligand chemistry of tellurium has evolved very slowly due to the perception that these ligands were harmful, smell bad and are sensitive to air. However, the coordination chemistry of organo-tellurium ligands has gained considerable attention in the last 30 years. Many research groups were fascinated by the organo-tellurium compounds due to their utilization in material chemistry [3-7], biochemistry [8-13], ligand chemistry [1,2,14-19] and supramolecular structure developments [20-22]. The organo-tellurium ligand chemistry has been intensified since their complexes were found suitable as single-source precursors for the synthesis of metal-telluride semiconductors through chemical vapor deposition (CVD) [23]. Various palladium and platinum chalcogenides [24-35] specifically tellurides have been utilized in the electronic industry [24] as well as in many organic reactions as a catalyst [36-38].

In addition to metal tellurides, several metal complexes of organo-chalcogen ligands including their palladium ones have been reported and utilized as catalysts [39-50]. Although, the data on the understanding of the association of tellurium ligands with metal, their potential use in the formation of catalysts and their application in catalysis are limited [25]. The stability of reactive organotellurium compounds can be improved via intra-molecular coordination by incorporating additional hard donor atoms for instance oxygen or nitrogen along with soft donor tellurium. This led to the possibility of the formation of a highly stable complex with the tuning of the stereo-electronic environment at the metal center [51].

Recently, Pd-complexes of (Se, N, O<sup>-</sup>) donor ligands having different pendant alkyl chains have been utilized as catalysts for the Suzuki-Miyaura coupling (SMC) and the alkyl chain have found to govern their efficiency through the generation of nanoparticles (NPs) said to be "the real" catalytic species [51-56]. Several other complexes have also been explored for various carbon-carbon coupling reactions and the relationship between the length of a ligand's pendent/non-coordinating


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39. Title of Name: Colorimetric Sensing by Naphthalene-Pyridine Containing unit of Schiff base ligand for Multimetallic ion detection for Fe<sup>2+</sup>, Fe<sup>3+</sup>, and Cu<sup>2+</sup>

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## Colorimetric sensing by Naphthalene-Pyridine containing unit of Schiff base ligand for multimetallic ion detection for Fe<sup>2+</sup>, Fe<sup>3+</sup>, and Cu<sup>2+</sup>

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Page 1/23

### Abstract

A hydroxyl Schiff-base namely 2-(1-(pyridin-2-ylmethylimino)ethyl) naphthalen-1-ol (PMNOL) having naphthalene and pyridine units has been synthesized and characterized using <sup>1</sup>H NMR, <sup>13</sup>C NMR, FTIR and UV-vis spectroscopy. Solvent and pH has a significant impact on the UV-vis spectroscopy of PMNOL as ascertained. The UV-Visible spectra technique has been applied to evaluate the sensing capacity towards the metal ions Ni<sup>2+</sup>, Co<sup>2+</sup>, Cu<sup>2+</sup>, Fe<sup>2+</sup>, Fe<sup>3+</sup>, Hg<sup>2+</sup>, Al<sup>3+</sup> Cr<sup>3+</sup>, Ca<sup>2+</sup> and Cd<sup>2+</sup> in the combination of methanol and DMF. By applying the UV-Vis spectra, a considerable shift (50-120) from the origin has been reported. Azomethine (>C=N-) with hydroxyl (-OH) moieties as contained by Schiff base ligand were reported as a colorimetric chemosensor as it coordinates easily with metals and produces coloured metal complexes. The Schiff base ligand displayed colorimetric characteristics with Cu<sup>2+</sup>, Fe<sup>2+</sup>, and Fe<sup>3+</sup> and as a consequence a distinct shift in colour for every metal can easily be recognized by the naked eye. The stoichiometric ratio 1:1 coordination complexation for PMNOL-Fe<sup>2+</sup>, PMNOL-Cu<sup>2+</sup>, and a 2:1 complex mode for HNMAL-Fe<sup>3+</sup> by UV-visible titration as well as Job's plot were postulated. PMNOL may have sensing potential for Fe<sup>2+</sup>, Fe<sup>3+</sup> and Cu<sup>2+</sup> colorimetric detection effectively. The addition of ligand to the metal ions is might be because of LMCT, so as to inhibit C=N isomerization and ICT. Graphical abstract

### 1. Introduction

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**Natural resources as cancer-treating material**

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ABSTRACT

This review study investigates conventional anticancer treatments derived from the world's different parts as a wonderful substitute for pharmaceuticals since they have fewer or no side effects and can fix the disease at its source. This study provides thorough information regarding physiologically active substances derived from various parts of the plant for cancer treatment such as Alkaloids (eryvirine, methyleryvirine, ervolanine, and aervolanine), Terpenoids, Vitamins, Coumarins, Tannins, Carbohydrates, Flavonoids (kaempferol, quercetin, isorhamnetin, persinol, persinoides A and B), Fatty Acids, and Essential Oils). This technique is beneficial in clinical studies for breast, prostate, and colon cancer. The ongoing rise in cancer incidence, the inability of traditional chemotherapies to manage cancer, and the excessive toxicity of chemotherapies all call for a new strategy. The first trial to establish the effectiveness of chemoprevention was conducted in breast cancer patients using tamoxifen, which indicated a substantial reduction in invasive breast cancer. The effectiveness of utilizing chemopreventive drugs to protect high-risk people from cancer suggests that the technique is sound and promising. Dietary components such as capsaicin, cucurbitacin B, isoflavones, catechins, lycopene, benzyl isothiocyanate, phenethyl isothiocyanate, and piperlongumine have been shown to suppress cancer cell growth, indicating that they might be used as chemopreventive agents.

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**1. Introduction**

Cancer has long been regarded as one of the leading causes of mortality, causing widespread suffering. Chemotherapy, radiation treatment, surgery, hormone therapy, and other conventional therapies are accessible. Yet, these medications have a variety of undesirable side effects that have hampered conventional therapy's efficacy. Many phytochemicals found in plants have been studied extensively for their anticancer properties (Groedly et al., 2023; Siegel et al., 2023; Tzenios 2023).

As a result, researchers have several potentials to develop effective anticancer medications using medicinal plants grown in various nations. The current study thoroughly examined the anticancer effects of many phytochemical substances to develop more effective anticancer medications (Khatun et al., 2011; Valçın et al., 2021; Bağcı et al., 2010). Plants are incredibly significant to humans because they contain a wide range of active compounds used in the creation of a wide range of medications (Ahmed et al., 2022; Khan et al., 2022; Mazumder et al., 2022). As such, they might be used to improve cancer therapeutic procedures. Yet, there are significant barriers to modifying extraction system for therapeutic benefit (G. P. Gupta and Massagué 2006; Kojima et al., 2013; Lu et al., 2016; Sahai et al., 2020). Waldenström's maladies, Multiple myeloma, Lymphomas, Leukemias, Hodgkin's maladies, malignant growth of different organs, and Choriocarcinoma (Fig 1), Plants have been used to treat a variety of human illnesses since antiquity, and not just as a source of food. Many plants and plant components are utilized to treat a variety of physical and mental illnesses, as well as to help in human survival. Some medicinal herbs can act as anticancer experts in cases of malignant development (Bose et al., 2022; Pascual et al., 2022; Govind 2011b; Sulaiman et al., 2022). Because of their adaptive immunomodulatory and cell-reinforcing properties, medicinal herbs have been demonstrated to have anticancer properties. They may help the host's immunological response by re-establishing biological balance and sculpting body tissues (Alqathama et al. 2022; Pascual et al., 2022; Kaplan 2022; Kola et al., 2022; Umshanker and Shruti 2011).

Abbreviations: CD8<sup>+</sup>T cells, lymphocytes; DWD, Human Oral Cancer; DU-145, Human Prostrate Cancer; COLO-205, Human Colon Cancer; HepG2, Human liver cancer cell lines; CAS, *Gossia Auriculata* saponin; DIA, Dalton's lymphoma ascites; EAC, Ehrlich ascites carcinoma; MLL, Purified mulberry leaf lectin; MLB, mulberry bark lectin; OPCs, Oligomeric Proanthocyanidins; PTOX, Plastid Terminal Oxidase; HL-60, Human leukemia cancer cells; A549, Human lung epithelial carcinoma cells; ACOXI, Acyl-CoA oxidase 1; TER, Therapeutic enhancement ratio; Hep2c, laryngeal cancer cells; RD, Rhabdomyosarcom; L20B, Mice intestine carcinoma cell line; R6<sub>2</sub>, INS<sup>-</sup>, Rat cancer cell lines; HT29, Human colorectal adenocarcinoma cell line; MCF7, Human breast cancer cell line; L929, Mouse fibroblast cell line; HeLa, Henrietta Lacks; MAPK1, Mitogen-activated protein kinase 1; AKT, Ak strain transforming; UPR, unfolded protein response; LAEF, left atrial emptying fraction; A375, Human Melanoma Reporter Gene Cell lines; MTT, 3-[4,5-dimethylthiazol-2-yl]-2,5 diphenyl tetrazolium bromide; MDA-MB-231, Human breast cancer cell line; COLO-320DM, colorectal adenocarcinoma cancer; Vero, Verdo reno, which means 'green kidney'; Bax, Bcl-2, and PARP-1, Core regulators of the intrinsic pathway of apoptosis; AU565, AU565 breast cancer cells; p-Akt, Phospho-Akt

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Review article

## Chalcogenated Schiff base ligands utilized for metal ion detection

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### ARTICLE INFO

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### ABSTRACT

Metal poisoning has recently arisen as a global concern, which imposes a significant threat to both the environment and human health. Schiff bases and related metal ion complexes are being researched due to their remarkable applications in metal ion detection. Here in this review, we present many chalcogenated sensors for metal ion detection for both biological and heavy metals and a comparison based on detection limit and sensor techniques is discussed. This review also describes the performance of the Schiff base with a multi-donor set for metal ion detection. Aside from prospects, this evaluation offers a general guide to using such environmentally beneficial Schiff bases to identify dangerous chemicals. This review discusses recent advancements in the detection system of metal, including their synthesis methods and sensing applications for the detection of heavy metal ions such as Iron (III), Mercury (II), Copper (II), Chromium (VI), Lead (II), Cobalt (II), Aluminum (III), Zinc (II), Silver (I), and Gold (III), all of which are major environmental pollutants. Different mechanisms of detection such as ICT, IFE, CHEF, CHEQ, etc are also discussed here in detail with examples.

### 1. Introduction

Metal ions are hazardous to both human health and the environment so metal detection systems are becoming more important as metal concentrations rise due to industrialization and urbanization [1–5]. Metals are essential in medicine to keep serum lithium and potassium levels under control in patients being treated for manic depression or high blood pressure [6]. Although various approaches are accessible, and despite previous successes, new work in these areas is necessary. The Schiff base is capable of detecting various metal ions as it contains an azomethine unit [7]. Although Schiff bases are well known for their different biological and catalytic applications [8–10]. Schiff bases are a kind of ligand that has a wide range of applications in coordination chemistry. Their donor–acceptor ease with different metal ions provides

efficient use in metal ion detection. They may act as multidentate ligands for transition and typical metals and anions [11–20]. As a result, significant effort is being put into building viable sensors capable of detecting and evaluating heavy, transition metal ions, and anions in biological systems to detect Serious human illnesses include cancer, diabetes, neurological disorders, and cardiovascular disease [21–24]. In agriculture, it is useful for the detection of organophosphate, nitrite, and carbamate insecticides. [25,26]. Two broad metal detection approaches that are being explored are “recognition” and “reactivity” by Aron et al. 2015. For example, a recognition-based approach is used to construct transition metal probes for copper and nickel, whereas the approach provided here is employed to study cobalt and iron in Fig. 1 [27].

Metal ions also play an important role in donor selection, depending on donor groups and the type of ligands. Several studies have reported

**Abbreviations:** DAP, N<sup>o</sup>-(1E,2E)-3-(4-(dimethylamino)phenyl)allylidene)-3-nitrobenzohydrazide; ROS, Reactive oxygen species; GSH, Glutathione; AIE, Aggregation-induced emission; ESIP, Excited-state intramolecular proton transfer; FRET, Forster resonance energy transfer; LMCT, Ligand to metal charge transfer; ICT, Intra/intermolecular charge transfer; TICT, Twisted intramolecular charge transfer; CHEF, Chelation enhancement fluorescence; IFE, Inner filter Effect; NBSPP, N,N'-bis(salicylidene)-2,6-pyridine-diamine; MPMNP, 2-[(4-methoxy-phenylamino)-methyl]-4-nitro phenol; DSAB, 2-((E)-1,2-diphenyl-2-[(2-2-sulfanyphenyl)imino]ethylideneamino)-1-benzenethiol; MCPH, methoxy chromone-3-carbaldehyde-(30,40-dimethyl)pyrrole hydrazone; MTT, 3-(4,5-dimethyl thiazole-2-yl)-2,5-diphenyl tetrazolium bromide; 4-DHBB, (E)-N'-(4-(diethylamino)-2-hydroxybenzylidene)-2-(benzamido)benzo hydrazide; NDBHC, N'-(4-diphenylamino) benzylidene) hydrazinecarbothiohydrazide; CHEQ, chelation-enhanced fluorescence quenching; SNN, N-(1-thien-2-ylethylidene)benzene-1,2-diamine; NHT, thiophene-substituted naphthyl hydrazone derivative; QT, 8-aminoquinoline thiophene-2-carboxaldehyde; MTT, 3-(4,5-dimethyl thiazole-2-yl)-2,5-diphenyl tetrazolium bromide; HMBT, 2-((5-(2-hydroxy-3-methoxybenzylideneamino)-2H-1,2,4-triazole-3-ylimino)methyl)-6-methoxyphenol; MCAH, 7-methoxy chromone-3-carbaldehyde ((2'-Benzothiazolylthio)-acetyl) hydrazone; HNAT, 2-hydroxy-1-naphthaldehyde-2-amino thiazole; NIMN, 1-[(2-naphthalenylimino)methyl]-2-naphthalenol; MTMBT, 2-((3-methylthiophen-2-yl) methylene-amino)benzenethiol; AR, Aminated rhodamine; AA, Antraldehyde; LOD, Limit of detection; LOQ, Limit of quantification; TPA-Py, triphenylamine-functionalized salicylaldehyde-pyridine.

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**ORIGINAL ARTICLE**

**OPEN ACCESS**

## **Soil indigenous microbial flora for the preparation of leaf venation of leaves**

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### **Abstract**

Leaf venation is an important feature for botanists and taxonomists to identify and catalogue a plant species because venation orientation and quantitative characters are relatively stable at the species level. Present methods of leaf clearing are mostly chemical-based, which are harsh on specimens and cause damage or shrinkage to tissue structure, aside from causing toxic effects on the biota of the soil. The current study attempted to establish a non-toxic and cost-effective biological leaf clearing method for the preparation of leaf venation of leaves using indigenous microbial flora of soil extract. Cellulosic digestion due to the enzymatic activity of indigenous microbial flora leading to leaf vein skeleton formation was reported in *Ficus religiosa*, *Ficus nuda*, *Ficus benjamina*, *Ficus heterophylla*, *Artocarpus lakucha*, and *Artocarpus heterophyllus* with different exposure time periods.

**Keywords:** Leaf clearing, Leaf venation, Plant studies, Soil indigenous microbial flora.

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### **INTRODUCTION**

Leaf architecture is the hierarchical arrangement of different sizes and patterns of veins found on the surface. The arrangement of leaf veins creates a distinct and intricate pattern known as leaf venation. Leaf architecture, viz., the shape, size, margin, leaf base, tip, veins, and petioles, is correlated with plant evolution and has systematic significance in plant identification and classification [1]. Leaf venation is a key to understanding vascular patterning and tissue differentiation, and the leaf architecture impressions are essentially very relevant for plant macrofossils available to paleobotanists and aid in identifying fossil samples with greater phylogenetic resolution. Leaf venation pattern plays a very important role in the identification of incomplete plants, e.g., sterile specimens, archaeological remains, and fragmentary fossils of non-reproductive organs [2]. Leaf vein clearing has been widely used for decades in plant microtechnique for preparing whole mount specimens [3]. Whole-leaf preparations are much more useful than thin sections in enabling the rapid examination of the whole infection process, including the leaf surface and within-leaf phases, and the measurement of quantitative differences between infections [4]. It has also been used for the detection of various fungal diseases associated with plants and has been found effective for assisting fungal spore germination counts on several leaves [5]. Even though leaf venation is broad, there are numerous scientific applications for studying leaf veins. However, data is frequently scarce [6]. Because there are insufficient techniques developed for the long past period, such techniques are used less frequently, resulting in a significant reduction in the number of taxonomists [7]. The technique of leaf vein clearing is the most effective way of preserving leaves. Thus, by selecting the appropriate method of clearing that results in intact leaf venations with unaltered morphology can be used in the preservation of endangered species, which can later be used both as fossils in the study of evolution and in the identification of plant material [8]. Therefore, for all the studies mentioned above, it is important to have a way to observe even the smallest details of veins. To this end, numerous leaf vein clearing techniques have been developed. Leaf vein clearing methods are designed to degrade the interveinal tissue of leaves without damaging the venation architecture. The interveinal tissues of leaves are traditionally cleared using a variety of chemical techniques, such as chloral hydrate, sodium bicarbonate, trichloroethanol, trichloroacetic acid, and sodium hydroxide [9–11]. Unfortunately, the majority of these chemical treatments are harsh on the specimens and result in structural damage or shrinkage. Cleared leaves obtained through a chemical-based method are fragile with broken veinlets as the chemical is harsh on specimens and causes tissue

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43. Title of Paper: Bioelectricity Production from Algal Water Sample Using Microbial Fuel Cells

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ORIGINAL ARTICLE

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### Bioelectricity Production from Algal Water Sample Using Microbial Fuel Cells

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#### ABSTRACT:

Renewable energy source is a need of developing countries to fulfill their present and future energy requirements. Microbial fuel cell technology represents a new form of renewable energy by generating electricity from algal sample. The demand for electrical energy to some extent can be fulfilled by this technology. Biomass is a good choice of electricity and algae are the most easily available source of biomass. The present study was aimed to find out the potency of bioelectricity produced by microalgae based microbial fuel cell (MFC) technology using algal water sample. This technology produces energy with maximum efficiency and minimum cost. The work was focused on the feasibility and potential generation of bioelectricity from algal water sample. The bioelectricity production was carried by using six chamber systems and it was found to generate up to 3 volts of energy. The scale up studies on this in future may lead to the fulfillment of electric energy needs by green earth initiatives and achievement of sustainability in energy production.



Graphical Abstract

**Keywords:** Algae, Microbial Fuel Cell (MFCs), Bioelectricity, Energy.

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#### 1. INTRODUCTION:

Conventional methods of electrical energy generation are posing threat to Green Earth. Hence, there is a dire need for Green Earth initiatives and achievements of sustainable energy as evident from the recently held discussions during United Nations Climate Change Conference 2022 (COP27, Egypt, November 2022). Study on application of Microbial Fuel Cell (MFCs) employing algal biomass could be answer for

#### 44. Title of Paper: Synthesis of NiCo<sub>2</sub>O<sub>4</sub> Microflowers by Facile Hydrothermal Method: Effect of Precursor Concentration

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Research paper

**Synthesis of NiCo<sub>2</sub>O<sub>4</sub> microflowers by facile hydrothermal method: Effect of precursor concentration**

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**ARTICLE INFO**

**Keywords:**  
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Supercapacitor  
NiCo<sub>2</sub>O<sub>4</sub>  
Microflowers

**ABSTRACT**

In this work, NiCo<sub>2</sub>O<sub>4</sub> microflowers are developed via hydrothermal method. The impact of precursor concentration on morphology and supercapacitor performance is investigated. The XRD, FTIR and XPS study reveals the formation of NiCo<sub>2</sub>O<sub>4</sub>. The FE-SEM study shows the formation of microflower-like morphology. The NiCo<sub>2</sub>O<sub>4</sub> with molar ratio Ni:Co = 1:2 exhibited a BET specific surface area of 147.3 m<sup>2</sup> g<sup>-1</sup>. The supercapacitor study confirms the optimized NiCo<sub>2</sub>O<sub>4</sub> electrode showed a maximum sp. capacitance of 747.4 F g<sup>-1</sup> at 5 mV s<sup>-1</sup>. It exhibited highest energy density of 9.27 Wh kg<sup>-1</sup> (@55.55 W kg<sup>-1</sup>) and 82.32% capacity retention over 5000 cycles.

**1. Introduction**

In the last decades, research is more focused on modern electrode materials for energy storage devices (ESD) so as to complete the increasing demand for highly efficient renewable devices [1]. Among the various ESDs, supercapacitors are noteworthy candidates because of its excellent coulombic efficiency, high cyclic stability and higher power density than other ESDs [2]. The different conducting polymers [3], transition metal oxides like RuO<sub>2</sub> [4], MnO<sub>2</sub> [5], NiO [6], and Co<sub>3</sub>O<sub>4</sub> [7], CeO<sub>2</sub> [8] has been widely studied as an electrode for pseudocapacitors. The ternary metal oxides (TMOs) deliver greater specific capacitance (sp. capacitance) than conducting polymers as it contains multi-electron redox reactions [9]. In addition, due to their rich redox-active sites and improved electronic conductivity, TMOs show better capacitive performance than single metal oxides [10]. Among the various TMOs, battery type nickel cobaltite (NiCo<sub>2</sub>O<sub>4</sub>) has been considered as promising electrode material in supercapacitor applications [11]. The high electrical conductivity and improved sp. capacitance of NiCo<sub>2</sub>O<sub>4</sub> are due to the contributions from different valence states of the cobalt and nickel ions [12].

Researchers have tried to improve supercapacitor performance by synthesizing NiCo<sub>2</sub>O<sub>4</sub> with different morphologies. Sethi et al. [13] developed NiCo<sub>2</sub>O<sub>4</sub> nanorods using the low-temperature solvothermal method. The prepared NiCo<sub>2</sub>O<sub>4</sub> nanorod reported 440 F g<sup>-1</sup> sp. capacitance at a scan rate of 5 mV s<sup>-1</sup>. Also, it exhibited 94% initial capacity retention over 2000 cycles. Waghmode et al. [14] prepared rodlike to flowerlike NiCo<sub>2</sub>O<sub>4</sub> via chemical bath deposition method by varying reaction times. The optimized NiCo<sub>2</sub>O<sub>4</sub> electrode achieved a maximum sp. capacitance of 540 F g<sup>-1</sup> at a scan rate of 5 mV s<sup>-1</sup> and 93.5% initial capacity retention over 1000 cycles. Han et al. [15] synthesized NiCo<sub>2</sub>O<sub>4</sub> featherlike arrays by hydrothermal method. The NiCo<sub>2</sub>O<sub>4</sub> electrode reported a maximum sp. capacitance of 450 F g<sup>-1</sup> at 0.5 A g<sup>-1</sup>. This electrode exhibited outstanding cyclic stability of 139.6% over 3000 cycles.

A literature survey showed that hydrothermal is a noteworthy technique for synthesizing different inorganic nanostructures with high complexity and structural specialties [10]. In the present investigation, we have synthesized a microflower-like structure of NiCo<sub>2</sub>O<sub>4</sub> by using a hydrothermal method and used it as electrode material for supercapacitor application. The effect of Ni:Co concentration on the surface morphology and electrochemical supercapacitor performance of the NiCo<sub>2</sub>O<sub>4</sub> material is investigated.

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**45 Title of Paper: Nanotoxicological Study of Cu-Doped TiO<sub>2</sub> Nanoparticles on Gram Positive Bacteria *Bacillus amyloliquifaciens*** Title of the Paper: Isolation, and Characterization of *Cladosporium alboflavescens* for Acetaminophen Biodegradation

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**ORIGINAL ARTICLE**

**OPEN ACCESS**

## **Nanotoxicological study of Cu-doped TiO<sub>2</sub> nanoparticles on Gram positive bacteria *Bacillus amyloliquifaciens***

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### **ABSTRACT**

Titanium dioxide is being one of technologically important material in the field of nanotechnology. Titanium dioxide doped with copper nanoparticles are widely used because of its thermodynamic stability, anticorrosion, high photo catalytic activity, wide band gap, high transmittance in visible and infrared spectral range. In the present study, TiO<sub>2</sub> doped with copper nanoparticles was synthesized from Titanium isopropoxide as a precursor using hydrothermal method and sol-gel technique. Cu doped TiO<sub>2</sub> nanoparticles were characterized by Fourier-transform infrared spectroscopy (FTIR), UV-Visible spectroscopy, and scanning electron microscopy with Energy Dispersive X-ray Spectroscopy (SEM / EDX). The Cu doped TiO<sub>2</sub> nanoparticles were found to be spherical, ellipsoidal and irregular in shape. Individual nanoparticles as well as a few aggregates are found having the size of 5-20 nm. The biocompatibility of the Cu doped TiO<sub>2</sub> nanoparticles with their photo catalytic activity make them future candidate for the development of sustainable environmental remediation technologies. To assess bioremoval of the Cu doped nanoparticles on the microorganisms, this study was undertaken. In this study growth of *Bacillus amyloliquifaciens* was checked against various concentration of nanoparticles prepared by the both methods (2, 3, 4 and 5w/v %). It was seen that the microorganism has ability to grow in presence of nanoparticles with increase in the total protein content. The 5% concentration of Cu doped TiO<sub>2</sub> enhanced the cell mass protein of *Bacillus amyloliquifaciens* by 3.63 times.

**Keywords:** *Bacillus amyloliquifaciens*, Cu doped TiO<sub>2</sub>, Sol Gel, and Bioremediation

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### **1) INTRODUCTION:**

Due to the enormous applications of nanotechnology, the environmental and ecological effects of nanomaterials have to be considered. Changes of nanomaterials will not only help ensure the safety of Nano technological applications, but also help design functional materials that have minimal adverse effects [3]. Titanium dioxide (TiO<sub>2</sub>) has been widely used in many fields [2]. To enhance the functional properties and applicability of titanium dioxide, doped versions of TiO<sub>2</sub> are benignly synthesized to enhance catalytic activity for light harvesting applications [5]. Many researchers have conducted studies to evaluate if nano-scale titanium dioxide would have biological impacts [1]. TiO<sub>2</sub> NPs have been reported to have antimicrobial activities due to the reactive oxygen species formation. On the other hand, copper NPs appear to have higher cytotoxicity than copper ions because they may penetrate the cell membrane and release copper ions inside the cell [15]. However, it is still not clear whether there is synergistic effect when TiO<sub>2</sub> NPs are doped with CuO. Also, very few studies have examined the natural remediation of toxic metal NPs from the environment [17], which can be another important consideration of NPs; ecological impact. This study employed a model bacterial species: *Bacillus amyloliquifaciens* a Gram-positive bacterium and a model strain for the study of Nano toxicology. The objectives of this study are: 1) to determine the toxicity of Cu-doped TiO<sub>2</sub> NPs; and 2) to investigate bacterial responses to NPs.

### **2) MATERIALS AND METHODS**

#### **2.1) Synthesis of Cu doped Nanoparticles:**

**Cu doped NP s are Synthesized by two methods i) Hydrothermal Method ii) Sol gel Method**

##### **2.1.1) Hydrothermal Method:**

The term hydrothermal process is defined as performing chemical reaction in solvent contained in sealed vessels in which the temperature of solvent can be brought to around their critical points via heating

## 46. Title of the Paper: A Study of Cost Management System and its Impact on Productivity

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### A STUDY OF COST MANAGEMENT SYSTEM AND ITS IMPACT ON PRODUCTIVITY

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#### Abstract

Estimation, budgeting, and cost control are all steps in the process of cost management. This style of management seeks to boost profitability and productivity inside an organisation. Understanding cost management will make it easier for you to comprehend how a business determines and classifies expenses in accordance with project needs and why it plays a crucial part in planning, regulating, and decision-making. Different cost accounting techniques are used in cost management for businesses in an effort to increase cost efficiency by cutting costs or at the very least limiting cost growth.

**Keywords:** Cost Management, Productivity, Efficiency, Techniques

#### Introduction

The primary goal of businesses is to maximise profit, which is made possible by strong management techniques that may give managers all the information they need to make the best business decisions. In this case, cost is a key factor to consider. Management necessitates special consideration. Controlling all firm expenses through cost management is crucial for effective financial planning, which includes managing cash flow and identifying the resources available for new investment. The practise of organising and regulating a company's operating expenses is known as cost management. In order to budget, anticipate, and monitor costs more accurately, it also involves gathering, evaluating, and reporting cost information. Cost management techniques can be used for particular projects or the business's overall operations. The company's entire operating model or particular initiatives can both benefit from the application of cost control strategies. Cost management frequently concentrates on making savings and increasing earnings over the long run. Since the start of the industrial revolution, cost accounting has existed. Cost Accounting, however, is becoming more significant today. Cost management makes it possible to lower costs and boost profit margins since it makes it easy to spot wasteful spending that isn't producing a return and superior investment opportunities.

#### Review of Literature

Cost Management: Control and Profitability <https://catalogimages.wiley.com>

Kaizen Cost Management Technique and Profitability of Small and Medium Scale Enterprises (SMEs) in Ogun State, Nigeria: Research Journal of Finance and Accounting [www.iiste.org](http://www.iiste.org) ISSN 2222-1697 (Paper) ISSN 2222-2847 (Online) Vol 3, No 5, 2012: OLABISI Jayeola1\* SOKEFUN, A. O. 1. OGinni, B.O.1.2 - The study examines the relationship that exists between Kaizen cost management technique and profitability of small and medium scale enterprise in Ogun State, Nigeria. It evaluates the nature of Kaizen cost management technique and how it can be adopted to reduce and control operational costs of SMEs.

Use of Cost Accounting in cost management: Grzegorz Lew, Article in Prace Naukowe uniwersytetu Ekonomicznego – January 2019

## 47. Title of the Paper: National Education Policy 2020: Future of India

Journal of the Oriental Institute

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Dr. Neeta B. Kamble

### NATIONAL EDUCATION POLICY 2020: FUTURE OF INDIA.

**Abstract:** Education plays a powerful role in building a nation, education decides the future of the nation, the destiny of its people. The impact will be a long-lasting one in terms of growth and development of the nation and its citizen. The role of education and its importance cannot be ignored in today's scenario. The growth and development can be seen if we compare the pre-independence and post-independence era. After 34 years Indian Govt. is going to change the way we study, this is the third amendment in the education policy. There are many changes proposed in the new National Education Policy 2020 that would certainly affect all the stakeholders. In this paper the author is going to explore about National Education Policy 2020 and its effects on the stakeholders and also try to bring awareness and future impact of National Education Policy 2020 by asking a series of questions floated on all the available social media and analyzing the same.

**Keywords:** Indian Education, NEP 2020, National Education Policy 2020, Future of Indian Education, Effects on the Stakeholders, NEP 2020-students, NEP 2020-Teachers, NEP 2020-Parents.

#### INTRODUCTION

India was a well-known name in the world in reference to the education system from ancient time. The Gurukul system of imparting education is very well known to all of us. As the time changes there are some changes in the Indian Education system has been observed after post-independence. The first education policy was formed in 1968 there later on in 1986 with a small amendment in 1992 since then we are following the same education pattern for the last 34 years.

After 34 years, a new education policy has been proposed by the Indian government in the year 2020. This proposed system bears the acceptance of the cabinet and soon it will be passed.