



Study of Post Covid-19 Complications Based on Epidemiological Survey

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ABSTRACT:

The COVID-19 era officially began in 2019. Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV) is another name for it. The number of infections continues to rise even after COVID-19 immunizations. Patients who are afflicted have the most typical symptoms, including fever, weakness, coughing, and loss of taste and smell. The symptoms that are least often are a sore throat, headache, diarrhoea, aches and pains, etc. Age, sex, comorbid diseases, duration and year of COVID-19 infection, acute COVID-19 characteristics, history of hospitalization (type & severity of disease, length of hospital stay, need for respiratory supports, and need for intensive care unit [ICU]), duration since symptoms began, presence of persistent symptoms and vaccination were the details about the patients that were included in the questionnaire. The causes of receiving medical aid and the causes of being readmitted to the hospital were both questioned. This investigation includes a 100-person epidemiological survey on "Post COVID Complications" over one month. In conclusion, our survey and the data from the study indicate that among 100 people, more females than males had COVID-19 infection. The most frequent side effects following COVID-19 were loss of taste (54%), loss of smell (44%), weight loss (28%) and other issues. We deduced from the facts and statistics that people were somewhat aware of post-COVID-19 complications.

Keywords: COVID-19, Epidemiological survey, Post COVID Symptoms, Loss of smell, Sore throat.

INTRODUCTION

The year 2019 marked the beginning of COVID-19. It is also known as Severe Acute Respiratory Syndrome CoronaVirus (SARS – CoV). Even after vaccinations against COVID-19 the number of people infected goes on increasing. The infected patients show most common symptoms such as fever, weakness, cough, loss of taste and smell etc. The least common symptoms include sore throat, headache, diarrhoea, aches and pains etc. The symptoms of acute COVID-19 are shortness or difficulty in breathing, loss of speech or mobility or confusion, chest pain. These patients require hospitalization and some serious cases may even lead to death. The recovery from COVID-19 takes about 1 week to 4 week depending on individuals; it is also followed by some post COVID-19 complications in most people [1].

Long-term breathing issues, cardiac issues, chronic renal damage, stroke, and Guillain-Barre syndrome, a condition that causes momentary paralysis, are a few examples of long-term health impacts that may occur in some individuals. After receiving COVID-19, some adults and kids develop multisystem inflammatory syndrome.

Post COVID symptoms are also known as "long COVID", "post acute COVID syndrome" and "post – acute sequelae of SARS – CoV-2 infection". The exact cause of post COVID-19 conditions is not well understood. But it is hypothesized to be secondary to virus specific patho-physiological changes, prolonged inflammatory responses to acute infection and sequelae of post intensive care illness. Even people who did not have symptoms in the days or weeks after they were infected can have post COVID-19 conditions. These post COVID complications present as different types and combinations of health problems for different lengths of time. Increased risk of seeing these symptoms are in older patients who have underlying health conditions [2]. The post COVID-19, makes conditions serious for people with heart problems, diabetes, blood pressure, respiratory troubles etc. way before COVID. Post COVID complications include fatigue, loss of taste and smell, weight loss, muscle aches, difficulty in breathing, confusion etc [3].

OBJECTIVES

- To conduct a survey on POST COVID-19 Complications.
- To collect data on diseases and their distribution in the population.
- To correlate the diseases/complications with respect to age group.
- To propose positive preventive measures for POST COVID-19 Complications.



Nano-revolution in Vector-Borne disease management: Exploring control strategies and mechanisms

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Abstract

Vector-borne diseases (VBDs) are complex socio-ecological systems that have an impact on many facets of our planet and go well beyond human health. Even though previous study has focused on the direct consequences of vector-borne illnesses on human health and death, it is evident that these diseases are part of a complex web of interactions. The environment, ecology, diseases, and societal reactions are closely associated with vector-borne diseases, resulting in feedback loops that facilitate the spread of disease. As a result, they have permanently altered the course of human history. The application of nanoparticles produced by various processes as novel insecticides has attracted a lot of interest. Silver nanoparticles plays a crucial role along with gold, zinc oxide and other nanoparticles in the control of (VBDs). Many research have examined the toxic effect against a variety of pests and insect vectors, with a focus on mosquitoes. Using nanoparticles as cutting-edge insecticides is a promising line of inquiry in the battle against VBDs. This review encompasses around the various nanoparticles (NP's) and their mode of action and various control strategies against vectors.

Keywords: Vector borne diseases (VBDs), Nanoparticles (NP's), Silver nanoparticles, mode of action, control strategies

Introduction

A rise in human mobility, globalization, and climate change has resulted in the ecological spread of highly invasive species. These invading species, which include arthropods, can produce fatal diseases that spread like epidemics or pandemics. The most significant in that respect are mosquitoes (Diptera: Culicidae), which serve as carriers of numerous dangerous parasites and infections. The most dangerous of these are the genera *Anopheles*, *Aedes*, and *Culex*, which are the carriers of the most significant infections and are responsible for diseases like Dengue, malaria, yellow fever, filariasis, Japanese encephalitis, and Zika [1]. In the past and present, vector-borne diseases (VBDs) like malaria, dengue, Zika, Chikungunya, and Japanese encephalitis have had a significant global impact on public health. Although many illnesses cannot spread directly from person to person, they can spread when circumstances allow germs, hosts, and the environment to interact. The threat posed by insect-borne diseases to human health has grown in recent years due to changes in social and environmental conditions, including global climate change and international trade, which have led to the reproduction and spread of these diseases. In 2020, there were an anticipated 241 million malaria cases and 627,000 malaria deaths globally, according to WHO's most recent World Malaria Report. This translates to roughly 69,000 extra deaths and 14 million more illnesses in 2020 compared to 2019. In addition, dengue was endemic in Pakistan during September 2019 to November 2021, with 102,404 cases recorded, including 278 deaths (case fatality ratio, or CFR): 0.27%). Thus, we must address the key VBDs that are emerging and reemerging as well as the difficulties in controlling them. In this review, three main categories of nanoparticles (NPs) were discussed. (Fig 1). Type 2 NPs are nonmetal-based (like Si and Ca), Type 3 NPs are some complex polymers (like chitosan and plant extract), and

Type 1 NPs are metal-based (like Ag, Cu, and Ti), which are the most commonly employed to repel insects. Due to its significant effect on insect antioxidant and detoxifying enzymes, which results in ROS-mediated apoptosis, DNA damage, and autophagy, Ag has the highest proportion among Type 1 reagents. For Type 1, this is how most metals function. But Type 2's primary insecticidal principle is different; for instance, desiccation, abrasion of the body wall, and obstruction of the spiracles are the reasons for SiO₂ NPs' toxicity. Furthermore, the various functions of nanoparticles used as pesticides can be used to classify them. Metal-based NPs are most frequently used in Type 1, which primarily consists of NPs for direct use as insecticides. When it comes to Type 2, NPs operate as carriers for the active substances that suppress insects [2].

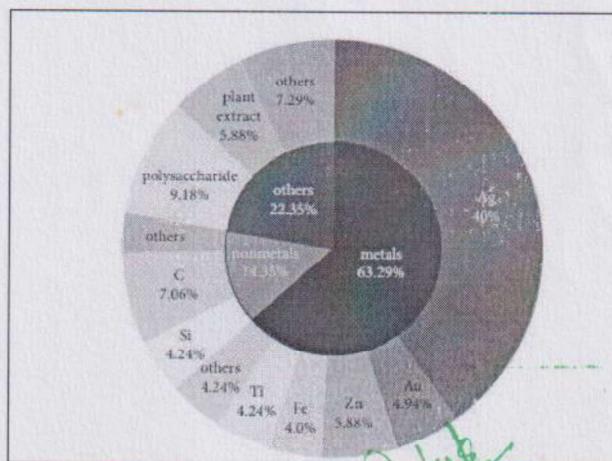


Fig 1: Classification of NP's. Based on various attributes, NPs used as insect repellent can be broadly categorized into three groups. Of them, nonmetal-based NPs like Si- and C-based make up just 14.35%, while metal-based NPs make up the largest percentage at 63.29% [2].



Toxicology Mechanisms and Methods >

Volume 34, 2024 - Issue 4

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Research Articles

Alcohol-induced hormonal and metabolic alterations in plasma and erythrocytes—a gender-based study

Daisy Kunnathuparambil Lonappan, Gouthami Kuruvalli, Althaf Hussain Shaik, Ananda Vardhan Hebbani , Hymavathi Reddyvari, Vaddi Damodara Reddy & ...show all

Pages 350-358 | Received 05 Sep 2023, Accepted 27 Nov 2023, Published online: 15 Dec 2023

Cite this article <https://doi.org/10.1080/15376516.2023.2290071> Check for updates

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Abstract

Purpose

This study aimed to understand the gender-specific alcohol-induced biochemical changes and TBARS association with the endocrine system.

Methods

Human male and female subjects ranging from 35 ± 10 years old with an 8-10-year drinking history were included in the study.

Results



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POTENTIAL INHIBITORY ACTIVITIES OF *CATHARANTHUS ROSEUS* ALKALOIDS ON PTP-1B IN RELATION TO ENHANCING INSULIN USAGE FOR TYPE II DIABETES TREATMENT

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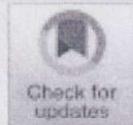
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(Received 10 February 2024, Revised 3 April 2024, Accepted 11 April 2024)

ABSTRACT : Even with the emergence of hypoglycaemic drugs, diabetes mellitus remains one of the major endocrine and metabolic disorders, affecting approximately 10% of the global population. It stands among the top five global causes of death. Type II diabetes has been managed by using a variety of plant extracts. Due to the side effects of taking insulin and oral hypoglycaemic drugs, patients are growing more and more interested in natural products with antidiabetic properties. Ancient societies made widespread use of *Catharanthus roseus* (*C. roseus*) and other herbal plants as therapeutic therapies to treat Type-II Diabetes mellitus. *C. roseus* extract has been demonstrated in several tests to dramatically lower blood glucose levels. Studies examining the genetic make-up of people, animals and cells have shown that Protein Tyrosine Phosphatase-1B (PTP-1B) is an enzyme that functions as a negative regulator of the insulin signalling pathway by removing phosphate groups from certain tyrosine residues on insulin receptor substrates (IRS). PTP-1B inhibitors have been examined in an effort to boost glucose metabolism and insulin sensitivity. This study focuses on the alkaloid which exhibits the most potent activity in hampering PTP-1B and less cytotoxicity in overseeing the insulin signaling pathway. It also uses Auto Dock bioinformatic tools for demonstrating the mechanism of potential inhibitory activities of four alkaloids of *C. roseus* in the active sites of PTP-1B, namely vindoline I, vindolidine II, vindolicine III and vindolinine IV.

Key words : Type-II Diabetes mellitus, *Catharanthus roseus*, Protein Tyrosine Phosphatase – 1B (PTP-1B), Vindoline I, Vindolidine II, Vindolicine III and Vindolinine IV.

How to cite : Vanitha G. Ramesh (2024) Potential inhibitory activities of *Catharanthus roseus* alkaloids on PTP-1B in relation to enhancing insulin usage for Type II Diabetes treatment. *Biochem. Cell. Arch.* **24**, 929-933. DOI: <https://doi.org/10.51470/bca.2024.24.1.929>



INTRODUCTION

Catharanthus roseus is known as *C. roseus*, it is a significant medicinal plant that grows in several nations. It is a beautiful shrub that is widely utilized for a variety of uses throughout the world. It is also referred to as *Madagascar periwinkle* or *Vinca rosea*. In many parts of the world, this plant has been used to cure type 2 diabetes mellitus, gonorrhoea, stomach aches and various forms of cancer. The primary emphasis of this investigation was its antidiabetic efficacy. Numerous compounds found in *C. roseus* have a variety of biological actions, including anticancer, antidiabetic, antibacterial and antifungal effects. In many countries, it has a long history of use as folk medicine (Don, 1999) such as South Africa, China, India, Mexico (Patel *et al*, 2012) and Malaysia (Ong *et al*, 2011), where it is applied as a treatment to lessen issues related to diabetes (Li *et al*,

2004). Rather of using the pure bioactive components, crude extracts (Nammi *et al*, 2003; Ohadoma *et al*, 2011; Gacche *et al*, 2011; Ganga *et al*, 2012) have been used in the majority of the research activities on this plant's antidiabetic efficacy. The plant's extract demonstrated hypoglycaemic action in a streptozotocin-induced diabetic rat model (Ganga *et al*, 2012; Ethnopharmacol *et al*, 2001).

PTP-1B and the insulin signalling pathway

Insulin is essential for preserving glucose homeostasis as well as controlling the metabolism of proteins, fats, and carbohydrates. Insulin binds to its receptor on insulin target tissues (adipose, liver and muscle) to initiate a cascade of signalling events that cause the hormone to exhibit its pleiotropic physiologic effects (Soon Huat Tiong *et al*, 2013).





Comparative Analysis of *Bacopa monnieri* and *Withania somnifera* in *Drosophila melanogaster* Neurodegeneration Models: Memory, Locomotion, Fertility, and Lifespan

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Received: 30 Sep 2023

Revised: 20 Nov 2023

Accepted: 13 Jan 2024

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ABSTRACT

This study delves into the manifestation of neurodegeneration-like symptoms in *Drosophila melanogaster*, particularly focusing on memory and locomotion impairments, as well as decline in fertility and reduced lifespan. It also explores the potential for mitigating these symptoms through treatment with *Bacopa monnieri* and *Withania somnifera*. To investigate potential variations in neurodegenerative responses and therapeutic effectiveness, we conducted a comparative analysis between *Drosophila* Oregon K-Type and hybrid fly strains. *Drosophila melanogaster*, a widely recognized model organism, serves as a valuable platform for probing neurodegenerative mechanisms. We induced neurodegeneration-like symptoms by exposing flies to paraquat herbicide, replicating oxidative stress conditions. Subsequently, we assessed memory and locomotion deficits as behavioural indicators of neurodegeneration. Additionally, our observations revealed a substantial decrease in fertility and a shortened lifespan among Paraquat-exposed flies in comparison to the control group. These findings underscore the detrimental impact of Paraquat on both reproductive and aging processes in *Drosophila melanogaster*. Our research findings have revealed significant impairments in memory and locomotion in *Drosophila* flies exposed to paraquat, mirroring symptoms commonly associated with neurodegenerative diseases. Specifically, we observed a reduction in memory index from 100% to -26.5% and a decrease in locomotion from 100% to 45.5%. Furthermore, these exposed flies exhibited diminished fertility, decreasing from 100% to 72%, and a shortened lifespan, declining from 100% to 86%. However, the administration of *Bacopa monnieri* and *Withania somnifera* extracts showed promising potential for alleviating these symptoms. In the case of



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ORIGINAL ARTICLE

Exploring the Phosphorus-Enhancing Potential: Isolation, Identification, and Characterization of Phosphate-Solubilizing Bacteria from Rhizospheric Soil

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ABSTRACT

Phosphate-solubilizing microbes (PSMs) play a crucial role in converting insoluble phosphates into soluble forms, thereby enhancing phosphorus availability to plants. In this study, we aimed to isolate and identify PSMs collected from rhizospheric soil. The isolated strain was identified as *Serratia* based on colony characteristics and biochemical analysis. Furthermore, we explored the phosphatase activity of 77.26 ± 0.46 U/ml, optimization of growth conditions for crude acid phosphatase was found to be temperature of 45°C , pH was 5 and glucose and ammonium sulphate served as good substrates for carbon and nitrogen sources. Partial purification of acid phosphatase by salt precipitation and dialysis gave a yield of $36.68 \pm 0.05\%$ compared to crude. Acetic acid was vigorously produced by the isolate, reaching concentrations of 40.41 ± 0.35 mg/L compared to other organic acids analysis by GC-MS. The production of other plant growth-promoting enzymes and hormones were identified. The antagonistic activity as biocontrol agent of the isolate was performed on plant pathogens. These findings contribute to our understanding of microbial-driven processes for sustainable agriculture and highlight the potential application of PSMs in enhancing phosphorus availability and plant growth in agricultural systems.

Keywords: Phosphate-solubilizing microbes (PSMs), phosphatase activity, organic acids, antagonistic activity.

Received 24.08.2023

Revised 11.10.2023

Accepted 21.12.2023

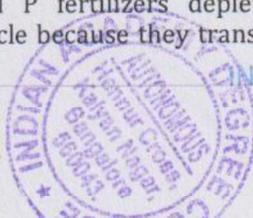
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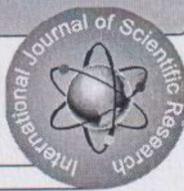
Shashank V, M P Sandhya, Rahul E, S Anu Kiruthika. Exploring the Phosphorus-Enhancing Potential: Isolation, Identification, and Characterization of Phosphate-Solubilizing Bacteria from Rhizospheric Soil. Adv. Biores., Vol 15 (1) January 2024: 49-62.

INTRODUCTION

Phosphorus (P) is one of the most important elements in the nutrition of plants, next to nitrogen (N). It is required for all key metabolic activities in plants, including photosynthesis, energy transmission, signal transduction, macromolecular biosynthesis, respiration, and nitrogen fixation in legumes [1]. P is abundant in soil, both in its inorganic and organic forms, but because it cannot be absorbed by roots, it limits plant development. Following the frequent application of chemical fertilizers, the majority of insoluble mineral complexes containing inorganic P have been found in soil. Plants cannot absorb these insoluble precipitated forms [2] [3].

High P fixing by Al and Fe hydroxides is a prevalent concern in agricultural soils [4]. In the tropics, the soils with the highest P fixing capability cover 1,018 million hectares (ha). As a result, soil P gets fixed and, on the majority of agricultural soils, must be supplemented with artificial P fertilizers [5]. These chemical P fertilizers not only increase agricultural production costs, but they also have significant impacts on soil health and the degradation of terrestrial, freshwater, and marine resources [6]. As a result, greater P levels have been identified as a primary cause to surface water eutrophication, which can lead to algal blooms. The widespread use of chemical P fertilizers depletes soil fertility [7]. Microorganisms are an essential component of the soil P cycle because they transport P across distinct





"NATURE'S DEFENSE: HARNESSING THE POWER OF OCIMUM SANCTUM (TULSI) AND NISIN EXTRACTS FOR ENHANCED FOOD SAFETY AND EXTENDED SHELF LIFE"

Microbiology

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ABSTRACT

Background And Objective: Foodborne pathogen contamination is a severe public health hazard that can lead to foodborne illnesses. Foodborne infections continue to be a global public health issue, with an estimated 600 million people being ill each year. This study thus encompasses around studying the antimicrobial effects of *Ocimum sanctum* and extraction of Nisin from *Lactococcus* sp. for formulation of a product which can enhance the food safety and preservation aspects in food industry. **Materials And Methods:** As a part of the experiment we prepared different concentrations of extract of *Ocimum sanctum* to check the antimicrobial activity against a set of 10 commonly occurring microorganisms of food industry. For easy diffusion of the extract wells were punched in the media and the microorganisms were inoculated, followed by incubation at 37°C for 24 hrs. Second part of the experiment was extraction of Nisin from *Lactococcus* sp. which is known to extend shelf life of food products. The fermented broth was centrifuged at 10,000 rpm for 15 minutes after 24 hours of incubation, and the supernatant was precipitated with 80% ammonium sulphate overnight at 4°C. **Results And Discussion:** Zone of inhibition was observed in the media having the *Ocimum sanctum* extract which indicated its antimicrobial efficacy against all the 10 sets of microorganisms. Nisin was extracted. Further studies were conducted, calculations done regarding the concentrations of the two compounds that can be used to formulate the product. **Conclusion:** Prevention from contamination and an enhanced shelf life can be achieved using the product which can be a breakthrough in enhancing food safety in Food industries.

KEYWORDS

Ocimum sanctum, Nisin, Antimicrobial activity, Shelf life, Food safety.

INTRODUCTION:

Since the birth of civilization, medicinal plants have been used by humans to combat disease. *Ocimum sanctum* has been known for over 2000 years as one of the most versatile medicinal plants, with a wide range of biological activity. It is a well-known sacred plant in the Indian subcontinent. Tulsi is also known as holy basil. Basils are tropical Asian plants that are thought to have originated in India. It is an annual plant that is mainly grown by seeds. It is common in tropical places and can be found at a height of 1800 metres in the Himalayan region. Tulsi variants can be found growing wild in several parts of Asia and Africa (Fig. 1). The species differ from one another in terms of geographical location, chemical constituent type and percentage, and thus have varied pharmacological effects. Tulsi has an antimicrobial, immunomodulatory, antistress, anti-inflammatory, antiulcer, antidiabetic, hepatoprotective, chemoprotective, antihyperlipidemic, cardioprotective, antioxidant, antitussive, radioprotective, memory enhancing, antiarthritic, antifertility, antihypertensive, anticoagulant, anticataract, anthelmintic, and antinociceptive activity index. Potential antimicrobial activity of tulsi has also been shown in recent research which can lead to prevention of food contamination in industries to quite an extent [1].

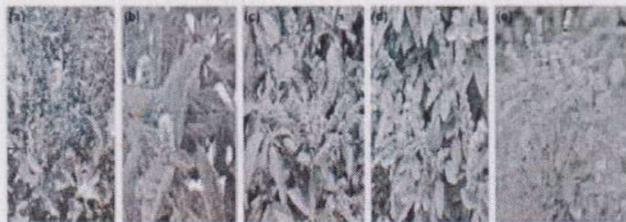


Figure 1: a) *Ocimum sanctum*, b) *Ocimum basilicum*, c) *Ocimum gratissimum*, d) *Ocimum americanum*, e) *Ocimum canum* [1].

Nisin is an antimicrobial peptide that is produced by Gram-positive bacteria such as *Lactococcus* and *Streptococcus* (Lubelski et al., 2008; de Arauz et al., 2009). Nisin was discovered in fermented milk cultures in 1928 and was first commercially marketed in 1929. It was first used as an antibacterial agent in England in 1953 (Rogers and Whittier, 1928; Delves-Broughton et al., 1996). The Joint Food and Agriculture Organization/World Health Organisation (FAO/WHO) certified nisin as a safe food additive in 1969. Nisin is currently licenced in over 50 countries and has made a considerable impact in the food sector as a natural biopreservative for various types of foods (de Arauz et al., 2009). In the United States (US), the Food and Drug Administration

approved nisin in 1988 and granted it a generally recognised as safe (GRAS) classification for use in processed cheeses (Cotter et al., 2005). The first nisin variation, known as nisin A, is made up of 34 amino acids and is synthesised by *Lactococcus lactis* (Gross and Morell, 1971). Nisin belongs to the Type A (I) lantibiotics class of cationic peptide antimicrobials (Smith and Hillman, 2008). Nisin and other lantibiotics have received a lot of attention because of their potent and broad-spectrum activity, low likelihood of promoting bacterial resistance, and low cellular cytotoxicity at antimicrobial concentrations (Asaduzzaman and Sonomoto, 2009; Van Heel et al., 2011; Cotter et al., 2013). Recent research is focussed on studying the efficacy of nisin extracts as a preservative to extend the shelf life of food products in food industries [2].

MATERIALS AND METHODS:

Collection of plant leaves:

Indian Academy Degree College Autonomous, Bangalore was where the leaves of *Ocimum sanctum* (tulsi) were gathered from. For 4-5 days, leaves were carefully separated, washed, and dried. The leaves were then ground using a mortar and pestle into a coarse powder. Weighed and kept in an airtight container was around 50 g of powder from each leaves.

Preparation of Plant leaf Extracts:

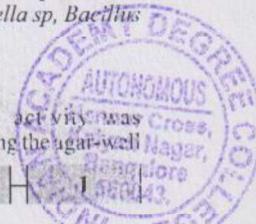
A stock solution of 0.2 g/ml of each leaf powder was created by adding 200 ml of methanol to a separate conical flask along with 50 g of each leaf powder using a cold maceration extraction technique for concentration. The working solution of each extract was then created using the formula " $C_1V_1=C_2V_2$ " at concentrations of 0.2 g/ml, 0.4 g/ml, 0.6 g/ml, and 0.8 g/ml, where C1 is the stock solution's concentration, C2 is the new solution's final concentration, V1 is the stock solution's volume, and V2 is the new solution's final volume. Then, by combining each extract concentration in a 1:1 ratio, mix solutions of neem and tulsi were also created at concentrations of 0.2 g/ml, 0.4 g/ml, 0.6 g/ml, and 0.8 g/ml [3].

Test Organisms:

The ten bacterial cultures used to check the antimicrobial activity of *Ocimum sanctum* were: *E. coli*, *S. aureus*, *Pseudomonas* sp, *Bacillus cereus*, *Salmonella* sp, *Proteus* sp, *Shigella* sp, *Klebsiella* sp, *Bacillus pumilus*, *Lactococcus* sp.

Antimicrobial Activity Test:

Ocimum sanctum leaves extract's antimicrobial activity was determined. Antibacterial activity were determined using the agar-well





Perusal of *Pleurotus Djamor* Growth by Using Different Substrates and Evaluate the Amount of Protein Content.

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ABSTRACT:

Pleurotus djamor is commonly called a pink oyster mushroom. The flavor of the pink oyster mushroom has been described as meaty and fishy. It is a species of fungus in the family Pleurotaceae. It was originally named *Agaricus djamor*. The present study describes the cultivation of pink oyster mushrooms with the utilization of vegetable waste (cabbage, cauliflower and radish leaves) in combination with agro waste (paddy straw and sugarcane bagasse) as substrate. Different ratios of both the substrates were used for the cultivation. When cultivation was carried out on vegetable waste alone, there was absence of mycelium spread and fructification. However, the combination of 50% vegetable waste and 50% paddy straw supported significant growth. It also shows high protein content during the estimation process. Thus the study implies that vegetable waste can prove to be a potent substrate for cultivation of pink oyster mushrooms with high protein content.

Keywords: spawn, pink oyster mushroom, vegetable waste, agro waste, protein, biuret method.

INTRODUCTION:

Mushrooms are one of the most loved food not only for its exotic taste but also for the benefits with which it comes. It can be consumed in various forms like fresh, pickled, dried, powdered, canned etc. Its farming has picked up a fast pace among contemporary entrepreneurs owing to its nutritional and medicinal benefits and low cost input with high output. Mushrooms are a fleshy fungi (Basidiomycota, Agaricomycetes) having a stem, cap and gills underneath the cap [1]. Because of its medicinal and nutritional benefits, mushrooms have long been valued as a significant dietary item. They are regarded as a good source of carbohydrates and protein. More than 3000 species of mushrooms have been shown to be edible, yet only ten of them are commercially grown. *Agaricus bisporus* is the most widely farmed mushroom in the world. It is followed by *Pleurotus* species, which account for around 27% of all cultivated mushrooms and include 5 to 6 different species [2]. From ancient times, mushrooms are looked upon as a delicacy for human consumption. The importance of consumption of mushrooms is based upon its nutritional benefits on human health. The exotic flavor, fleshy texture, richness of the mushroom makes it one of the most desirable food item for human consumption. Mushrooms are rich source of proteins polyunsaturated fatty acids (PUFA) and many other vital nutrients essential for human body with the advantage of having a low calorific value. Oyster Mushroom (*Pleurotus* sp.) also known as Dhingri in India is a macro lignocellulolytic fungus belonging to basidiomycetes [3]. Cultivation of edible mushrooms with agricultural and agro-industrial residues as substrate is an efficient and economically reliable technology for converting these materials into a valuable protein rich food and a cash crop of commercial interest [4]. It is considered to be unique based upon its ability of rapid mycelial growth and ability to muster its food by secreting some degrading enzymes. It also has a distinctive fruiting body. Tropical and temperate regions provide suitable environmental conditions which favour the growth of *Pleurotus djamor*. The various substrates that can be used for production of *Pleurotus djamor* are vegetable waste (cabbage, cauliflower and radish leaves) in combination with agro waste (paddy straw and sugarcane bagasse). The choice of substrate play an important role in the production of mushroom. It can invariably influence the growth characteristics and yield [5]. There is an increase in demand for production of *Pleurotus djamor* due to its medicinal properties which can play a crucial role in saving people from some life threatening diseases. Few medicinal properties of *Pleurotus djamor* include anticancer, immune modulator effect, anti inflammatory activities [6]. Microbial technology can help in large scale recycling of agro waste in India [7]. An alternative way of use of agricultural residues/wastes is in the use of the organic material in mushroom production [8]. The following study enlightens the aspect of the effect of different substrates on the yield of *Pleurotus djamor*.



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Critical Reviews in Food Science and Nutrition >

Volume 64, 2024 - Issue 2

874 | 13

0

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Reviews

A systematic review on potential microbial carbohydrases: current and future perspectives

Dilshad Begum Golgeri M., Sikandar I. Mulla , Zabin K. Bagewadi , Swati Tyagi, Anyi Hu, Swati Sharma, ...show all

Pages 438-455 | Published online: 05 Aug 2022

Cite this article <https://doi.org/10.1080/10408398.2022.2106545>

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Abstract

Various studies have shown that the microbial proteins are often more stable than belongs to other sources like plant and animal origin. Hence, the interest in microbial enzymes has gained much attention due to many potential applications like bioenergy, biofuel production, biobleaching, bioconversion and so on. Additionally, recent trends revealed that the interest in isolating novel microbes from harsh environments have been the main focus of many scientists for various applications. Basically, industrially important enzymes can be categorized into mainly three groups: carbohydrases, proteases, and lipases. Among those, the enzymes especially carbohydrases involved in production of sugars. Carbohydrases include amylases, xylanases, pectinases, cellulases, chitinases, mannases, laccases, ligninases, lactase, glucanase, and glucose oxidase. Thus, here, an approach has been made to highlight five enzymes namely amylase, cellulase, laccase, pectinase, and xylanase from different sources with special

Mycosynthesis of CuO Nanoparticles Using *Aspergillus niger* and Their Bioefficiency against Human Pathogens

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Received: Oct. 13, 2023; **Revised:** Nov. 25, 2023; **Accepted:** Dec. 15, 2023

Citation: K. Sahithya, A.K. Ekanayake, D. Hemanathan, et al. Mycosynthesis of cuo nanoparticles using *aspergillus niger* and their bioefficiency against human pathogens. *Nano Biomedicine and Engineering*, 2024, 16(2): 264–275.

<http://doi.org/10.26599/NBE.2024.9290062>

Abstract

In the present study, copper oxide (CuO) nanoparticles were biosynthesized from an *Aspergillus niger* cell-free extract (CFE), and several optimal operating parameters that affected the formation and dimensions of the CuO nanoparticles were determined, as follows: 15 mmol/L metal salt and 90 mL of CFE at room temperature for 24 h, to achieve an average size of 77 nm. Spectroscopic studies revealed an association between alcohol, alkene, and amine functional groups and the grain-shaped CuO nanoparticles. The elemental composition of the nanoparticles was confirmed by energy dispersive X-ray spectroscopy (EDX) data. Mycogenic CuO nanoparticles exhibited excellent antibacterial activity against Gram-positive bacterial species compared with Gram-negative bacterial species, i.e., *Streptococcus pneumoniae* MTCC 2672, *Staphylococcus aureus* MTCC 737, *Micrococcus luteus* MTCC 11948, *Pseudomonas aeruginosa* MTCC 424, and *Escherichia coli* MTCC 443, at 200 mg/mL, with inhibition zones of 9.2, 8.3 7.7, 7.2, and 6.1 mm, respectively. Finally, myogenic CuO nanoparticles exhibited good antifungal activity against *Aspergillus fumigatus* and *Aspergillus versicolor*.

Keywords: antibacterial activity; antifungal activity; *Aspergillus niger*; copper oxide (CuO) nanoparticles; human pathogens

Introduction

Over the past few decades, modern science and technology have established their roots in the field of nanotechnology, which has become a major thrust area of research by playing a vital role in the agrochemical, biomedical, cosmeceutical, environmental, pharmaceutical, and biotechnological sectors [1–4]. The development of environmentally friendly engineered nanomaterials with advanced properties is challenging because the process is safe

and ecofriendly [5]. Nanomaterial synthesis is emerging as a growing field because of the effects of the synthetic approaches on the physical and chemical properties of the final products [6, 7]. The green or biological preparation of nanomaterials using plants [8] and microorganisms (including bacteria [9], fungi [10], and algae [11]) has been extensively reported over the last two decades because of their advantages, i.e., biocompatibility, low cost, eco-friendliness, and reliability in nature [12, 13].

The filamentous-fungus-mediated synthesis of



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Comparative Analysis of Penicillin Production Using Various Media Compositions: A Research Study

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ABSTRACT

Background: Penicillin are bactericidal beta-lactam antibiotics that inhibit bacterial cell wall synthesis. A natural product, the penicillin structure has been modified to prepare a variety of semi-synthetic agents and used in pharmaceutical industries. The spectrum of antibacterial activity varies with each class of the penicillin family produced by penicillium species. Penicillin is generally well-tolerated, with hypersensitivity being the major adverse effect. Penicillin is used to treat a variety of conditions including skin infections, urinary tract infections, upper and lower respiratory infections, and endocarditis.

Methods: Preparation of different media compositions to check the increased growth of *Penicillium notatum* and its ability to produce penicillin crystals using the varied compositions. The obtained penicillin from the extract we checked for the antibacterial activity against various microbial species.

Result: We have successfully established that Penicillin can be useful drug for the treatment of serious *Pseudomonas aeruginosa* infections because of its enhanced activity against this organism. This indicates that Penicillin still could serve as medicinal drug and antimicrobial activity in pharmaceuticals for treatment of many pathogenic diseases.

Conclusions: The above research work concludes that high yield of penicillin production can be obtained using sabouraud dextrose broth medium with wheat bran as the substrate in industrial means. It shows the efficacy of the Penicillin against various infection and can inhibit the growth of some organisms causing infection effectively.

Keywords: Substrate wheat bran, Sabouraud Dextrose Broth, Rose Bengal Broth, Potato dextrose Broth, *Penicillium*, bacterial test organisms.

INTRODUCTION

Penicillin is one of the most important and widely used antibiotics in modern medicine. It is a group of naturally occurring and synthetic antibiotics that are effective against a broad spectrum of bacterial infections. The discovery of penicillin marked a significant milestone in the history of medicine and revolutionized the treatment of infectious diseases. Penicillin was discovered by Sir Alexander Fleming, a Scottish bacteriologist, in 1928 (Borner, 1968). While working at St. Mary's Hospital in London, he accidentally observed that a mold called *Penicillium notatum* had contaminated a bacterial culture plate, leading to the inhibition of bacterial growth around the mold. He identified this mold as the source of a potent antibacterial substance, which he named penicillin (Bodey G P, 1971). Penicillin is an antibiotic, which means it is a type of medication that kills or inhibits the growth of bacteria. It targets the bacterial cell wall, disrupting its formation and weakening the bacteria, ultimately leading to bacterial cell death.

After Fleming's initial discovery, further research was conducted to isolate and produce penicillin in larger quantities. This involved the work of scientists Howard Florey, Ernst Boris Chain, and Norman Heatley at the University of Oxford during the 1940s (Schatz *et al.*, 1944). They successfully developed methods to mass-produce penicillin, which played a crucial role in treating wounded soldiers during World War II. Penicillin and its derivatives have saved countless lives since their introduction into medical practice. Prior to its discovery, bacterial infections were a leading cause of death, and treatment options were limited. Penicillin was a breakthrough in the fight against bacterial diseases like pneumonia, strep throat, syphilis, and various skin infections (Landesman *et al.*, 1981). Over time, various forms of penicillin have been developed to enhance their effectiveness against different types of bacteria and to address issues of resistance. The substrate used for penicillin production is typically a nutrient-rich medium that provides essential nutrients for the growth of the *Penicillium* mold, which is the microorganism responsible for producing penicillin. *Penicillium* fungi require a carbon source, nitrogen source, minerals, and other growth factors to thrive and produce penicillin (Rocha *et al.*, 2019). The primary substrate used for industrial-scale penicillin production is a liquid medium, often based on corn steep liquor or lactose as the carbon source and a nitrogen source such as corn steep liquor, soybean meal, or a combination of both. The medium may also contain various salts, vitamins, and other growth-promoting agents. The process of penicillin production involves fermentation, during which the *Penicillium* mold is grown in large fermentation tanks or bioreactors using the nutrient-rich substrate.



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NATURE'S CHROMATIC PALETTE - EXPLORING THE SPECTRUM OF CAROTENOIDS IN FRUITS, VEGETABLES, AND MICROBES FOR HEALTH AND WELLNESS: A REVIEW

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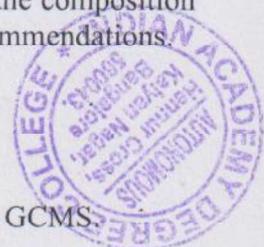
ABSTRACT

Carotenoids, a diverse group of over 700 fat-soluble compounds, are responsible for the vibrant yellow, red, and orange pigments observed in plants, fruits, vegetables, algae, and photosynthetic bacteria. With a staggering assortment of more than 600 types, among which the well-known members of this pigment family are alpha-carotene, beta-carotene, beta-cryptoxanthin, lutein, zeaxanthin, and lycopene. This study aimed to isolate carotenoid-rich microbes from various fruits and vegetables using shadow drying followed by powder formation. Different extraction methods, including the traditional approach, as well as innovative techniques like USAE and MWAE, were employed to extract carotenoids from the microbial samples. The confirmation of successful carotenoid extraction was achieved through the utilization of the sophisticated HPLC technique. The carotenoids were classified into two main groups: xanthophylls and carotenes. Both groups exhibited antioxidant properties, contributing to their potential health benefits. Additionally, certain carotenoids possess the remarkable ability to be converted into vitamin A, a vital nutrient crucial for human growth and overall well-being. These carotenoids, known as provitamin A compounds, namely alpha-carotene, beta-carotene, and beta-cryptoxanthin, fall under this category. Alongside these, non-provitamin carotenoids like lutein, zeaxanthin, and lycopene offer their own distinctive human health benefits. Various fruits and vegetables rich in carotenoids include yams, kale, spinach, watermelon, cantaloupe, bell peppers, tomatoes, carrots, mangoes, and oranges. Understanding the composition and concentration of carotenoids in fruits and vegetables can contribute to improved dietary recommendations.

KEYWORDS

Pigment-producing microorganisms, fruits, vegetables, carotenoids, USAE, MWAE, HPLC, and GCMS.

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Neuromicrobiology: Alzheimer's Disease and Gut Microflora

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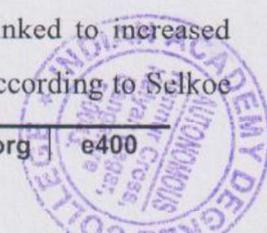
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ABSTRACT: Alzheimer's disease (AD) is a neurodegenerative condition related with ageing and marked by cognitive decline. The cognitive functions include altered behavior, a diminished ability to learn, and memory loss that results in dementia. The hippocampus, cerebral cortex, and other parts of the brain develop beta-amyloid (A) fibrils, oligomers, and neurofibrillary tangles (NFTs), which are the root cause of AD. Studies that are now available indicate that gene mutation, protein aggregation, excitotoxicity, protein aggregates, oxidative stress, and mitochondrial dysfunction are the main mechanisms contributing to the pathogenesis of AD. A collection of microorganisms needed to support the digestive system makes up the gut microbiota. The microbiota-gut-brain axis is a dynamic, bidirectional communication system that connects the functions of the peripheral intestine with cognitive and emotional awareness. This chapter encompasses around the role of gut microflora in Alzheimer's Disease and also the role of probiotics, prebiotics and synbiotics in AD.

Keywords: Alzheimer's disease (AD), beta-amyloid, oxidative stress, microbiota-gut-brain axis, Probiotics.

INTRODUCTION

According to Deture and Dickson (2019), Alzheimer's disease (AD) is a progressive neurological disorder characterised by neuronal degeneration, memory loss, learning disabilities, and major changes in personality and behavioural activities. Although there aren't many cases of AD in young people, it is an age-related disease that has been reported to affect 10% of people between the ages of 65 and 75 and about 32% of people over the age of 80 (Alzheimer's Association, 2016). Due to the complexity of AD's pathogenesis, no treatment has yet been found to stop the disease's progression. One of the causes of cholinergic dysfunction has been linked to increased acetylcholinesterase activity and decreased levels of the neurotransmitter acetylcholine [1]. According to Selkoe





DEGRADATION OF FLOWER WASTE USING MICROBIAL CONSORTIUM: AN APPROACH TOWARDS ENVIRONMENTAL SUSTAINABILITY AND WASTE MANAGEMENT

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ABSTRACT

India is one of the largest flower producing countries in the world. According to the estimates of the national horticulture board, in 2021-2022 the production is 341.63 million tonnes across the country and according to the statistics, floral waste is one of India's biggest pollution, accounting for nearly a third of all solid waste in the country. Floral waste degradation is an extremely slow process compare to degradation of kitchen waste, thus no suitable modes for disposal of this significant organic solid waste. In nature microorganisms do not live isolated, they co-exist with microorganisms establishing relationship that makes the highly complex organic compounds into simpler forms. The present study was taken to develop efficient microbial consortium to degrade the flower waste. Soil samples were collected from different places in which the flower waste were dumped. The isolation and screening of microbes that are capable of degrading the flower waste is performed with the help of flower extract media. A flower-based media was used to develop a microbial consortium for degrading flower waste instead of conventional microbial media. The different enzymatic test was performed to find out the enzymes produced by the organisms to degrade the flower waste. One chamber was created with inoculation of the microbial consortium along with flower waste and another chamber with flower waste without the microbes. Degradation was checked at different time intervals and it showed that the microbial consortium helped in degrading a large amount of flower waste faster.

KEYWORDS: Flower waste, degradation, flower based media, microbial consortium.

PROBIOTICS, PREBIOTICS & SYNBIOTICS – IMPACT ON HEALTH

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ABSTRACT:

Probiotics are live, nonpathogenic microorganisms that are given to patients to help with microbial balance, especially in the digestive system. They are controlled as dietary supplements and foods and are made of *Lactobacillus* and *Bifidobacterium* species or *Saccharomyces boulardii* yeast. Probiotics work to benefit the body through a number of processes, including as reducing intestinal pH, preventing the colonisation and invasion of the body by harmful organisms, and altering the host immune system. Benefits of probiotics linked to a particular species or strain may not apply to others. Probiotics may help prevent conditions such as antibiotic-associated diarrhoea, travellers' diarrhoea, irritable bowel syndrome (IBS), ulcerative colitis, Crohn's disease and vulvovaginal infections, hypertension, mental illness although more research is required to fully understand this. A probiotic should normally contain several billion germs to improve the likelihood that proper gut colonisation will occur, but there is no agreement on the minimum quantity of microorganisms that must be consumed to have a positive effect. Probiotics are typically seen to be safe and well tolerated, with bloating and flatulence being the most common side effects. Since systemic infections can infrequently happen, they should be used cautiously in patients who are very ill, highly immunocompromised, or those who have central venous catheters. Probiotics made from bacteria should be taken at least two hours apart from antibiotics.

Keywords: Probiotics, Traveller's diarrhoea, irritable bowel syndrome (IBS), Hypertension.

Introduction

The word "probiotics" is a Greek word that means "for life" Probiotics were described by an expert panel FAO (Food and Agriculture Organisation) and WHO commissiond as "live micro-organisms" which, when provided in sufficient proportions, impart a health benefit on the host. The bacterial genera *Lactobacillus*, *Bifidobacterium*, *Escherichia*, *Enterococcus*, *Bacillus*, and *Streptococcus* are the most frequently employed in probiotic formulations. Additionally, some *Saccharomyces*-related fungal strains have been utilised. Eli Metchnikoff, the 1908 Nobel Prize laureate, proposed that the long life of Bulgarian peasants was due to their consumption of fermented milk products, which is when the idea of probiotics first emerged. Lilly and Stillwell



Dietary Synbiotic as a Supplemental Therapy to Reduce Cancer Symptoms: A Review

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ABSTRACT

The significance of the human microbiome in the pathogenesis of cancer is becoming more widely recognized. Pre-, pro-, and synbiotics are some of the most well-studied ways to alter the microbiota for therapeutic purposes, and there is growing interest in their potential to be used in the diagnosis and treatment of cancer. In this review, we examine how these drugs may preserve the integrity of the intestinal barrier, regulate the immune system, regulate metabolism, and restrict the growth of host cells. We emphasize the epidemiological and trial-based evidence that pre-, pro-, and synbiotics play a role in cancer prevention. In the end, there is more evidence to support the use of these drugs as cancer treatment adjuncts. We go over their roles in enhancing the effectiveness of chemotherapy and radiation and/or reducing their side effects. The use of pre-, pro-, and synbiotics for clinical benefit in oncology patients has tremendous potential, but the discipline is still in its infancy, making it difficult for oncologists to provide their patients the right advice.

Keywords: microbiome, oncology, probiotics, prebiotics, synbiotics.

Received 09.05.2023

Revised 19.05.2023

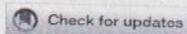
Accepted 30.06.2023

INTRODUCTION

By specifically enhancing the growth and/or stimulating the metabolism of one or more numbers of health-promoting bacteria, a synbiotic product benefits the host by positively impacting the survival and implantation of live microbial dietary supplements in the gut. Because it suggests synergism. The word "synbiotics" should only be applied to products in which the prebiotic compound(s) benefit the probiotic organism(s). This review will examine the possible therapeutic uses of pre-, pro-, and syn-biotic concerning cancer. These agents now constitute the main treatments geared towards positive modification of the microbiota (as opposed to negative manipulation with antibiotics). As our grasp of science has evolved, pre- and probiotic classifications have undergone several changes. 'A substrate that is preferentially used by host microorganisms imparting a health advantage' is the definition of a prebiotic [1]. Numerous molecules fall under this category; the non-digestible oligosaccharides fructo-oligosaccharide (FOS, which may be found in foods like onions and garlic) and galacto-oligosaccharide have received the most research. These substances work by encouraging commensal bacteria to proliferate and/or operate in ways that are advantageous to the host. Probiotics, on the other hand, are "live microorganisms that, when administered in sufficient amounts, confer a health benefit on the host" [2].

Although many fermented foods (like kimchee, tempeh, kombucha, sauerkraut, probiotic yogurt or kefir) contain live organisms, the majority are not considered probiotics because the food itself confers the health benefit rather than the organisms, and they frequently do not contain enough organisms to be classified as probiotics. Synbiotics are a preparation that combines pre- and probiotics. Probiotics are a group of certain microorganisms that may be found in the *Lactobacilli* or *Bifidobacteria* genera and are available as single agents or multi-strain formulations. Probiotics are typically consumed orally and are made to survive transit to the lower gastrointestinal (GI) tract, whether they are consumed in the form of yogurt, freeze-dried live organisms taken as a powder, or in capsule form. [3] By competitive exclusion, direct antagonistic action, neutralization of pathogenic bacterial toxins, and preservation of intestinal barrier function, they may lessen the impact of pathogenic organisms on the host. Short-chain fatty acid (SCFA) generation, bile acid metabolism, vitamin biosynthesis, and carcinogen neutralization are only a few of the metabolic impacts of probiotics [4-6].





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RECEIVED 27 March 2023

ACCEPTED 05 June 2023

PUBLISHED 23 June 2023

CITATION

Prabhakaran P, Hebbani AV, Menon SV, Paital B,
Murmu S, Kumar S, Singh MK, Sahoo DK and
Desai PPD (2023) *In silico* generation of novel
ligands for the inhibition of SARS-CoV-2 main
protease (3CL^{pro}) using deep learning.
Front. Microbiol. 14:1194794.
doi: 10.3389/fmicb.2023.1194794

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In silico generation of novel ligands for the inhibition of SARS-CoV-2 main protease (3CL^{pro}) using deep learning

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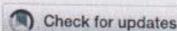
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The recent emergence of novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causing the coronavirus disease (COVID-19) has become a global public health crisis, and a crucial need exists for rapid identification and development of novel therapeutic interventions. In this study, a recurrent neural network (RNN) is trained and optimized to produce novel ligands that could serve as potential inhibitors to the SARS-CoV-2 viral protease: 3 chymotrypsin-like protease (3CL^{pro}). Structure-based virtual screening was performed through molecular docking, ADMET profiling, and predictions of various molecular properties were done to evaluate the toxicity and drug-likeness of the generated novel ligands. The properties of the generated ligands were also compared with current drugs under various phases of clinical trials to assess the efficacy of the novel ligands. Twenty novel ligands were selected that exhibited good drug-likeness properties, with most ligands conforming to Lipinski's rule of 5, high binding affinity (highest binding affinity: -9.4 kcal/mol), and promising ADMET profile. Additionally, the generated ligands complexed with 3CL^{pro} were found to be stable based on the results of molecular dynamics simulation studies conducted over a 100 ns period. Overall, the findings offer a promising avenue for the rapid identification and development of effective therapeutic interventions to treat COVID-19.

KEYWORDS

SARS-CoV-2, recurrent neural network, deep learning, 3CL^{pro}, admet


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RECEIVED 10 May 2022
ACCEPTED 20 April 2023
PUBLISHED 10 May 2023

CITATION
Pandey S, Anang V, Singh S, Seth S,
Bhatt AN, Kalra N, Manda K, Soni R,
Roy BG, Natarajan K and Dwarakanath BS
(2023), Dietary administration of the
glycolytic inhibitor 2-deoxy-D-glucose
reduces endotoxemia-induced
inflammation and oxidative stress:
Implications in PAMP-associated acute
and chronic pathology.
Front. Pharmacol. 14:940129.
doi: 10.3389/fphar.2023.940129

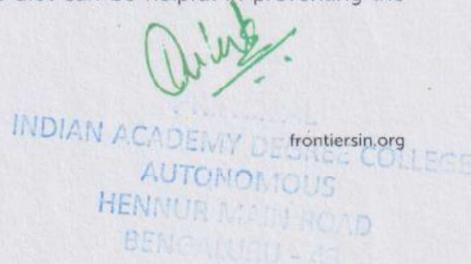
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Dietary administration of the glycolytic inhibitor 2-deoxy-D-glucose reduces endotoxemia-induced inflammation and oxidative stress: Implications in PAMP-associated acute and chronic pathology

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Pathogen-associated molecular patterns (PAMPs) like bacterial cell wall components and viral nucleic acids are known ligands of innate inflammatory receptors that trigger multiple inflammatory pathways that may result in acute inflammation and oxidative stress-driven tissue and organ toxicity. When dysregulated, this inflammation may lead to acute toxicity and multiorgan failure. Inflammatory events are often driven by high energy demands and macromolecular biosynthesis. Therefore, we proposed that targeting the metabolism of lipopolysaccharide (LPS)-driven inflammatory events, using an energy restriction approach, can be an effective strategy to prevent the acute or chronic detrimental effects of accidental or seasonal bacterial and other pathogenic exposures. In the present study, we investigated the potential of energy restriction mimetic agent (ERMA) 2-deoxy-D-glucose (2-DG) in targeting the metabolism of inflammatory events during LPS-elicited acute inflammatory response. Mice fed with 2-DG as a dietary component in drinking water showed reduced LPS-driven inflammatory processes. Dietary 2-DG reduced LPS-induced lung endothelial damage and oxidative stress by strengthening the antioxidant defense system and limiting the activation and expression of inflammatory proteins, viz., P-Stat-3, NfκB, and MAP kinases. This was accompanied by decreased TNF, IL-1β, and IL-6 levels in peripheral blood and bronchoalveolar lavage fluid (BALF). 2-DG also reduced the infiltration of PMNCs (polymorphonuclear cells) in inflamed tissues. Altered glycolysis and improved mitochondrial activity in 2-DG-treated RAW 264.7 macrophage cells suggested possible impairment of macrophage metabolism and, therefore, activation in macrophages. Taken together, the present study suggests that inclusion of glycolytic inhibitor 2-DG as a part of the diet can be helpful in preventing the



Enhanced Glycolysis Confers Resistance Against Photon but Not Carbon Ion Irradiation in Human Glioma Cell Lines

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Purpose: Metabolic reprogramming is a key hallmark in various malignancies and poses a challenge in achieving success with various therapies. Enhanced glycolysis is known to confer resistance against photon irradiation while the tumor response to carbon ion irradiation (CII) has not been investigated. This study aimed to investigate the effects of enhanced glycolysis on the response of human glioma cell lines to CII compared to the response to X-rays.

Material and Methods: Glycolysis was stimulated using Dinitrophenol (DNP), a mild OXPHOS inhibitor, in three human glioma cell lines (U251, U87, and LN229) and assessed by monitoring glucose uptake and utilization as well as expression of regulators of glycolysis (glucose transporter protein type 1 (Glut1), hexokinase-II (HKII), and Pyruvate Kinase-2 (PKM2). Radiation (X-rays and CII) induced loss of clonogenic survival growth inhibition and perturbations in cell cycle progression (G₂+M block), cytogenetic damage (micronuclei formation), apoptosis, necrosis (reflecting interphase death), and cell migration (Scratch assay) were investigated as parameters of radiation response.

Results: DNP (1 mM) enhanced the expression levels of GLUT1, HKII, and PKM2 by 30–60% and glucose uptake as well as usage by nearly 3 folds in U251 cells suggesting the stimulation of glycolysis. Enhanced glycolysis attenuated the loss of clonogenic survival with D₁₀ doses increasing by 20% to 65% in these cell lines, while no significant changes were noted following CII. Concomitantly, dose-dependent growth inhibition, and cytogenetic damage as well as apoptosis and necrosis induced by X-rays were also reduced by elevated glycolysis in U251 and LN229 cells by 20–50%. However, stimulation of glycolysis enhanced the X-ray-induced cell migration, while it had negligible effect on migration following CII.

Conclusion: Our results suggest that enhanced glycolysis confers resistance against X-ray-induced cell death and migration, while it may not significantly alter the cellular responses to carbon ion irradiation.

Keywords: carbon ion radiotherapy, metabolic-reprogramming, radio-resistance, Warburg effect, glucose metabolism, X-rays irradiation

Plain Language Summary

Radiotherapy is widely used for treating more than 50% of all malignancies. A major challenge in achieving success in radiotherapy is the development of radioresistant cancer cells partly linked to a reprogramming of the metabolism in the form of enhanced glucose dependency and utilization called the “Warburg effect” that occurs in most tumors. Treatment of tumors with a form of particle therapy using carbon ion- has been shown to be more effective against solid tumors.

Here, in this work, we have for the first time investigated the response of three human brain tumor (glioma) cell lines (U251, LN229, and U87) stimulated for enhanced glucose utilization (using OXPHOS modifier 2-dinitrophenol, DNP) to carbon ion irradiation (CII). Our results show that stimulation of glycolysis reduces radiation-induced cell death (mitotic, apoptotic and necrotic) growth inhibition in all three glioma cell lines, while it did not alter these responses significantly in carbon ion irradiated cells.



REVIEW



Technological advancements in cancer diagnostics: Improvements and limitations

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Funding information

NCI-SBIR, Grant/Award Numbers:

75N91019C000016, 75N91019C000043

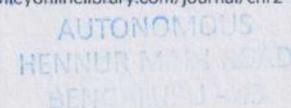
Abstract

Background: Cancer is characterized by the rampant proliferation, growth, and infiltration of malignantly transformed cancer cells past their normal boundaries into adjacent tissues. It is the leading cause of death worldwide, responsible for approximately 19.3 million new diagnoses and 10 million deaths globally in 2020. In the United States alone, the estimated number of new diagnoses and deaths is 1.9 million and 609 360, respectively. Implementation of currently existing cancer diagnostic techniques such as positron emission tomography (PET), X-ray computed tomography (CT), and magnetic resonance spectroscopy (MRS), and molecular diagnostic techniques, have enabled early detection rates and are instrumental not only for the therapeutic management of cancer patients, but also for early detection of the cancer itself. The effectiveness of these cancer screening programs are heavily dependent on the rate of accurate precursor lesion identification; an increased rate of identification allows for earlier onset treatment, thus decreasing the incidence of invasive cancer in the long-term, and improving the overall prognosis. Although these diagnostic techniques are advantageous due to lack of invasiveness and easier accessibility within the clinical setting, several limitations such as optimal target definition, high signal to background ratio and associated artifacts hinder the accurate diagnosis of specific types of deep-seated tumors, besides associated high cost. In this review we discuss various imaging, molecular, and low-cost diagnostic tools and related technological advancements, to provide a better understanding of cancer diagnostics, unraveling new opportunities for effective management of cancer, particularly in low- and middle-income countries (LMICs).

Recent Findings: Herein we discuss various technological advancements that are being utilized to construct an assortment of new diagnostic techniques that incorporate hardware, image reconstruction software, imaging devices, biomarkers, and even artificial intelligence algorithms, thereby providing a reliable diagnosis and analysis of the tumor. Also, we provide a brief account of alternative low cost-effective cancer therapy devices (CryoPop[®], LumaGEM[®], MarginProbe[®]) and picture archiving and communication systems (PACS), emphasizing the need for multi-disciplinary

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Fingerprint Recognition Model Using Improved Firebug Swarm Optimization and tanh-Based Fuzzy Activated Neural Network

J. Parvathy¹ · Poornima G. Patil¹

Received: 4 January 2024 / Accepted: 6 April 2024
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Abstract

Fingerprints play a crucial role in recognizing criminal suspects. In general, the acquired fingerprints are sometimes accomplished in bad resolution with background noises, thus making it hard for the forensics to process the matching. To recognize fingerprints, many top-notch methods were available. Owing to the poor resolution of the images, the majority of the prevailing approaches lack accurate matching of the fingerprints. To overcome this difficulty, a dominant approach named the fingerprint recognition model utilizing Improved Firebug Swarm Optimization (IFSO) and tanh-based Fuzzy activated Neural Network (tFNN) is proposed in this paper. Also, effective IFSO and tFNN are implemented in the research approach to perform Feature Selection (FS) and classification, correspondingly. This model was tested with FCV2002 dataset with 4 folders, namely DB1, DB2, DB3, and DB4. The proposed model's efficient performance was demonstrated by the simulation results. The Fingerprint Images (FIs) are effectively classified by the proposed model with low error. The proposed model's accuracy, specificity, and sensitivity were 12%–200%, 25%–7%, and 25%–75%, respectively higher when compared to the prevailing approaches.

Keywords Fingerprint recognition · Improved firebug · Swarm optimization · Fuzzy activated · Neural network

Introduction

Since the fingerprint is easy to collect, analyze, and classify, it is the most widely utilized biometrics in person identification [1, 2]. Numerous persons' fingerprints are not unique; also, no two persons have similar fingerprints. The fingerprints never change throughout the age of the person as they are more unique than DNA. The twins cannot have similar fingerprints even though they can share similar DNA [3]. As exhibited in Fig. 1, the fingerprints are categorized into 3 classifications, such as roller fingerprints, plain fingerprints, and latent fingerprints. As per Tan and Ban [4],

the fingerprint has a pattern of ridges and valleys on the surface of the fingertip. Minutiae are the crosspoints and endpoints of the ridges. Figure 2 presents the endings of minutiae and bifurcation. A ridge point in which a ridge bifurcates into two ridges is termed bifurcation. It is extensively accepted that the pattern of minutiae of every single finger is found to be unique; also, it does not alter over the lifetime. A good quality fingerprint typically encompasses 40 to 150 minutiae [5]. The fingerprints have been regarded as a good and secure biometrics. Confirming or refusing if a scanned fingerprint belongs to a particular person or not is the process of fingerprint recognition. The rising commercial applications and the number of civilians who rely on fingerprint-centric identification result in an enormous fingerprint database. It is computationally time-consuming to match specific fingerprints stored in the database. Furthermore, the fingerprints' manual observation is inclined to inconsistency and could prompt errors [6].

The automatic verification of similarity between several fingerprints without the intervention of human participants is called the Automatic Fingerprint Recognition System (AFRS), which encompasses two phases, namely the enrolment and recognition phase. The person registers

This article is part of the topical collection "Computer Vision for Enhanced Learning Outcomes in Multimedia-based Education and Training Applications" guest edited by Adeleh Asemi Zavareh, Ali Alibeigi, Ali Akbari and Mutaz AlShafeey.

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Adoption of Internet of Things for Smart Monitoring of Aquaponics

IEEE - 56998

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Abstract—Aquaponics is a cutting-edge, clever, and ecological technology for agriculture that combines both aquaculture and hydroponics to produce vegetable products prototype. This method promises to be environmentally friendly and viable due to its high-water consumption efficacy, lack of use of pesticides, and decreased fertilizer use. The main task is to make aquaponics viable and dependable at a business scale because interest in it is growing. By recognizing, being listed, and thoroughly describing each of the characteristics detected in aquaponics, as well as the smart platforms and Internet of Things (IoT) devices in the examined literature, this article hopes to support study towards a feasible business aquaponics option. The suggested study also identifies future efforts needed for mechanized aquaponics and possible voids in the existing literature. This is anticipated the fact that the system for aquaponics backed by smart control units will benefit in terms of profitability, intelligence, accuracy, and effectiveness within the context of the research studies examined in this paper.

Keywords: Aquaponics, IoT, Water quality, Environment

I. INTRODUCTION

In 2018, About fifty-three countries nearly about one hundred thirteen million individuals affected by acute starvation, necessitating immediate nutritional and wellbeing aid (IPC/CH Phase 3 or above) [1]. In light of this fact, it is imperative to consider options in order to resolve this issue. Globalise current dietetic needs cannot be encountered by using more possessions from nature or exploiting the soil. The aquaponics cultivating technique enters as a remedy to increase productivity in agriculture in this situation of food shortages and disaster for the environment. Aquaponics is the practise of producing vegetation and aquatic creatures cooperatively.

Aquaponics is now used as a pastime in many nations [2], and it has come to be seen as a workable answer to address the recent world food crisis. Given inexperience and subpar administration, only 31% of companies with aquaponics practises are reportedly monetarily viable and lucrative. In order to cover a variety of significant subjects, including species of farmed fish, plant species, administration practices, novel designs, and applications of this system, a number of literature pieces on aquatic farming

systems have been published [3]. But the majority of recent evaluations haven't concentrated on work on networks of communication, control units within these systems, or automatic methods. It became necessary to review these works in order to point out current developments in this tendency.

Plants were utilized as bio filtration in RAS aquaculture facilities with the aim of enhancing the water purity by eliminating the surplus of ammonia. After 2010, aquaponics study began to expand [4]. These days, aquaponics is used in a minimum of 43 different nations, but 84% of those who use it do so for recreational purposes [2]. A significant portion of a more environmentally friendly global food supply may be guaranteed by the effective growth of aquaponics [4]. In so far as aquaponics is adopted broadly as an economic alternative, it is going to work in addressing the global food problem and promoting sustainability. As a result, there are still study obstacles to finding practical business aquaponics centres.

A fresh platform for the advancement of these systems for aquaculture was created with the advent of technology, intelligent strategies, and interconnectivity in the agricultural sector. Smart mechanization is anticipated to result in a substantial decrease in laborious manual labour, more effective process management by improving the parameters' ease and interaction, and the use of computers to make data-driven choices [5]. Implementing sensing, intelligent or IoT systems in aquaponics systems with the goal of addressing some of the issues raised by earlier writers has been one of the ongoing research initiatives over the past three years. Analysis of the achievements made reveals that the robotic systems that have been put in place vary greatly from one another. These variations lower the business aquaculture systems' success rates.

The most significant factors impacting aquaponics systems are discussed in this article, as well as the significance of each variable independently, the potential for mechanical monitoring, techniques for forecasting quality metrics within aquaponic systems, and the key applications of technology, tracking, interactions, and IoT technologies. The subsequent sections include a thorough assessment and

FRMSDNET Classifier for Multimodal Feature Fusion Biometric Authentication

Parvathy J.¹, Dr. Poornima G. Patil²

Submitted: 26/09/2023

Revised: 16/11/2023

Accepted: 27/11/2023

Abstract: Biometric System (BS), which requires biometric information from people grounded on their physical characteristics and/or behavioral attributes like Fingerprint (FP), iris, face, or voice pattern, is a pattern recognition system. Unimodal BS has a number of issues in real-world applications. It may include the person's age factor, degradation of biological traits, and depending on just one trait that loses the authentication credits. A novel multi-BS grounded on the FP and iris has been proposed to get over the issue with unimodal systems. Two biometric characteristics, namely FP and iris are utilized in the proposed work. Initially, the FP image is pre-processed; in addition, by employing the Adaptive Ostu Mode segmentation (AOMS), the FP region is segmented. Next, the binarization and injection of segmented images into the ridge thinning procedure are done; next, the minutiae points are extracted. Afterward, the Iris image is pre-processed. Also, by deploying Kernel Snake Control Method (KSCM), the regions of the iris are segmented. The features are extracted from the segmented regions. By utilizing the Levy Good, the Bad, and the Ugly Optimizer (LGBUO), the significant features are selected as of the obtained features from the 2 phases. Lastly, the selected features are fused, which is then fed to the Fuzzy Residual Mean Squared Deviation Network (FRMSDNET) Classifier. The experiential outcomes exhibited that the proposed model attained an enhanced performance.

Keywords: Adaptive Ostu Mode Segmentation Technique (AOMS), Kernel Snake Control Method (KSCM), Levy Good, The Bad, and the Ugly Optimizer (LGBUO), Fuzzy Residual Mean Squared Deviation Network (FRMSDNET) Classifier, deep learning.

1. Introduction

Real-time applications were enabled by several advancements in technology via remote access in banking, medical, national security, trade, enterprise, law enforcement, along with various other sectors [1]. Recently, the major issue is security needs. In many ways, security could be managed. Prior to the secure resource's release, the correct person is identified by a process named authentication. To attain this, the person acquires counter-configuring unique information [2]. Human identity verification was provided with a Biometric Authentication System (BAS) to perform high-level security [3]. The physiological along with behavioural characteristics were utilized by BS for authentication [4]. The static mannerism of the human body is linked with the Physiological characteristics, which never alters regarding age; however, only to the behaviour of personnel, the behavioural style of biometrics is limited [5]. Face, Fingerprint (FP), iris, et cetera is the characteristics that come under the physiological characteristics, while signature, voice, and gait are included in the behavioural biometrics characteristics [6].

The Biometric System (BS) is named a verification system or identification system grounded on the applications utilized in the environment [7]. The system attempts to

differentiate an individual as of a population when executing identification. It also seeks to verify a person's identity during verification [8]. It also has various applications like electronic data security, ATM, credit card, computer network login, e-commerce, mobile phones, distant learning, health records management, physical access control, internet access, et cetera [9]. Biometrics can't be lost, manipulated, copied, shared, forgotten, or else forged unlike other conventional methodologies, namely passwords and tokens [10].

Unimodal as well as multimodal are the 2 varieties of biometric recognition systems. The user is recognized by the unimodal system that utilized a single biometric trait [11]. Variations in biometric data, low recognition rate, spoofed easily, etcetera were the issues faced by the unimodal system [12]. By employing a scheme that merges numerous biometric input sources into a single decision, a combination of diverse BS could be employed to tackle the issues in unimodal BAS [13, 14]. Noise affects the multimodal BS slightly. The non-universality issue is tackled along with elevating the matching accuracy; thereby providing a secure storage environment [15]. When analogized to unimodal BS, a higher rate of security was provided by the Multi-BS [16]. Multi-sensors, -samples, -algorithms, and -instances are the four categories of multi-BS. Information fusion is defined as merging information as of multiple biometric sources [17]. Generating a proper function is the aim of fusion and it

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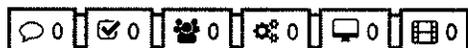
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Stable expression of *Helicobacter pylori* cagA oncoprotein in brinjal

Mohammad Javad Mehran, Rambod Barzigar, Basaralu Yadurappa Sathish Kumar, Nanjundappa Haraprasad, Bashasab Fakrudin, Sayan Paul, Rajesh Kumar Ramasamy, Sudhakar Malla

doi: <https://doi.org/10.1101/2023.05.12.540570>

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Abstract

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Abstract

Helicobacter pylori is closely connected to upper gastrointestinal tract diseases including gastric cancer. Transgenic plants are found to be successful in expressing the bacterial antigens, which could elicit an immune response when consumed. The Cytotoxicity-associated immunodominant antigen protein (*cagA*) of *H. pylori* is kindred with pathogenicity and cancer risk. We expressed the *cagA* transgenically in the brinjal. We amplified the *cagA* gene from *H. pylori* strain 26695 chromosomal DNA and transformed it into brinjal callus derived from leaf explants using the pBI121 expression vector. The stable expression and accumulation of the recombinant *cagA* gene were confirmed by using quantitative real-time PCR, western blot analysis and ELISA. The RT-PCR, western blot and ELISA showed stable expression of *cagA* gene in the transgenic lines B3, B5, B11, B17 and B21. Among them, B11 and B17 samples showed higher expression of the *cagA* compared to the other samples. Besides, the immunohistochemistry assay showed the abundant expression of *cagA* protein in the parenchymal regions of the transgenic plants. Out of the 52 plants, a set five plants were found to be positive for *cagA* expression. Our experimental outcomes can be used further to design the vaccines against *H. pylori* from the transgenic brinjal plants.

Competing Interest Statement

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Review Article

Synthesis of Pharmacologically Potent Benzimidazole Analogs

Jeelan Basha Nagenahalli , Prashanth Reddiyappa & Akshay K Thammaiah

Received 24 Aug 2023, Accepted 29 Jul 2024, Published online: 13 Aug 2024

 Cite this article  <https://doi.org/10.1080/10406638.2024.2387615>

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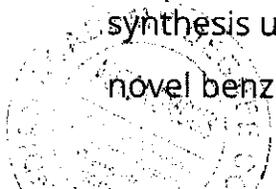
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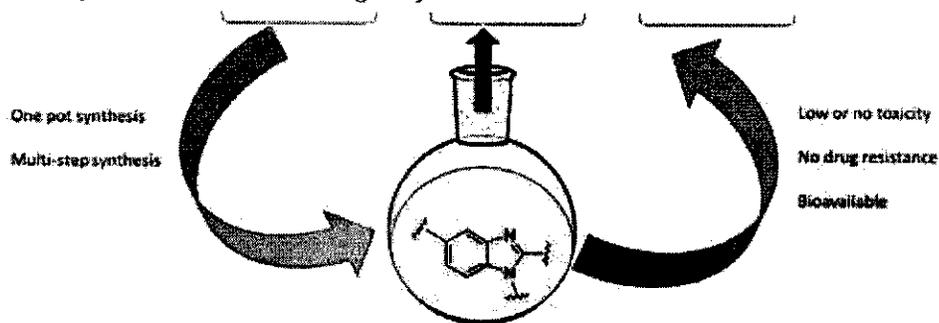
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Abstract

Benzimidazole is one of the heterocycles associated with diverse biological potential such as anthelmintic, antacid, antimicrobial, anticancer, and antiviral. Based on the importance of this moiety in medicinal drugs, both clinically approved and in clinical trials, many novel synthetic approaches have been reported for benzimidazoles. Nonetheless, there is a need for novel benzimidazoles to overcome drug resistance and side effects. The present review covers the recent reports on benzimidazole synthesis using a different strategy, our work on the synthesis, and biologically potent novel benzimidazoles.



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Acknowledgment

The authors thank College management, IADC-A for their constant support.

Author contributions

JBN: conceptualization, methodology, software, data curation, writing-original draft preparation, writing-reviewing and editing, supervision. PR: writing-original draft preparation, methodology, and software. AKT: writing-reviewing and editing.

Disclosure statement

No potential conflict of interest was reported by the authors.

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Abstract

Cancer diagnostics and prognosis, propelled by cutting-edge technologies, navigates the evolution from traditional methods to innovative approaches that revolutionize how we detect and predict cancer. The discussion encompasses various facets of modern diagnosis, starting with fluid biopsy and molecular profiling, which offer noninvasive insights into cancer's molecular signatures. Next-generation sequencing opens windows into the genetic landscape, facilitating personalized treatment strategies. The role of MRI as a robust diagnostic tool is explored, while advanced sensing systems like electrochemiluminescence (ECL) nanosensors and aptasensors present novel avenues for

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REVIEW |  Open Access |  

Technological advancements in cancer diagnostics: Improvements and limitations

Akhil Pulumati, Anika Pulumati, Bilikere S. Dwarakanath, Amit Verma , Rao V. L. Papineni 

First published: 06 January 2023

<https://doi.org/10.1002/cnr.2.1764>

Citations: 6

Funding information: NCI-SBIR, Grant/Award Numbers: 75N91019C000016, 75N91019C000043

Abstract

Background

Cancer is characterized by the rampant proliferation, growth, and infiltration of malignantly transformed cancer cells past their normal boundaries into adjacent tissues. It is the leading cause of death worldwide, responsible for approximately 19.3 million new diagnoses and 10 million deaths globally in 2020. In the United States alone, the estimated number of new diagnoses and deaths is 1.9 million and 609 360, respectively. Implementation of currently existing cancer diagnostic techniques such as positron emission tomography (PET), X-ray computed tomography (CT), and magnetic resonance spectroscopy (MRS), and molecular diagnostic techniques, have enabled early detection rates and are instrumental not only for the therapeutic management of cancer patients, but also for early detection of the cancer itself. The effectiveness of these cancer screening programs are heavily dependent on the rate of accurate precursor lesion identification; an increased rate of identification allows for earlier onset treatment, thus decreasing the incidence of invasive cancer in the long-term, and improving the overall prognosis. Although these diagnostic techniques are advantageous due to lack of invasiveness and easier accessibility within the clinical setting, several limitations such as optimal target definition, high signal to background ratio and associated artifacts hinder the accurate diagnosis of specific types of deep-seated tumors, besides associated high cost. In this review we discuss various imaging, molecular, and low-cost diagnostic tools

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Research Articles

Therapeutic Efficacy of Benzimidazole and Its Analogs: An Update

N. Jeelan Basha

Pages 6549-6569 | Received 15 Jun 2022, Accepted 23 Aug 2022, Published online: 06 Sep 2022

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Abstract

Benzimidazoles, one of the nitrogen heterocycles, possess pharmaceutical and biological potential. This heterocycle has been known for pharmacological activities such as antifungal, antibacterial, and antiparasitic. The reports on the activities of the compounds containing this basic moiety are well-reported in the literature, specifically as anthelmintic and proton pump inhibitors. This review covers the synthesis of benzimidazole analogs by feasible methods from our laboratory. Also, the present review explores the recent reports on benzimidazole analogs designed as antibacterial, antifungal, anticancer, and antiviral agents.

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[Handbook of Oncobiology: From Basic to Clinical Sciences](#)

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Abstract

This chapter takes the readers through a comprehensive journey through the multifaceted landscape of cancer with insights into the fundamental differences distinguishing normal cells from their malignant counterparts, exploring the intricate web of common and rare cancer types. The discussion then extends to the intricate relationship between epidemiology and etiology, unravelling the factors that shape cancer development across ages, genders, and lifestyles. Additionally, the discussion encompasses molecular insights, unearthing the mechanisms behind tumorigenesis,



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AkiNik Publications®
New Delhi



Published By: AkiNik Publications

AkiNik Publications
169, C-11, Sector - 3,
Rohini, Delhi-110085, India
Toll Free (India) – 18001234070
Phone No.: 9711224068, 9911215212
Website: www.akinik.com
Email: akinikbooks@gmail.com

Chief Editor: Arti Prasad
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Publication Year: 2023

Pages: 151

ISBN: 978-93-5570-864-9

Book DOI: <https://doi.org/10.22271/ed.book.2456>

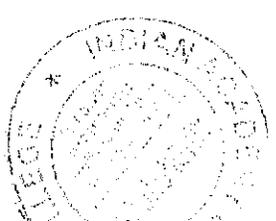
Price: ₹ 762/-

Registration Details

- Printing Press License No.: F.1 (A-4) press 2016
- Trade Mark Registered Under
 - Class 16 (Regd. No.: 5070429)
 - Class 35 (Regd. No.: 5070426)
 - Class 41 (Regd. No.: 5070427)
 - Class 42 (Regd. No.: 5070428)

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Contents

Chapters	Page No.
1. Telemedicine: A New Horizon in Public Health Management <i>(Dr. M. Banerjee and N. Kumari)</i>	01-23
2. The Spectrophotometric method to Measure Glutathione Peroxidase activity in Human and Rat Red Blood Cells <i>(Giuseppe Gallo and Guglielmo Martino)</i>	25-34
3. Artificial Intelligence (AI) in Nursing Education and Practice <i>(Debajani Sahoo)</i>	35-45
4. Unravelling the Microbial Symphony Within: A Comprehensive Review of Gut Microbiota <i>(Sidra Khouzin, M.P. Sandhya and Dr. S. Anu Kiruthika)</i>	47-67
5. Anthropo enic Intervention in Aggravating Natural Hazards <i>(Murcahna Sarmah)</i>	69-85
6. An Overview of Antibiotic Resistance and Herbal Remed es for Urinary Tract Infection <i>(Dr. S. Vijayalakshmi, Dr. J. Marlin Cynthia and Dr. B. Kalaivani)</i>	87-111
7. Nucleic Acid-DNA and RNA <i>(Dr. Swarupa Balasaheb Jadhav)</i>	113-134
8. Engineering Photosynthesis: New Horizon in Plant Improvement for Agricultural Progress <i>(Jogender, Arjoo and Shreya)</i>	135-151



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INDIAN

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Chapter - 4
**Unravelling the Microbial Symphony Within: A
Comprehensive Review of Gut Microbiota**

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Chapter - 4

Unravelling the Microbial Symphony Within: A Comprehensive Review of Gut Microbiota

Sidra Khousin, M.P. Sandhya and Dr. S. Anu Kiruthika

Abstract

The gut microbiota is a complex ecosystem of microorganisms, including bacteria, viruses, fungi, and archaea, that inhabit the human gastrointestinal tract. This microbial consortium plays a crucial role in various physiological processes and has gained increasing attention in recent years. The gut microbiota's functions extend beyond digestion, contributing to nutrient metabolism, immune system development, and protection against pathogens. The balance and composition of gut microbiota are regulated by factors such as diet, host genetics, and environmental influences. Disruptions in this balance can lead to health issues. A diverse gut microbiota is associated with better health outcomes. The links between microbiota diversity and conditions like obesity, diabetes, and autoimmune diseases are discussed, with potential therapeutic implications. External and internal factors, such as dietary choices, antibiotic use, and stress, significantly impact gut microbiota composition. Imbalances in the gut microbiota, known as dysbiosis, have been implicated in a range of diseases, including inflammatory bowel disease, allergies, and mental health disorders. Understanding the composition, functions, and regulation of the gut microbiota provides opportunities for innovative therapeutic interventions. Future research holds promise for advancing our understanding of the gut microbiota's role in health and disease. This comprehensive review article offers insights into the gut microbiota, providing a foundation for future research and therapeutic developments.

Keywords: Gut microbiota, microbial diversity, host-microbiota interaction, dysbiosis, gut-brain axis

Introduction

Microbiome refers to the collective genomes of the microorganisms in a particular environment, and microbiota is the community of micro organisms themselves. The human gastrointestinal system contains 100 trillion

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Navigating Challenges and Strengthening Resilience: A Study of Supply Chain Measures in the Tirupur Garment Industry Amid the Pandemic



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and T. Unnamalai[✉]

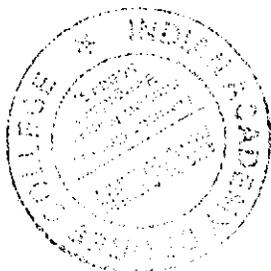
Abstract This study investigates the challenges faced by the Tirupur Garment Industry at the height of the pandemic, examining the unique hurdles encountered during this critical period. It aims to uncover the factors and strategies employed to fortify supply chain resilience within the industry. The research delves into the comprehensive measures adopted by the Tirupur Garment Industry to ensure the robustness of its supply chain, offering insights into the dynamic landscape of adaptation and recovery. Through meticulous analysis, the study sheds light on the industry's response to unprecedented disruptions, providing a nuanced understanding of the multifaceted strategies implemented for resilience. The primary data was collected from the garment industry and analyzed with suitable tools. The findings not only contribute to the specific context of Tirupur but also offer valuable lessons for industries globally, navigating the complexities of supply chain challenges in times of crisis. The study stands as a testament to the resilience of the Tirupur Garment Industry and provides a roadmap for other sectors seeking to enhance their supply chain resilience in the face of unforeseen challenges.

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Synthesis, Antimicrobial Activity, Drug-likeness, and Molecular Docking Studies of Novel 3-((2-(Benzylthio)-5-(phenylselanyl) pyrimidin-4-yl)amino)-2-(4-substituted phenyl)thiazolidin-4-ones

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ARTICLE HISTORY Received 29 November 2023; Accepted 16 March 2024

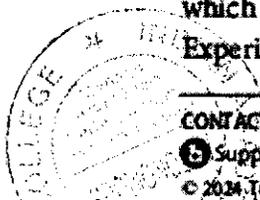
Pyrimidines possess numerous important biological activities, including anticancer, anti-viral, and antimicrobial properties.^{1–3} As a subset of these valuable compounds, 5-phenylselenenyl-substituted pyrimidines are known for their inhibition of dihydrouracil dehydrogenase, orotate phosphoryl transferase, thymidine phosphorylase, and uridine phosphorylase.^{4–5} 1-(Ethoxymethyl)-6-(phenylselenenyl)pyrimidines were effective against human immunodeficiency virus types 1 and 2.⁶ It is interesting to note that selenium nanoparticles themselves have been studied for their antimicrobial activity.⁷ Thiazolidinones are also known for their diverse biological activities.^{8–10} In view of the importance of pyrimidines, and in continuation of our own research on potent molecules^{11–14} we now report on the synthesis, antimicrobial character, drug-likeness, and molecular docking of new 3-((2-(benzylthio)-5-(phenylselanyl)pyrimidin-4-yl)amino)-2-(4-substituted phenyl)thiazolidin-4-one analogs 5 and 6.

Our studies began with the use of 2-(benzylthio)-4-chloro-5-(phenylselanyl) pyrimidine (1) (Scheme 1). Compound 1 was subjected to treatment with hydrazine hydrate in ethanol and underwent nucleophilic substitution to obtain compound 2 (80%). The reaction of compound 2 with substituted aromatic aldehydes (4-methoxybenzaldehyde and 2-chlorobenzaldehyde) in the presence of hydrochloric acid gave the desired Schiff bases, namely the 4-arylidinehydrazino-5-phenylselenenyl-2-benzyl pyrimidines 3 (81%) and 4 (72%). In terms of functional group characteristics, compound 4 showed IR absorption peaks at 3353 and 1597 cm^{-1} for N-H and C=N structural units. The ¹H-NMR gave signals at δ 8.26 (s, 1H, C₆H), 7.72–7.22 (m, 16H, 14-Ar-H, 1 N=CH, 1 N-H), and 4.37 (s, 2H, S-CH₂-Ph). In the mass spectrum, there were molecular ion peaks at m/z 510 (M⁺), 512 (M⁺) and significant fragment peaks at 475 and 357. Subsequent cyclization of these Schiff bases in the presence of thioglycolic acid and zinc chloride in benzene produced the target compounds 5 (55%) and 6 (52%), each of which was fully characterized, including satisfactory ($\pm 0.40\%$) elemental analyses (see Experimental section and Supplementary Materials Figures S1–13).

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 Supplemental data for this article can be accessed online at <https://doi.org/10.1080/00804948.2024.2333168>.

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PAPER • OPEN ACCESS

Structural and Optical Properties of AgO Nanoparticles Synthesized using Solid State Combustion

Thejas Ramakrishnaiah, D Vinay, Ganesh S Hegde, T S Siddivinayaka, K T Vasudevan and Abhiram Jagannathan

Published under licence by IOP Publishing Ltd

IOP Conference Series: Materials Science and Engineering, Volume 1300, International Conference on Physics of Materials and Nanotechnology (ICPN 2023) 21/09/2023 - 23/09/2023 Mangalore, India

Citation Thejas Ramakrishnaiah *et al* 2024 *IOP Conf. Ser.: Mater. Sci. Eng.* **1300** 012035

DOI 10.1088/1757-899X/1300/1/012035

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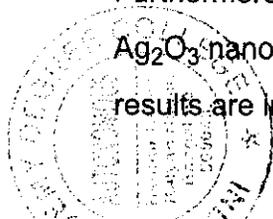
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Abstract

Silver oxide nanoparticles (AgO NPs) were synthesized by solid state combustion technique with AgNO₃ as a precursor and cow dung cake and cow urine as fuel. XRD results exhibit prominent peaks at 28°, 32°, 46° respectively indicating the AgO nanoparticles in cubic phase. Furthermore, structural elucidation through Rietveld refinement has confirmed the existence Ag₂O₃ nanoparticles, thereby indicating the formation of silver oxide nanoparticles. UV-Vis-NIR results are indicative that that the silver nanoparticles have exhibited a strong SPR peak at 435





Neuromicrobiology: Alzheimer's Disease and Gut Microflora

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ABSTRACT: Alzheimer's disease (AD) is a neurodegenerative condition related with ageing and marked by cognitive decline. The cognitive functions include altered behavior, a diminished ability to learn, and memory loss that results in dementia. The hippocampus, cerebral cortex, and other parts of the brain develop beta-amyloid (A) fibrils, oligomers, and neurofibrillary tangles (NFTs), which are the root cause of AD. Studies that are now available indicate that gene mutation, protein aggregation, excitotoxicity, protein aggregates, oxidative stress, and mitochondrial dysfunction are the main mechanisms contributing to the pathogenesis of AD. A collection of microorganisms needed to support the digestive system makes up the gut microbiota. The microbiota-gut-brain axis is a dynamic, bidirectional communication system that connects the functions of the peripheral intestine with cognitive and emotional awareness. This chapter encompasses around the role of gut microflora in Alzheimer's Disease and also the role of probiotics, prebiotics and synbiotics in AD.

Keywords: Alzheimer's disease (AD), beta-amyloid, oxidative stress, microbiota-gut-brain axis, Probiotics.

INTRODUCTION

According to Deture and Dickson (2019), Alzheimer's disease (AD) is a progressive neurological disorder characterised by neuronal degeneration, memory loss, learning disabilities, and major changes in personality and behavioural activities. Although there aren't many cases of AD in young people, it is an age-related disease that has been reported to affect 10% of people between the ages of 65 and 75 and about 32% of people over the age of 80 (Alzheimer's Association, 2016). Due to the complexity of AD's pathogenesis, no treatment has yet been found to stop the disease's progression. One of the causes of cholinergic dysfunction has been linked to increased acetylcholinesterase activity and decreased levels of the neurotransmitter acetylcholine [1]. According to Selkoe

Monitoring of Defense Enzymes (Phenylalanine Ammonia Lyase and Peroxidase) in *Magnaporthe oryzae* Infected Leaves after Treatment with Green Synthesized Silver Nanoparticles

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ABSTRACT

Objectives: In this study, we focus on the amount of the two defence enzymes phenylalanine ammonia-lyase (PAL) and peroxidase (POX) expressed with regard to the treatment of green synthesized silver nanoparticles. **Materials and Methods:** The leaf blades were infected with Fungal spores and silver nanoparticles by spraying, and following infection, we estimated the enzyme activity of PAL and POX. The PAL activity is considered by using cinnamic acid as a standard. **Results:** Our results showed both the PAL and POX enzymes were found to be elevated on infection with spores, and on treatment, the activity was reduced in both cases. There was a significant elevation of PAL (8.937±0.55) in infected leaves which could be due to infection and on treatment, the enzyme activity was reduced which possibly could be because of the antifungal activity of the synthesised nanoparticles. The POX levels exceeded the control by 417.86%, 807.14% and 921.43% respectively for infected, treatment with AgNPs and treatment with positive control. This confirms the role of the peroxide enzyme in disease control and resistance. **Conclusion:** This enzyme activity study to our knowledge is the first report done on the infected rice plants with *Magnaporthe oryzae* and on treatment with silver nanoparticles. This could pave the way to understanding the role of these enzymes in defence activity.

Keywords: *Magnaporthe oryzae*, PAL, POX, Silver Nanoparticles, Defense enzymes.

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Received: 22-09-2022;

Revised: 02-10-2022;

Accepted: 10-11-2022.

INTRODUCTION

Magnaporthe oryzae causes critical diseases called rice blast. In tropical Asian nations like India and China, the output of rice decreased by up to 69%.¹ The use of chemical fungicides to treat rice blast disease posed a serious risk to the environment and to the general public's health. Earlier, chemical fungicides were employed to treat soil-borne fungal diseases, but these chemicals are still present in the agriculture ecosystem today, where they harm helpful bacteria and allow plant pathogens to become resistant to them.² As a result, we must discover a different biocontrol strategy that can control plant diseases without endangering human health or the environment.³ One of the best options recently as a reliable and safe clarification for sustainable agriculture is biological control. An environmentally beneficial

way for lowering the possibility of resistance to selection pressure is biocontrol.⁴

Recent findings reported that nanoparticles can be an eco-friendly solution for fungal diseases and many plant extracts are used for metal ion reduction to produce metal nanoparticles. among different metals, silver has shown very good antifungal activity.

There are passive and active defence mechanisms which are being used to defend themselves during pathogen attack.⁵ In the passive defence mechanism, antimicrobial molecules are vital compounds while in active barriers pathogenesis-related proteins, hypersensitive response, phytoalexins, the production of reactive oxygen species (ROS) and lignification.⁶ The resistance or susceptible reaction to fungal infection is determined by the influence of defence responses by the plants during pathogen infection. In plant fungal infection, penetration may induce different plant cell defence responses during different infection stages.⁷ We should say that the defence enzymes are vital to the plant during infection.⁸ The activity of Peroxidase (POX) and Phenylalanine Ammonia-Lyase (PAL) are observed to be crucial in the wheat defence mechanism. We can say changes in PAL and

DOI: 10.5530/001954642708

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Publishing Partner : EManuscript Tech. [www.emanuscript.in]



IN-VIVO AND IN-VITRO ANALYSIS FOR THE DEVELOPMENT OF COST-EFFECTIVE PROBIOTIC AND MUFA RICH PROTEIN DIETARY SUPPLEMENT FOR ADULT AGE GROUPS

46S_MSC_120

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1. INTRODUCTION

Malnourished individuals of various age groups are often victims of various infections like weight loss, iron, iodine, mineral, vitamin B complex deficiency etc. As with underweight, the predominance of different micro and macro nutritional deficiencies vary extensively across different states (Rosy, K., *et al.* 2017); where our product can be very effective in nutrition as it is formulated by using locally sourced and organically procured raw materials. Prevention of malnourishment can be started by providing nutrient rich supplementary foods to the individuals of all age groups. According to FAO standards (FAO 1995), suggestion, to meet the recommended dietary allowances of infants, preschool children, adolescent girls, pregnant, lactating women and men, low-cost supplementary foods could be processed domestically by simple, inexpensive processing technology. The use of protein-calorie sources of vegetables or other origins as a supplementation on regular diet has been proposed a possible solution to this problem (Farzana T& Mohajan., 2015). Hence, the present study is designed to develop a low cost, novel nutritionally rich probiotic supplementary product, fortified with various natural products to make it PUFA and MUFA rich for malnourished individuals using locally available milky mushroom, flaxseeds and palm jaggery along with probiotic cultures.



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Electrical and Thermal Properties of Polymer Nanocomposites

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Abstract

Biodegradable polymers has inherent drawbacks, such as limited thermal stability and electrical conductivity, which hinder their widespread application in various fields, including electronic devices. These challenges result in less-than-optimal electrical and thermal properties when compared to standalone biodegradable polymers. Various techniques, such as co-polymerization, cross-linking and blending, with other polymers, can address and enhance the electrical and thermal properties of biodegradable polymers. Among these methods, the creation of nanocomposites emerges as very important approach to significantly improve the overall characteristics and applications of biodegradable polymers. This article provides a comprehensive overview of the electrical and thermal properties of biodegradable polymers. Additionally, it delves into the discussion of biodegradable polymer nanocomposites, encompassing blends of polymers, inorganic materials, and other nanomaterials.

Keywords: Polymer Composite; Thermal; Electrical Properties; Conductivity.

1. INTRODUCTION

Polymers, versatile materials with the potential to substitute for metals, glass, and traditional materials [1-3], offer a range of benefits, such as being flexible, lightweight, and cost-effective. They find extensive applications in energy, biomedical and optoelectronics fields [4-6]. Both organic and coordination polymers hold promise for further applications. The term "biodegradable polymers" was introduced in 1980, gaining significant traction. The standard defines biodegradable composites as those capable of degrading >89% of their mass in a biological environment over six months.

The term "biodegradable" ensures the environmental reliability of products without causing harm. Biodegradable materials, as defined by standards, must exhibit 70% degradation within 30 days under anaerobic conditions [7-9]. The synthesis of biodegradable polymer composites involves combining biodegradable polymers with reinforcing materials to enhance their mechanical, thermal, and electrical properties. Common biodegradable polymers include PLA, PHB, and PCL. Various methods, such as melt blending, solution casting, and in situ polymerization, are employed to incorporate reinforcing agents like natural fibers, nanoparticles, or other polymers. The goal is to achieve a synergistic balance between the biodegradable matrix and reinforcing materials, optimizing both performance and environmental impact. These composites find applications in eco-friendly packaging, biomedical devices, and agricultural materials, contributing to sustainable practices in materials science.

Materials derived from natural sources, such as polysaccharides (e.g., cellulose, lignin, starch, chitin/chitosan) or proteins (e.g., collagen, silk fibril (SF)), contrast with synthetic polymers obtained from fossil oil or petroleum.

Natural polymers and composites are materials derived from renewable resources found in nature. These materials offer environmentally friendly alternatives to synthetic polymers and composites, often characterized by their biodegradability and sustainability. Here's an overview of natural polymers and composites: Cellulose used for Paper, textiles, cellulose acetate, and as a reinforcement in composites. Chitin used for wound dressings, drug delivery systems, and as a reinforcement in composites. Starch used for



RESEARCH ARTICLE

Effect of exogenous elicitors in enhancing the postharvest quality and antioxidant potential of *Spinacia oleracea* cv. Pusa Jyothi

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Received: 28.04.2023

Accepted: 12.06.2023

ABSTRACT

The effect of exogenous elicitors such as methionine and salicylic acid on spinach were investigated in the current study. Leaves were treated with 100, 200 μ M of salicylic acid and 10 and 50mM of methionine as elicitors. Complete retention of chlorophylls was possible in the spinach treated with 200 μ M of salicylic acid. The shelf life of spinach was increased up to 9 days in comparison with the control which deteriorated in 5 days of storage at 15°C. Both the treatments were effective in improving the phenolic and antioxidant potential of spinach during the storage. The results from the present study highlights the synergetic effect of elicitors in extension of shelf life and quality of the spinach. In future, strategies can be developed based on the effect of these elicitors, especially salicylic acid on improvement of postharvest quality of fruits and vegetables.

Keywords: Antioxidant, ascorbic acid, elicitors, methionine, postharvest losses, salicylic acid, spinach, storage

Citation: Menon, S.V., Ashrith, K.A., Rai, P., and Ahamed, O.M.J.A. 2023. Effect of exogenous elicitors in enhancing the postharvest quality and antioxidant potential of *Spinacia oleracea* cv. Pusa Jyothi. *Journal of Postharvest Technology*, 11 (3): 56-66.

INTRODUCTION

The most preferred and major source of essential vitamins and minerals are fresh fruits and vegetables. They contain the nutrients which are needed for the wellbeing for human beings. The quality of fresh vegetables has been checked on the basis of their appearances, texture, flavor, nutritional value etc. (Mahajan et al., 2013). Due to their concentrations of vitamins (vitamins C and A), minerals (electrolytes), recently photochemical (antioxidants), vegetables have historically held a place in dietary guidance (Joanne and Llyod, 2012). However, fresh vegetables are nothing but perishable living products which requires certain activities to maintain the quality of the vegetables for certain period of time. The food production relied on locally and seasonally available crops can reduce the production, storage and transport cost, thereby reducing the ecological footprint considerably (Singh, 2018).

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Educational Awareness and Knowledge Concerning Field of Biotechnology among Biotechnology Students at Debre Birhan University, North Shewa, Ethiopia

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ARTICLE INFO

Received: 📅 February 08, 2023

Published: 📅 February 22, 2023

Citation: Girum Tefera Belachew and Paramesh Hanumanthaiah. Educational Awareness and Knowledge Concerning Field of Biotechnology among Biotechnology Students at Debre Birhan University, North Shewa, Ethiopia. Biomed J Sci & Tech Res 48(5)-2023. BJSTR. MS.ID.007711.

ABSTRACT

Background: Progressive natural sciences, for example, biotechnology, are assuming control over the million-dollar businesses because of their approaching applications, just as their significance in the well-being of living creatures. This investigation aims to decide the variables associated with choosing this field, their vocation inclinations, educational awareness, and knowledge of biotechnology.

Methods: The study undertook at Debre Birhan University through a pre-approved questionnaire given to the students joined in the biotechnology department. A total of 220 students, 130 (60.46%) females, 85 (39.53%) males, and 5 (2.32%), failed to give their data. Students who were involved in this study gave their responses to record their responses. Student replies were analyzed using the Statistical Package for the social sciences (SPSS) [version 20.0].

Results: Out of 220 Biotechnology students, 215 participants filled the questionnaire; therefore, the response rate was (97.72%). Of 215 respondents, 116 (53.95%) were not mindful of the scope of biotechnology before getting admission in the biotechnology program, 20 (9.30%) were interested in research. In contrast, 29 (13.48%) were either indifferent or indeterminate about their choices.

Conclusion: Almost all participants, 186 (86.51%), we're able to seek a job in biotechnology after their graduation, and Personal curiosity was the prominent factor 139 (64.65%) included in the choice succeeded by status 31 (14.41%) and income 15 (6.97%) correspondingly

Keywords: Awareness; Biotechnology Students; Debre Birhan University; knowledge; North Shewa

Introduction

Biotechnology is a science and innovation field that shows a fast improvement in the 21st century. Ethiopia is one of the nations keen on using biotechnology to move the present economy towards a top-level economy. Science instruction has a significant task in creating human assets and abilities for the biotechnology field in non-industrial nations to make progress [1]. Biotechnology is one of the comparatively new expanses of science that progressively impacts our lives globally almost in all fields of society, from medical care and food items to environmental issues and energy sources [2,3]. Although cheese, wine, and beer are the products of old-style

biotechnology, they are even now considered prominent parts of human innovation action. The present-day biotechnology displays remarkable high quality joined with restricted information on the part of the community [4,5]. Currently, scientific literature, the capacity to peruse and expound on science and innovation, biotechnology specifically inside the setting of this investigation, is planned for all because of its importance in traditional settings and that it empowers people to participate in argument and decision-making in settings highlighting scientific knowledge [6,7].

Hence, current contentions emphasize the requirement for individuals to know something about science and make science open

A STUDY ON THE ROLE OF FINANCIAL LITERACY AND FINANCIAL INCLUSION ON INVESTMENT BEHAVIOUR AMONG WOMEN FACULTY

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Abstract

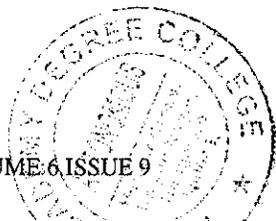
Financial literacy and financial inclusion play a pivotal role in investment decisions in the present scenario, which is influenced by many demographic variables such as income, age qualification and gender. Financial inclusion provides access to various financial avenues whereas financial literacy creates awareness about these avenues which influence investment behaviour. Women play a very important role in the economic development of a country. But some studies replicate those women are not secure and independent in terms of finance. Still, the financial decision is taken by the male in the family the main reason for this is the lack of financial literacy and accessibility of financial services among women.

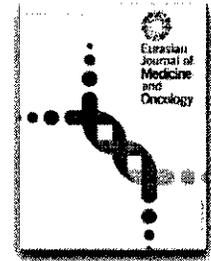
Thus, this research is an attempt to study the role of financial literacy and financial inclusion on investment behaviour among women faculty in Bangalore, Karnataka. This research is descriptive in nature, data were obtained by a closed-end questionnaire. A total of 126 responses were collected through a google form. The measure of central tendency, SPSS, and AMOS was used to analyse the data collected through a questionnaire. The analyses of the study clearly show that financial literacy has a greater influence on investment behaviour. The respondents clearly state that the knowledge about the financial avenues and accessibility of the financial services play a role in catalyst planning their investment.

Key Words: Financial Literacy, Financial Inclusion, Investment Behaviour, Financial Services.

Introduction

The financial sector plays an important role in the welfare of society and global economic growth. The role of the financial sector can be observed by the level of consumers' financial literacy, financial inclusion and investment behaviour. Financial literacy means knowledge of managing own





Review

Acute Pelvic Inflammatory Disease

✉ Sankhadip Dolui, ✉ Sneha Manna, ✉ Aditya Mandal

Department of Biotechnology, Indian Academy Degree College – Autonomous, Hennur Main Road, Bangalore, Karnataka, India

Abstract

Pregnant women of reproductive age continue to be a major public health concern. It is linked to serious long-term consequences such as tubal factor infertility, pregnancy, and persistent pelvic discomfort. Furthermore, the treatment of acute PID and its consequences incurs significant healthcare expenses. Preventing these long-term consequences requires doctors to have a high index of suspicion in order to make an early diagnosis and devise treatment methods based on the understanding of the microbiologic etiology of acute PID. A polymicrobial infection is widely regarded as the cause of acute PID. In many cases, sexually transmitted organisms such as *Neisseria gonorrhoeae* and *Chlamydia trachomatis* are present, while microbes from the endogenous vaginal and cervical flora are usually associated with PID. This comprises anaerobic and facultative bacteria, which are related to bacterial vaginosis. *Mycoplasmas* of the vaginal tract, most notably *Mycoplasma genitalium*, have lately been linked to acute PID. As a result, treatment regimens for acute PID should include wide spectrum coverage that is effective against these pathogens.

Keywords: Pelvic inflammatory disease (PID), Genital tract inflammation, Sexually Transmitted Disease (STD).

Cite This Article: Dolui S, Manna S, Mandal A. Acute Pelvic Inflammatory Disease. EJMO 2024;8(1):9–14.

A serious sexually transmitted disease known as pelvic inflammatory disease. Usually affects sexually active female adolescents and young adults.^[1] Every year, around 800,000 US women are diagnosed with PID or pelvic inflammatory disease. The US Centres for Disease Control and Prevention (CDC) project that more than a million women experience an episode of PID each year, taking into account any occurrences of PID that have gone unreported. The prevalence of PID is concerning given its serious potential effects, which include tubal fertility issues, ectopic pregnancy, and chronic pelvic pain (CPP). There is a higher risk of PID-related complications when PID instances are ignored, misdiagnosed, or improperly or poorly handled.^[2] The sexually transmitted pathogens *Chlamydia trachomatis* (CT) and *Neisseria gonorrhoeae* (GC), in particular, are estimated to represent the root of more than 85% of PID cases.

Haemophilus influenzae, *Gardnerella vaginalis*, and anaerobes like *Peptococcus* and *Bacteroides species* are additional microbes linked to PID. A sexually engaged woman at risk of STDs should begin presumptive antibiotic therapy if PID is suspected based on the minimal clinical criteria, according to the CDC's suggested diagnostic criteria: motion discomfort in the cervical region, adnexal soreness, or uterine tenderness.^[3] In the NHANES 2013-2014, the rate of self-reported lifelong PID was 4.4% among 1,171 sexually active reproductive-age women. This suggests that approximately 2.5 million women in the country between the ages of 18 and 44 have ever received a PID diagnosis (95% CI = 1.8-3.2 million). In order to ascertain the incidence of self-reported PID in a nationally representative population, our studies made use of data from the NHANES' 2013–2014 cycle.^[4] Significant progress has been made in the past 25 years in

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Submitted Date: October 17, 2023 **Revision Date:** November 29, 2023 **Accepted Date:** January 21, 2024 **Available Online Date:** March 06, 2024

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RESPONSE OF FIELD CROPS TO ABIOTIC STRESS

Current Status and Future Prospects

Edited by
Shuvasish Choudhury
Debojyoti Moulick



CRC Press
Taylor & Francis Group

Response of Field Crops to Abiotic Stress

Current Status and Future Prospects

Edited by
Shuvasish Choudhury and Debojyoti Moulick

Debojyoti
INDIAN ACADEMY OF AGRICULTURAL SCIENCES
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 **CRC Press**
Taylor & Francis Group
Boca Raton London New York

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First edition published 2023
by CRC Press
6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742

and by CRC Press
4 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

© 2023 selection and editorial matter, Shuvasish Choudhury and Debojyoti Moulick; individual chapters, the contributors

CRC Press is an imprint of Taylor & Francis Group, LLC

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Trademark notice: Product or corporate names may be trademarks or registered trademarks and are used only for identification and explanation without intent to infringe.

Library of Congress Cataloging-in-Publication Data

Names: Choudhury, Shuvasish, editor. | Moulick, Debojyoti, editor.

Title: Response of field crops to abiotic stress: current status and future prospects / edited by Shuvasish Choudhury and Debojyoti Moulick.

Description: First edition. | Boca Raton, FL : CRC Press, 2023. | Includes bibliographical references and index.

Identifiers: LCCN 2022029321 (print) | LCCN 2022029322 (ebook) | ISBN 9781032191966 (hardback) | ISBN 9781032191973 (paperback) | ISBN 9781003258063 (ebook)

Subjects: LCSH: Crops--Effect of stress on. | Field crops--Effect of stress on.

Classification: LCC SB112.5 .R48 2023 (print) | LCC SB112.5 (ebook) | DDC 631.4/52--dc23/eng/20220822

LC record available at <https://lccn.loc.gov/2022029321>

LC ebook record available at <https://lccn.loc.gov/2022029322>

ISBN: 9781032191966 (hbk)

ISBN: 9781032191973 (pbk)

ISBN: 9781003258063 (ebk)

DOI: 10.1201/9781003258063

Typeset in Times
by codeMantra

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Contents

Preface	vii
Editors.....	ix
Contributors	xi
1. Abiotic Stress Management through Elemental Biofortification in Field Crops.....	1
<i>Sudhakar Srivastava, Vartika Jain, and Kritika Sinha Nigam</i>	
2. Availing Engineered and Biosynthesized Metal-Based Nanoparticles to Alleviate Abiotic Stress.....	15
<i>Monolina Sarkar, Anindita Paul, and Debapriya Rajlakshmi Das</i>	
3. Arsenic Stress Sensitivity, Adaptation, and Mitigation Strategies in Field Crops.....	35
<i>Madhu Tiwari, Neelam Gautam, Yuvraj Indoliya, and Debasis Chakrabarty</i>	
4. Heavy Metals' Stress Responses in Field Crops	45
<i>Munish Kumar Upadhyay and Arnab Majumdar</i>	
5. Chromium Dynamics in Soil-Plant System.....	55
<i>Binaya Kumar Pattnaik and Chandan Sahu</i>	
6. Overview on the Effects of Heavy Metals on the Biological Activities of Leafy Vegetables.....	67
<i>Diyadyuti Das, Brahmarshi Mondal, Archita Dey, Deepanjan Mridha, and Tarit Roychowdhury</i>	
7. Aluminum Toxicity and Ionic Homeostasis in Plants.....	79
<i>Bedabrata Saha, Bhaben Chowdhara, Umakanta Chowra, and Chetan Kumar Panda</i>	
8. Drought and Heat Stress Tolerance in Field Crops: Consequences and Adaptation Strategies.....	91
<i>Lalichetti Sagar, Subhashisa Praharaj, Sultan Singh, Meenaksini Attri, Biswajit Pramanick, Sagar Maitra, Akbar Hossain, Tanmoy Shankar, Jnana Bharati Palai, and Upasana Sahoo</i>	
9. Drought and High-Temperature Stress Tolerance in Field Crops.....	103
<i>Goutam Kumar Dash, Madhusmita Barik, Soumya Kumar Sahoo, Selukash Parida, Jagdish Jena, Mirza Jaynul Baig, and Padmini Swain</i>	
10. Improving Submergence Tolerance in Rice: Recent Progress and Future Perspectives.....	111
<i>Debabrata Panda, Jijnasa Barik, and Prafulla K. Behera</i>	
11. Salinity and Osmotic Stress in Field Crops: Effects and Way Out.....	123
<i>Dibakar Roy, Pawar Deepak Vishwanath, Dasari Sreekanth, Himanshu Mahawar, and Dibakar Ghosh</i>	
12. Compatible Solutes Engineering to Balance Salt (Na⁺) and ROS-Induced Changes in Potassium Homeostasis	139
<i>Dipankar Barman, Lekshmy Sathee, Birendra K. Padhan, and Archana Watts</i>	
13. Metabolomics and Molecular Physiology Perspective for Drought and Salinity Stress Tolerance.....	153
<i>Sagar Sudam Jadhav, Renu Kumari, Sanjeet Kumar Mahtha, Ravi Kiran Purama, Vinita Lamba, and Gitanjali Yadav</i>	
14. UV Stress in Plants: A Curse in Plant Productivity and Blessing in Food Security.....	167
<i>Jayjit Majumdar</i>	
15. Impact of Elevated CO₂ and O₃ on Field Crops and Adaptive Strategies through Agro-Technology.....	177
<i>Arkabandee Mukherjee and Swati Hazra</i>	



Abiotic Stress Management through Elemental Biofortification in Field Crops

Sudhakar Srivastava and Vartika Jain
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CONTENTS

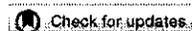
1.1 Introduction.....	1
1.2 Heavy Metal Stress.....	2
1.3 Salinity Stress.....	3
1.4 Drought Stress.....	3
1.5 Heat (High Temperature) Stress.....	7
References.....	10

1.1 Introduction

Stress is any factor, biotic or abiotic, that exerts pressure on individual plant or community causing it to deviate from normal system functioning and alters its growth and development (Rhodes and Nadolska-Orczyk 2001). The plant life is dependent on its interactions with environment, including individual components of soil, water and air. Since plants are static organisms, when components of the environment like temperature, elemental concentrations and water availability are beyond the optimum range, they suffer from stress as they cannot move/migrate to another place of optimum conditions. The well-known abiotic stresses include salinity, drought, extreme temperatures and metal(loid) concentrations. Abiotic stresses interfere with various physiological processes, affect biochemical machinery and alter molecular functions to alter the growth and metabolic activities of plants leading to reduced biomass accumulation and yields. Today's increasing demand for crop products has led to the requirement of management of crop growth by the available resources effectively (Ahmed 2020).

Nevertheless, owing to continuous exposure to one or other type of abiotic stress during its life cycle, plants have devised several defense strategies to effectively cope with the stresses and grow and reproduce. These strategies can operate temporarily for a specific duration causing short-term modifications, such as to tackle extremes of temperature during summer and winter, respectively. On the other hand, to tackle lifelong stresses, like in salinity-affected area or to low water availability in a desert, plants have adapted themselves with development of new or modified organs and physiological mechanisms

(Tester and Bacic 2005; Pandey et al. 2017). Root growth or root architecture is a common feature that shows changes in response to a lot of abiotic stresses. In the case of drought conditions, root grows profusely to increase the surface area and root hairs for water uptake (Pavia et al. 2019). For metalloids stress like arsenic (As), the growth of roots may be reduced or specifically altered with induced growth of lateral roots or root hairs so as to reduce As uptake (Srivastava et al. 2021). The production of reactive oxygen species (ROS) as a byproduct of oxygen-dependent metabolism is a normal process. In fact, there are several pro-oxidant enzymes, which produce different ROS in their reaction, and these enzymes have a crucial role in normal plant growth (Grob et al. 2013). However, in the presence of most of the abiotic stresses, the production and quenching of ROS are disturbed and levels of ROS increase rapidly. ROS are highly reactive and can interact with proteins, lipids and DNA to start chain reaction of radicals and disturb structural features of cell (Mittler 2017). To fine-tune the ROS levels, plants are equipped with several enzymes and molecules having antioxidant functions. These include superoxide dismutase (SOD), enzymes of Asada-Halliwell pathway [ascorbate peroxidase (APX), dehydroascorbate reductase, monodehydroascorbate reductase, glutathione reductase (GR)], catalase (CAT) and peroxidases among enzymatic antioxidants and ascorbic acid (ASA), glutathione (GSH), carotenoids, proline, phenolics etc. among molecular antioxidants (Alscher et al. 2002; Shigeoka et al. 2002; Kováčik et al. 2011; Srivastava et al. 2016a; Awasthi et al. 2018). Another important feature of stresses is the reduction in photosynthetic efficiency due to altered gaseous and water vapor exchange that may be caused by stomatal closure or due to effects on



OPEN ACCESS

EDITED BY

Sinosh Skariyachan,
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RECEIVED 27 March 2023

ACCEPTED 05 June 2023

PUBLISHED 23 June 2023

CITATION

Prabhakaran P, Hebbani AV, Menon SV, Paital B,
Murmu S, Kumar S, Singh MK, Sahoo DK and
Desai PPD (2023) *In silico* generation of novel
ligands for the inhibition of SARS-CoV-2 main
protease (3CL^{pro}) using deep learning.
Front. Microbiol. 14:1194794.
doi: 10.3389/fmicb.2023.1194794

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In silico generation of novel ligands for the inhibition of SARS-CoV-2 main protease (3CL^{pro}) using deep learning

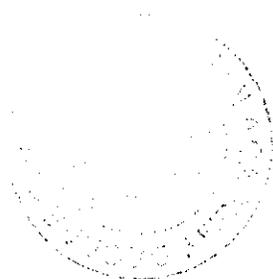
Prejwal Prabhakaran^{1,2}, Ananda Vardhan Hebbani³,
Soumya V. Menon^{4*}, Biswaranjan Paital^{5*}, Sneha Murmu⁶,
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The recent emergence of novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) causing the coronavirus disease (COVID-19) has become a global public health crisis, and a crucial need exists for rapid identification and development of novel therapeutic interventions. In this study, a recurrent neural network (RNN) is trained and optimized to produce novel ligands that could serve as potential inhibitors to the SARS-CoV-2 viral protease: 3 chymotrypsin-like protease (3CL^{pro}). Structure-based virtual screening was performed through molecular docking, ADMET profiling, and predictions of various molecular properties were done to evaluate the toxicity and drug-likeness of the generated novel ligands. The properties of the generated ligands were also compared with current drugs under various phases of clinical trials to assess the efficacy of the novel ligands. Twenty novel ligands were selected that exhibited good drug-likeness properties, with most ligands conforming to Lipinski's rule of 5, high binding affinity (highest binding affinity: -9.4 kcal/mol), and promising ADMET profile. Additionally, the generated ligands complexed with 3CL^{pro} were found to be stable based on the results of molecular dynamics simulation studies conducted over a 100 ns period. Overall, the findings offer a promising avenue for the rapid identification and development of effective therapeutic interventions to treat COVID-19.

KEYWORDS

SARS-CoV-2, recurrent neural network, deep learning, 3CL^{pro}, admet



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FRONTIERS

Lab Grown Meat: A Low Carbon and Water Footprint Alternative

Akshita Singh, Shruti Rajkishore Kuril, Pushpa Reddy*, Nikku Yadav, Raj Kumar Khalko and Sunil Babu Gosipatala

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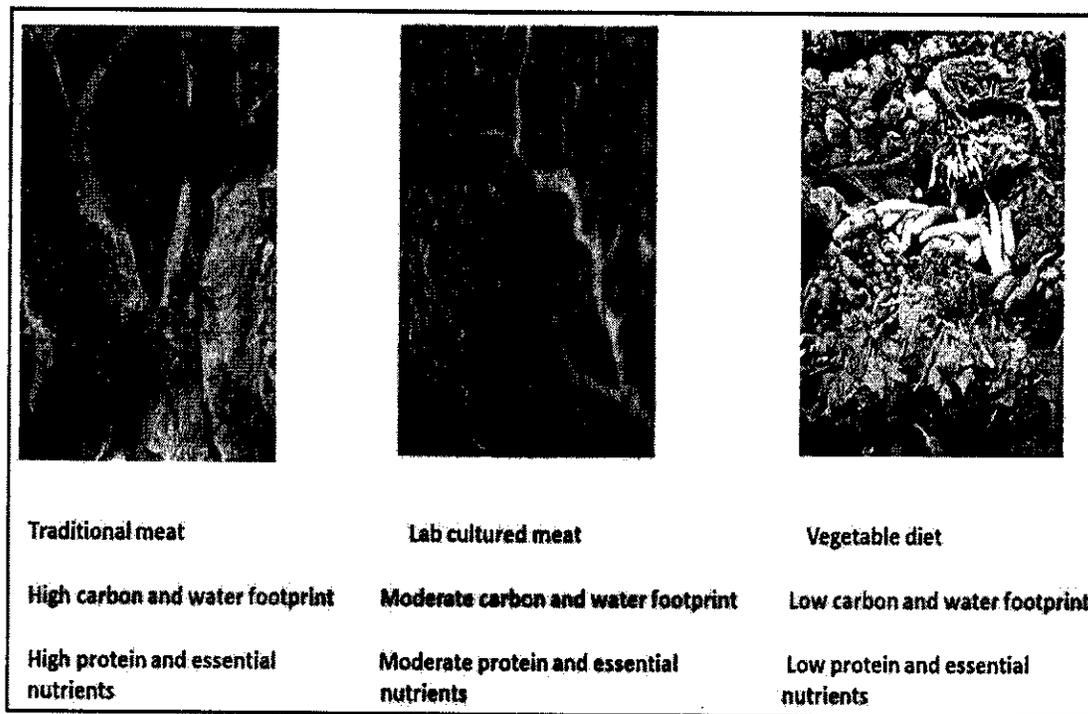


Figure 1: Comparison among traditional, lab-grown meat and vegetable diet.

SHARE

Abstract

As the global population continues to grow and dietary patterns shift towards higher protein consumption, traditional meat production faces mounting challenges. Lab-grown meat, a cutting-edge technology that allows meat to be cultivated in controlled laboratory settings, offers a promising solution. This article explores the emergence and potential of lab-grown meat as a sustainable and eco-friendly alternative. Lab-



Akshita
Author

Chapter - 7

Endophytic Bacteria in Stress Tolerance of Agricultural Plants: Diversity of Microorganisms and Molecular Mechanisms

Monisha Iyappan, Shashank V, Harish KR and Ranjith Kumar GS

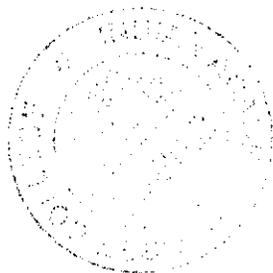
Abstract

A class of endosymbiotic bacteria known as bacterial endophytes is common among plants. A wide variety of bacterial taxa and host plants are involved in the connection of endophytic bacteria with plants. Focusing on the most recent findings acquired via metagenomic analysis, the present study provides an overview of the taxonomic makeup of the bacterial endophytes found in typical agricultural crops. The function and structure of the soil and endophytic microbial populations are significantly influenced by the endophytic microbiome, which is a component of the larger soil microbial community and is susceptible to direct or indirect effects of agricultural practices. In order to assure plant productivity and the quality of agriculture products, it is crucial to utilize agricultural techniques that preserve the natural variety of plant endophytic bacteria. On the other hand, it has been demonstrated that the endophytic microbiome itself has several impacts on the host plant, including the modification of pathways involved in phytohormone signaling, metabolic activity and plant defense responses. It has been shown that these effects could aid in the adaptation of plants to biotic or abiotic stressors. Consequently, using endophytic bacteria to boost disease resistance or crop performance under stress circumstances including cold, drought, salt and heavy metal pollution offers a significant opportunity for sustainable agricultural production.

Keywords: Diversity of endophytes, molecular analysis, secondary metabolites, phytohormones, biotic stress

Introduction

Throughout history, agricultural output intensification has been essential for sustaining population growth (Ellis *et al.*, 2013). Agricultural expansion has been substantially achieved during the last century through crop



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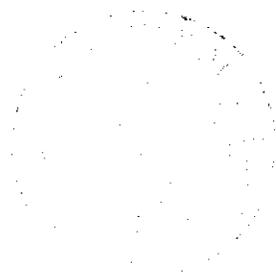
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Volume - 4

Chief Editor

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AkiNik Publications®
New Delhi

Published By: AkiNik Publications

AkiNik Publications

169, C-11, Sector - 3,

Rohini, Delhi-110085, India

Toll Free (India) – 18001234070

Phone No. – 9711224068, 9911215212

Email – akinikbooks@gmail.com

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Publication Year: 2023

Pages: 227

ISBN:

Book DOI: <https://doi.org/>

Price: ₹ 837/-

Registration Details

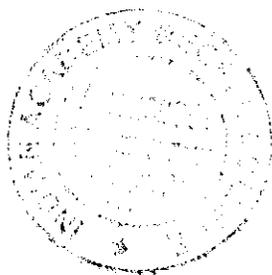
- **Printing Press License No.:** F.1 (A-4) press 2016
- **Trade Mark Registered Under**
 - Class 16 (Regd. No.: 5070429)
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Dr. Sukumar Taria

Contents

Chapters	Page No.
1. Impact of Increasing Climatic Temperature on Crop Yield <i>(Dr. Anil Kumar, Somendra Kumar and Nishi Jain)</i>	01-32
2. Microbial Biotechnology <i>(Muhammad Javaid Asad, Tasawar Sultana, Farah Deeba and Sidrah Nazir)</i>	33-60
3. Auxin Biosynthesis and Metabolism <i>(Jyoti, Harish Kumar and Vijay Kumar)</i>	61-75
4. Seed Priming Technology and its Role in Enhancing Seedling Quality and Tolerance to Biotic and Abiotic Stresses <i>(Aneeta Yadav, Syed Mohd Quatadah, Jitendra Kumar and Vinay Silas)</i>	77-97
5. Effect of Plant Growth Regulators on <i>in vitro</i> Morphogenesis and Regeneration of <i>Amaryllis belladonna</i> L. from Different Explants Cultures <i>(M.K. Tripathi, Niraj Tripathi, Sushma Tiwari, Devendra K. Payasi, Deepa Bhatt, Yashi Singh Tomar and Sharad Tiwari)</i>	99-138
6. Plant Regeneration from Cultured Cormel Explants in Gladiolus (<i>Gladiolus hybridus</i> HORT.) <i>(MK Tripathi, Niraj Tripathi, Sushma Tiwari, Ram Kanya Malviya, PN Tiwari and Sharad Tiwari)</i>	139-167
7. Endophytic Bacteria in Stress Tolerance of Agricultural Plants: Diversity of Microorganisms and Molecular Mechanisms <i>(Monisha Iyappan, Shashank V, Harish KR and Ranjith Kumar GS)</i>	169-201
8. Bioluminescence: "The Living Light" <i>(Arti Ghabru, Neerja Rana and Geeta Verma)</i>	203-227



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Chapter - 2

Plantibodies and their Applications as Biopharmaceuticals

Shashank V, Anusha KP, Adhikari Pavan Kumar and Monisha Iyappa

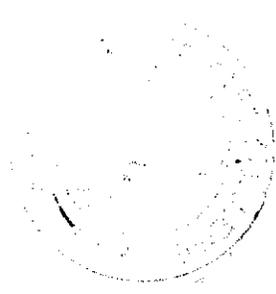
Abstract

The production of antibodies, a vital component of the vertebrate immune system, is now possible by introducing genes from animals or humans that code for antibodies into plants. The plant-derived antibodies, also known as plantibodies, work in a manner similar to that of mammalian antibodies. Compared to other techniques of producing antibodies, the manufacture of plantibodies has a number of benefits, including inexpensive production costs, a high antibody yield, a short time commitment, etc. As a result, plants are increasingly being accepted as green bioreactors. Trials for several plantibodies are under underway. Plantibodies are frequently produced using agricultural products like tobacco, tomato, potato, soya bean, alfalfa, rice and wheat. Numerous techniques, including the standard approach, the cell tissue culture method, breeding and sexual crossing, transgenic seeds, targeting and compartmentalizing, are used for producing these plantibodies. Plantibodies are currently employed in medical research to treat inflammatory illnesses, malignancies and immunological disorders as well as to make vaccines and for diagnostic purposes. The manufacture and use of plantibodies, as well as the numerous categories of therapeutic antibodies produced in transgenic plants, are highlighted in this article.

Keywords: Plantibodies, production, purification, therapeutic applications

Introduction

Immunoglobulins, or antibodies, are a class of intricate glycoproteins made by B-lymphocytes and found in the serum as well as tissue fluids of primates. They build up the humoral portion of the adaptive immune system and are able to recognize and bind to particular target antigens on infections or their toxic substances. Antibodies can be employed for a range of purposes, including the diagnosis, prevention, and therapy of illness (Andersen *et al.*, 2002), because of their unique and specialized binding ability. When a pathogen enters a vertebrate host, B-lymphocytes produce



Adhikari

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RESEARCH TRENDS IN MEDICAL SCIENCES

Volume - 22

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Published By: AkiNik Publications

AkiNik Publications
169, C-11, Sector - 3,
Rohini, Delhi-110085, India
Toll Free (India) – 18001234070
Phone No.: 9711224068, 9911215212
Website: www.akinik.com
Email: akinikbooks@gmail.com

Chief Editor: Sergiy Fedorov (MD, Ph.D., MBA, D.Sc.)

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Publication Year: 2023

Pages: 143

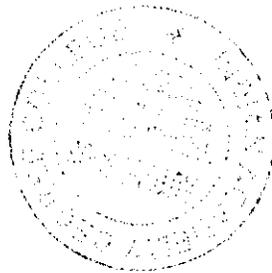
ISBN: 978-93-5570-693-5

Book DOI: <https://doi.org/10.22271/ed.book.2227>

Price: ₹ 753/-

Registration Details

- Printing Press License No.: F.1 (A-4) press 2016
- Trade Mark Registered Under
 - Class 16 (Regd. No.: 5070429)
 - Class 35 (Regd. No.: 5070426)
 - Class 41 (Regd. No.: 5070427)
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Contents

Chapters	Page No.
1. Endocrine and Exocrine Glands <i>(Dr. Mekala Mounika)</i>	01-18
2. Epidemiology, Pathogenesis, Clinical Manifestation and Diagnostic Treatment of Cervical Cancer <i>(Kushbu R, Dr. Madhu Malleshappa, Dr. Arpita Mishra and Dr. Challaraj Emmanuel ES)</i>	19-42
3. Hydrotropy: An Appropriate Method for Solubility Enhancement <i>(Nirmal Shah, Kamleshkumar, Dipti Gohil, Chitrani Talele and Sunil Kardani)</i>	43-54
4. Role of LIPG Endothelial Lipase in Cancer Progression <i>(Yakubu Magaji Yuguda, Dr. Avneet Kaur and Dr. Jyoti Upadhyay)</i>	55-65
5. Nutrition Related Disorders <i>(Sandhya V, Dr. J Gomathi, Farzana Affrin MF and Dhunmati K)</i>	67-85
6. Transplantation Immunology: Mechanism of Graft Rejection, Transplantation of Solid Organs and Bone Marrow <i>(Monisha Iyappan, Shashank V, Joyce Madalene and Raksha R)</i>	87-113
7. Recent Updates in Obstetrics and Gynecology <i>(Deeksha)</i>	115-126
8. Emerging Strategies for Enhancing Solubility of Poorly Soluble Drugs <i>(Dipti Gohil, Soniya Yadav, Zeel Thakkar, Rushabh Purohit and Nirmal Shah)</i>	127-143



Chakrabarti

Chapter - 6

Transplantation Immunology: Mechanism of Graft Rejection, Transplantation of Solid Organs and Bone Marrow

Monisha Iyappan, Shashank V, Joyce Madalene and Raksha R

Abstract

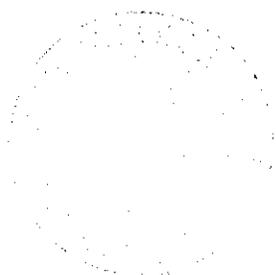
The major histocompatibility complex (MHC) of humans was identified in 1967, and since then, the area of organ and tissue transplantation has advanced significantly. It has been demonstrated that graft acceptance is significantly increased when the MHC antigens of the donor and recipient are matched. The functions of the various immune system parts in the acceptance or rejection of transplants and in graft-versus-host disease have been elucidated. These elements consist of immune cell surface chemicals, antibodies, antigen-presenting cells, helper and cytotoxic T-cell subsets, signaling systems, and the cytokines that they produce. The effectiveness of organ transplantation has been significantly impacted by the discovery of pharmacologic and biological therapies that inhibit the alloimmune response and graft rejection. Combinations of these substances have a synergistic effect that results in lower immunosuppressive medication dosages and less toxicity. The kidneys, liver, heart, lung, and bone marrow are among the solid organs for which reports of a sizable number of successful transplants have been made. For many of these ailments, bone marrow transplantation has replaced other treatments for hematological illnesses, notably for primary immunodeficiency and hematological malignancies.

Keywords: Transplantation immunology, mechanism of graft rejections, solid organs, bone marrow

Introduction

The desire to perform transplants is fueled by the knowledge that several diseases can be cured by the donation of a healthy organ, tissue, or cells from one person (the donor) to another individual who requires the transplant (the recipient or host). Transplantation is defined in immunology as the process of transferring cells, tissues, or organs from one site to another (Platt, 2010).

Page | 89



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Title

Mycosynthesis of CuO Nanoparticles Using *Aspergillus niger* and Their Bioefficiency against Human Pathogens.

Authors

Sahithya, K.; Ekanayake, Amanda K.; Hemanathan, D.; Sindhu, R.; Jaswanth, Bellary

Abstract

In the present study, copper oxide (CuO) nanoparticles were biosynthesized from an *Aspergillus niger* cell-free extract (CFE), and several optimal operating parameters that affected the formation and dimensions of the CuO nanoparticles were determined, as follows: 15 mmol/L metal salt and 90 mL of CFE at room temperature for 24 h, to achieve an average size of 77 nm. Spectroscopic studies revealed an association between alcohol, alkene, and amine functional groups and the grain-shaped CuO nanoparticles. The elemental composition of the nanoparticles was confirmed by energy dispersive X-ray spectroscopy (EDX) data. Mycogenic CuO nanoparticles exhibited excellent antibacterial activity against Gram-positive bacterial species compared with Gram-negative bacterial species, i.e., *Streptococcus pneumoniae* MTCC 2672, *Staphylococcus aureus* MTCC 737, *Micrococcus luteus* MTCC 11948, *Pseudomonas aeruginosa* MTCC 424, and *Escherichia coli* MTCC 443, at 200 mg/mL, with inhibition zones of 9.2, 8.3, 7.7, 7.2, and 6.1 mm, respectively. Finally, myogenic CuO nanoparticles exhibited good antifungal activity against *Aspergillus fumigatus* and *Aspergillus versicolor*.

Subjects

ASPERGILLUS niger; COPPER oxide; STREPTOCOCCUS pneumoniae; ENERGY dispersive X-ray spectroscopy; MICROCOCCUS luteus; ASPERGILLUS fumigatus; GRAM-negative bacteria

Publication

Nano Biomedicine & Engineering, 2024, Vol 16, Issue 2, p264

ISSN

2150-5578



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Editors

Handbook of Oncobiology: From Basic to Clinical Sciences

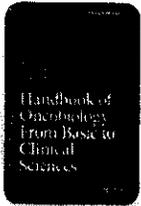
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Current Concepts and Advances in Oncobiology

| Reference work entry | First Online: 15 May 2024

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[Handbook of Oncobiology: From Basic to Clinical Sciences](#)

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Abstract

Abstract

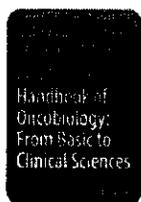
Embarking on the dynamic landscape of oncology, this chapter navigates the interface between emerging concepts and transformative advancements in cancer research. It delves into the intricate symbiosis of viruses and cancers, spotlighting the diverse roles of small DNA tumor viruses, RNA oncoviruses, and their diagnostic potential. Additionally, the discourse examines the evolving vistas of cancer genetics, accentuating the significance of oncogenes and their interactions with energy metabolism pathways. By traversing these complex dimensions, the chapter contributes to an enriched understanding of contemporary oncobiological paradigms.

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Handbook of Oncobiology: From Basic to Clinical Sciences

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Abstract

Embarking on the dynamic landscape of oncology, this chapter navigates the interface between emerging concepts and transformative advancements in cancer research. It delves into the intricate symbiosis of viruses and cancers, spotlighting the diverse roles of small DNA tumor viruses, RNA oncoviruses, and their diagnostic potential. Additionally, the discourse examines the evolving vistas of cancer genetics, accentuating the significance of oncogenes and their interactions with energy metabolism pathways. By traversing these complex dimensions, the chapter contributes to an enriched understanding of contemporary oncobiological paradigms.



Dietary Synbiotic as a Supplemental Therapy to Reduce Cancer Symptoms: A Review

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ABSTRACT

The significance of the human microbiome in the pathogenesis of cancer is becoming more widely recognized. Pre-, pro-, and synbiotics are some of the most well-studied ways to alter the microbiota for therapeutic purposes, and there is growing interest in their potential to be used in the diagnosis and treatment of cancer. In this review, we examine how these drugs may preserve the integrity of the intestinal barrier, regulate the immune system, regulate metabolism, and restrict the growth of host cells. We emphasize the epidemiological and trial-based evidence that pre-, pro-, and synbiotics play a role in cancer prevention. In the end, there is more evidence to support the use of these drugs as cancer treatment adjuncts. We go over their roles in enhancing the effectiveness of chemotherapy and radiation and/or reducing their side effects. The use of pre-, pro-, and synbiotics for clinical benefit in oncology patients has tremendous potential, but the discipline is still in its infancy, making it difficult for oncologists to provide their patients the right advice.

Keywords: *microbiome, oncology, probiotics, prebiotics, synbiotics.*

Received 09.05.2023

Revised 19.05.2023

Accepted 30.06.2023

INTRODUCTION

By specifically enhancing the growth and/or stimulating the metabolism of one or more numbers of health-promoting bacteria, a synbiotic product benefits the host by positively impacting the survival and implantation of live microbial dietary supplements in the gut. Because it suggests synergism, the word "synbiotics" should only be applied to products in which the prebiotic compound(s) benefit the probiotic organism(s). This review will examine the possible therapeutic uses of pre-, pro-, and syn-biotic concerning cancer. These agents now constitute the main treatments geared towards positive modification of the microbiota (as opposed to negative manipulation with antibiotics). As our grasp of science has evolved, pre- and probiotic classifications have undergone several changes. 'A substrate that is preferentially used by host microorganisms imparting a health advantage' is the definition of a prebiotic [1]. Numerous molecules fall under this category; the non-digestible oligosaccharides fructo-oligosaccharide (FOS, which may be found in foods like onions and garlic) and galacto-oligosaccharide have received the most research. These substances work by encouraging commensal bacteria to proliferate and/or operate in ways that are advantageous to the host. Probiotics, on the other hand, are "live microorganisms that, when administered in sufficient amounts, confer a health benefit on the host" [2].

Although many fermented foods (like kimchee, tempeh, kombucha, sauerkraut, probiotic yogurt or kefir) contain live organisms, the majority are not considered probiotics because the food itself confers the health benefit rather than the organisms, and they frequently do not contain enough organisms to be classified as probiotics. Synbiotics are a preparation that combines pre- and probiotics. Probiotics are a group of certain microorganisms that may be found in the *Lactobacilli* or *Bifidobacteria* genera and are available as single agents or multi-strain formulations. Probiotics are typically consumed orally and are made to survive transit to the lower gastrointestinal (GI) tract, whether they are consumed in the form of yogurt, freeze-dried live organisms taken as a powder, or in capsule form. [3] By competitive exclusion, direct antagonistic action, neutralization of pathogenic bacterial toxins, and preservation of intestinal barrier function, they may lessen the impact of pathogenic organisms on the host. Short-chain fatty acid (SCFA) generation, bile acid metabolism, vitamin biosynthesis, and carcinogen-neutralization are only a few of the metabolic impacts of probiotics [4-6].

PAPER • OPEN ACCESS

Effect of Sn on Physical and Optical Properties of Lithium Zinc Borate Glasses

To cite this article: K Mohamed Haneen *et al* 2024 *IOP Conf. Ser.: Mater. Sci. Eng.* 1300 012041

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Effect of Sn on Physical and Optical Properties of Lithium Zinc Borate Glasses

Mohamed Haneen K^a, Akshay K Thammaiah^a, Abhishek R^b, Shivamurthy C B^b,
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Abstract: 22.5 Li₂O₃-(20-x) ZnO-57.5B₂O₃- xSnCl₂ (x = 0, 0.5, 1) glasses were synthesized using the conventional melt quench technique. Glass composition with larger concentration of lithium oxide exhibits excellent transport properties. Introducing intermediate element like zinc into the matrix will lead towards slight modification in structure by not varying much in its intrinsic properties. Thus, incorporation of Sn as dopant into the matrix has tailored the physical and optical properties of glasses. In this study, it is interesting to note that, the density of the glass has reduced for 0.5 mol % SnCl₂ in the matrix and on the contrary, the density of glass was found to be increased for the SnCl₂ with 1 mol % concentration. It indicates that, there could be a possibility of slight modification in the structure of glasses which eventually leads towards tuning of the optical bandgap due to existence of Sn.

1. Introduction

Glass is an inorganic non-crystalline solid that is often transparent, hard, brittle, and chemically inert. Glass find its applications in variety of fields like optics, architecture, medical, house wares etc[1–3]. Borate glass network consists of BO₃ and BO₄ structural units and the combination of these units gives rise to di, tri, tetra, and penta borate groups in glass network[4,5]. Borate glasses have many advantages over silica glasses and soda-lime glasses like lower melting and softening temperature[1,6], better thermal shock resistance, chemical durability and higher electric resistivity[1]. Li₂O in B₂O₃ network modify the host structure through the transformation of the structural units of the borate network from [BO₄] to [BO₃] with the creation of non bridging oxygen(NBO) which forms more ionic bonds which results in higher ionic conductivity and refractive index values[5,7] and also results in the decrease of optical energy band gap for both direct and indirect band gap[8]. Addition of transition metals in borate glasses has shown great potential in technological applications like electrooptic, electronic, electrochemical devices and radiation dosimetry[9–12]. Addition of zinc to lithium borate glass will increase the strength and enhance the electron emission[11]. Presence of zinc in lithium borate glasses can alter or increase the glass transition temperature[13], thermal expansion coefficient and density. SnO₂ is a semiconductor material, and its incorporation into borate glasses improves their electrical conductivity which has very important applications in sensors, optoelectronic devices, and solid state batteries[14]. SnO₂ acts as a network modifier and also as network former in borate glasses[15]. This work discusses about the physical and



Effect of trehalose on growth and stress tolerance in crops by using bioinoculants

El efecto de la trehalosa en el crecimiento y tolerancia al estrés de los cultivos mediante el uso de bioinoculantes

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ABSTRACT

Trehalose biosynthesis is an important pathway that linked to abiotic stress tolerance. Recent research findings showed that the trehalose metabolic pathway is important for the growth and development of the plant. In plants, trehalose production seemed to be exclusively reserved for stress resistant plants which living in extreme habitats. In variety of plant species to improve the stress tolerance and yield particularly under stress condition, several attempts to engineer plants that produce more trehalose. In many studies have observed the regulatory role of trehalose-6-phosphate, a precursor of trehalose, play an important role in sugar metabolism, growth and development in plants. Trehalose-6-phosphate influences the starch and sucrose accumulation in leaves during day time regulates starch degradation at night to demand for sucrose. It is necessary to understand about the potential role of trehalose as a metabolite in abiotic stress responses and interactions of plants with bacterial and fungal pathogens, rhizobia, mycorrhizae and non symbiotic rhizobacteria.

Key words - Abiotic and biotic stress, Heavy Metals, Rhizobacteria, Trehalose

RESUMEN

La trehalosa biosintética es una ruta importante que está relacionada con la tolerancia al estrés abiótico. Investigaciones recientes demostraron que la ruta metabólica de la trehalosa es importante para el crecimiento y desarrollo de una planta. Para las plantas, la producción de trehalosa parecía estar reservada exclusivamente para las plantas resistentes al estrés, las cuales viven en hábitats extremos. Con el fin de mejorar la tolerancia al estrés de una variedad de especies vegetales y el rendimiento de ellas, especialmente en condiciones de estrés, se han realizado varios intentos para diseñar plantas que produzcan más trehalosa. En muchos estudios se ha observado la función reguladora de la trehalosa 6-fosfato, la cual es precursora de la trehalosa y que juega un rol fundamental en el metabolismo de los azúcares, el crecimiento y desarrollo de las plantas. La trehalosa 6-fosfato influye en la acumulación del almidón y la sacarosa en las hojas en el día, y en la noche regula la degradación del almidón para luego exigir sacarosa. Es necesario entender el rol potencial de la trehalosa como un metabolito con respecto a las respuestas al estrés abiótico y las interacciones de las plantas con patógenos bacterianos y fungales, rizobios, micorrizas y rizobacterias no simbióticas.

Palabras clave: estrés abiótico y biótico, metales pesados, rizobacterias, trehalosa



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Enhanced Catalytic Reduction and Electrochemical Sensing Properties of Magnetic Fe₃O₄@benzothiazole-Cu(II) Nanoparticles

Research Published: 06 May 2024

Volume 34, pages 4349–4363, (2024) Cite this article



Journal of Inorganic and Organometallic Polymers and Materials

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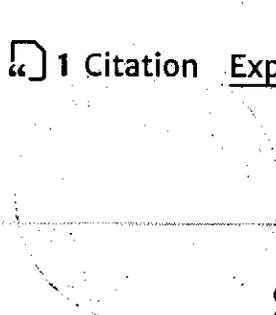
Guddappa Halligudra, Prasanna D. Shivaramu ✉, Chitrabanu C. Paramesh, Kunal Roy, Chetana Sabbanahalli, Manikanta P. N., Vinaya K., Ananda Kumar C. S. & Dinesh Rangappa



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Abstract

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Ethno-pharmacological of Lilium Flower

Anu Kiruthika S* and Sornaraj R

*Corresponding author: Dr. S Anu Kiruthika, Associate Professor, Department of Microbiology, Indian Academy Degree College – Autonomous, Bengaluru, Karnataka.

Submitted: 15-02-2023

Accepted: 25-02-2023

ABSTRACT

The Lilium flower have been regarded as an excellent source of biological active compounds. The present study reports the control of microbial load in air by open plate methods. The phytochemical analysis of the extract reveals the presence of phenols, flavonoids, tannins, terpenoids, glycosides, coumarins, and quinones. Bacterial identification of the isolates from the study area was confirmed with suitable tests.

Key words: Lilium flower, open plate method, phytochemical, bacteria.

I. INTRODUCTION

Lilium is a genus of herbaceous flowering plants growing from bulbs, all with large prominent flowers. They are the true lilies. India has a great treasure of medicinal plants due to which it is one of the richest nations in terms of a vast collection of genetic resources of medicinal plants in the world [1]. The members of the Liliaceae family have been found to contain phytochemicals such as alkaloids, steroidal saponins, vitamins, and fatty acids, which are responsible for their biological activity [2]. Flowers of various species of lily have been reported to possess broad-spectrum antimicrobial activity [3]. *L. longiflorum*, has been studied and used as an anti-inflammatory agent for the treatment of bronchitis and blood clotting during the surgical procedures [4]. Lipid peroxidation and cholesterol oxidase enzyme inhibitor assays are used to determine the bioactive compounds in *L. longiflorum* flower, which in turn shed light on its anecdotal medicinal use [5]. The *Lilium candidum* L. is also an ancient plant, which is used as an important edible plant and important biomedicine in China to alleviate the symptoms of various human inflammatory diseases and they are cultivated as an ornamental plant throughout the world [6]. This plant helped from time immemorial in the treatment of inflamed and suppurative wounds, ulcers, skin inflammations, burns and various injuries [7]. It is also used for muscle pain and gynecological problems. After surgery, it speeds up wound healing. Externally used is an

alcohol or oil extract [8]. Mechanisms of Lilium anti-inflammatory activity and their bioactive components remain little known, but the therapeutic effects of lilies are confirmed by modern medicine, which has shown its healing, anti-inflammatory, analgesic, antioxidant, and other effects [9]. Many studies have been conducted for the chemical constituents of the genus Lilium, which illustrated their pharmacological effects of anti-tumor, hypoglycaemic, anti-bacterial, anti-inflammatory, hypolipidemic, reducing blood lipid, anti-depression anti-fatigue and hypoxia tolerance. The importance of the genus in the world flower market is due to diversity and large number of hybrid and cultivars commercially available. However, some species are also known for medicinal and food value which increase the economic importance many folds [10]. Outdoor concentrations of airborne bacteria generally were higher than those indoors but similar in summer and winter. Bacterial concentrations indoors showed more seasonal difference, which may be due to changes in occupant dress and activities as well as ventilation patterns during the cooling and heating seasons. The present work was aimed to control the microbes present in the environment with incorporating the Lilium flower extract in medium.

II. METHODOLOGY

Preparation of flower extract

Fresh Lilium flower were collected directly from the farmers and flower sellers of Bengaluru and brought to the laboratory. The flowers were rinsed twice with distilled water and allowed to air dry in shade. It was made into small pieces using sharp sterile scissors. Extraction was done at room temperature by simple extraction method [11]. 10 gm of dried flower material was weighed accurately using digital electronic monopan balance and soaked in 40ml of propylene glycol solvent [12] and kept in a shaker for 48 hours at 37°C. Then the filtration was performed using muslin cloth and the filtrate was preserved for the further studies.

Home / Archives / Vol. 12 No. 3 (2024): Volume 12, Issue 3, July-September, 2024 / Articles

Exploring Social Preferences: A Study of Liking People Levels in College Students in Bengaluru

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DOI: <https://doi.org/10.25215/1203.162>

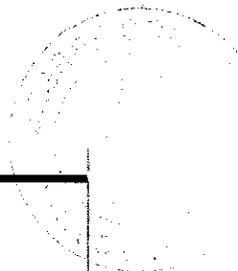
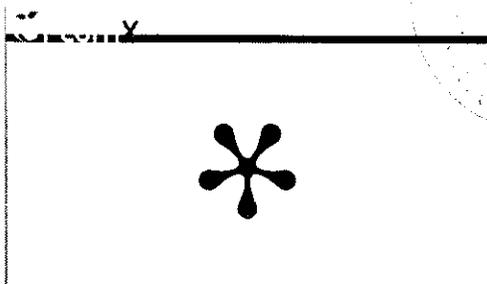
Keywords: Social Preference, Social Interaction, Social Relationship, Social Dynamic, College Students

Abstract

This study examines the levels of social interaction and relationship preferences among college students utilizing an online questionnaire format. The research sample comprises 100 college students from various academic disciplines. Employing a descriptive research design, data collection involves self-reported responses to an online questionnaire, specifically the Liking People Scale (Rubin, 1970). This scale is designed to assess individuals' affinity for social interactions and relationships. Through analysis, the study aims to ascertain the extent of social engagement and relationship inclination among college students. The findings provide valuable insights into the social dynamics within the college environment, shedding light on students' preferences and behaviors in social interactions. Understanding these preferences can inform the development of strategies and interventions aimed at fostering positive social connections and enhancing overall student well-being in academic settings.

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Fish on the platter! Dietary habits of fishing cats (*Prionailurus viverrinus*) in the Godavari Delta, India

ORIGINAL PAPER Published: 02 January 2024

Volume 69, pages 221–230, (2024) Cite this article



Mammal Research

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Abstract

The threatened fishing cat (*Prionailurus viverrinus*) is an elusive and medium-sized cat that is adapted to mangroves, swamps, wetlands and riverine habitats. A close look at the literature indicates that fishing cats are piscivorous; however, this is based on very few studies. Understanding the patterns of resource utilisation by species is crucial for assessing their role in ecosystems and in ensuring their conservation. Therefore, our study presents insights into fishing cat feeding patterns from mangroves of the Godavari delta, Andhra Pradesh, India. We collected 303 putative fishing cat scats and conducted diet analysis using 120 genetically identified scats. Our analysis revealed that fish was the most important prey for fishing cats in the study area (61.6% in frequency of occurrence),

Home / Archives / Vol. 12 No. 2 (2024): Volume 12, Issue 2, April-June, 2024 / Articles

Gender Disparities in Personality Traits and Life Satisfaction among Undergraduate Students

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DOI: <https://doi.org/10.25215/1202.426>

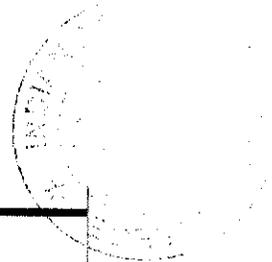
Keywords: Gender disparities, personality traits, life satisfaction, under graduate students

Abstract

This study investigates the relationship between gender, personality traits, and satisfaction with life among undergraduate students. Utilizing a sample of [n=152] participants who are resided in Bangalore, data was collected through online Google form. Personality traits were assessed using established measures such as the Eysenck's personality inventory (H J Eysenck, 1975), while life satisfaction was evaluated through Satisfaction with life scale (Emmons E Diener, 1985). Results indicate no significant gender differences in certain personality traits, with implications for life satisfaction. The findings highlight the importance of understanding gender dynamics in shaping individuals' perceptions of well-being within the undergraduate context. This research contributes to the broader literature on personality psychology and gender studies, offering insights for educators, counsellors, and policymakers seeking to support the holistic development of undergraduate students.

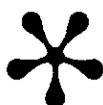
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Title

POTENTIAL INHIBITORY ACTIVITIES OF CATHARANTHUS ROSEUS ALKALOIDS ON PTP-1B IN RELATION TO ENHANCING INSULIN USAGE FOR TYPE II DIABETES TREATMENT.

Authors

Ramesh, Vanitha G.

Abstract

Even with the emergence of hypoglycaemic drugs, diabetes mellitus remains one of the major endocrine and metabolic disorders, affecting approximately 10% of the global population. It stands among the top five global causes of death. Type II diabetes has been managed by using a variety of plant extracts. Due to the side effects of taking insulin and oral hypoglycaemic drugs, patients are growing more and more interested in natural products with antidiabetic properties. Ancient societies made widespread use of *Catharanthus roseus* (*C. roseus*) and other herbal plants as therapeutic therapies to treat Type-II Diabetes mellitus. *C. roseus* extract has been demonstrated in several tests to dramatically lower blood glucose levels. Studies examining the genetic make-up of people, animals and cells have shown that Protein Tyrosine Phosphatase-1B (PTP-1B) is an enzyme that functions as a negative regulator of the insulin signalling pathway by removing phosphate groups from certain tyrosine residues on insulin receptor substrates (IRS). PTP-1B inhibitors have been examined in an effort to boost glucose metabolism and insulin sensitivity. This study focuses on the alkaloid which exhibits the most potent activity in hampering PTP-1B and less cytotoxicity in overseeing the insulin signaling pathway. It also uses Auto Dock bioinformatic tools for demonstrating the mechanism of potential inhibitory activities of four alkaloids of *C. roseus* in the active sites of PTP-1B, namely vindoline I, vindolidine II, vindolicine III and vindolinine IV.

Subjects

TYPE 2 diabetes; CATHARANTHUS roseus; INSULIN therapy; ALKALOIDS; INSULIN sensitivity; AMARYLLIDACEAE

Publication

Biochemical & Cellular Archives, 2024, Vol 24, Issue 1, p929

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Li-ion Spent Carbon-Loaded Magnesium-Zirconium Hydroxide Composite for Adsorption of Methylene Blue: Kinetics and Isotherm Modelling

Research Published: 15 May 2023

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A handwritten signature in black ink, possibly reading 'Prashanth', is written over the author list.

Abstract

The primary aim of the present investigation is to understand the efficiency of mesoporous graphene oxide incorporating Mg/Zr-hydroxide for the adsorption of methylene blue dye. Carbon from used Li-ion batteries was used to make graphene oxide, which is a way to reuse spent carbon that is safe for the environment. The structural and morphological features of the adsorbent were analysed in detail. The prepared adsorbents showed a specific surface area of 237.8 m²/g and 364.7 m²/g, respectively, for Mg/Zr-

Review

Synthesis and Antiviral Efficacy of Pyrimidine Analogs Targeting Viral Pathways

Dr. N. Jeelan Basha , T. L. Chandana

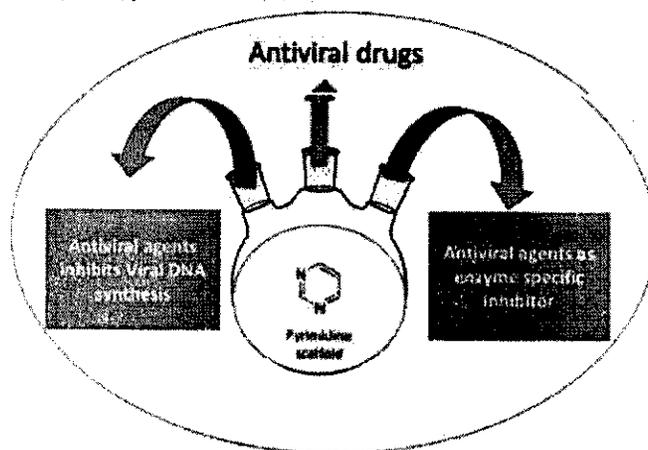
This review article is dedicated to late Dr. N.M. Goudgaon, Emory University, Atlanta, Georgia and former professor, Gulbarga University, Gulbarga, India.

First published: 16 May 2023 | <https://doi.org/10.1002/slct.202205009> | Citations: 1

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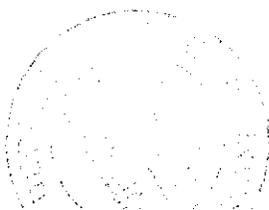
Graphical Abstract

Due to the emerging threat of viral infection caused by the viruses such as HIV, HCV, Cytomegalovirus, and SARS-CoV2, there is a need for small molecules that can eradicate these pathogens. Pyrimidines, basically nucleosides, have been known for their antiviral potential. There are challenges for the medicinal chemist to design and synthesize pyrimidine analogs specifically non-nucleosides, as potent antiviral agents to overcome problems such as toxicity and drug resistance. This review focuses the recent reports on potent pyrimidines as antiviral

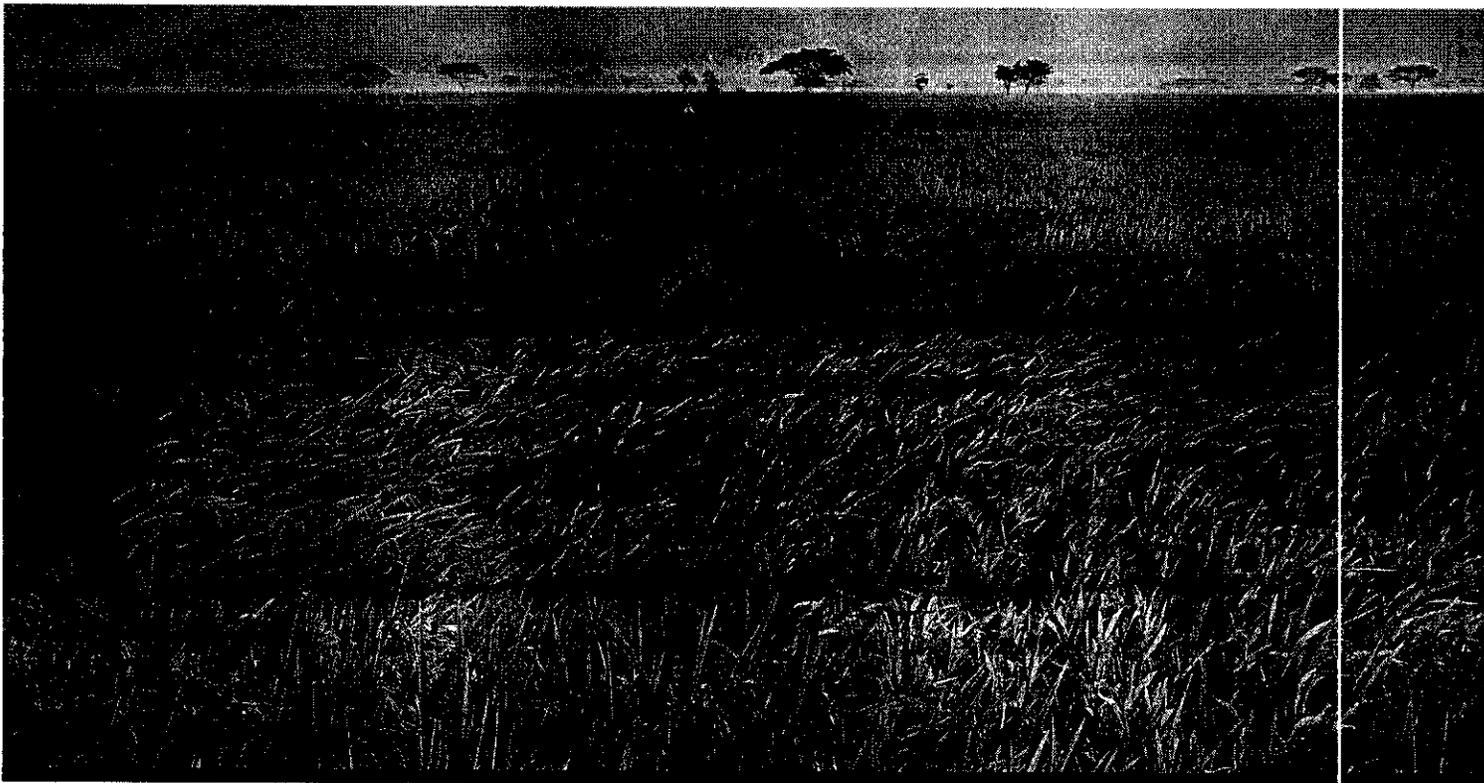


Abstract

To date, viruses are known to cause chronic to acute pathogenesis. Nevertheless, antiviral drugs have been known for their medicinal applications for the last few decades to treat infections caused by these pathogens. Despite advancements in the field of vaccination and antiviral drugs, there is a need for a molecule that can eradicate or control viral infection without getting resistance from pathogens will be a real challenge. This review covers possible ways to treat viral infections with pyrimidine and its mimics compared to known antiviral drugs. A comprehensive study of the report accomplished synthetic routes of pyrimidine analogs and their target-specific antiviral potential. The present review article covers literature from 2018 to 2022.



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RESPONSE OF FIELD CROPS TO ABIOTIC STRESS

Current Status and Future Prospects

Edited by

Shuvasish Choudhury

Debojyoti Moulick



CRC Press
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Response of Field Crops to Abiotic Stress

Current Status and Future Prospects

Edited by
Shuvasish Choudhury and Debojyoti Moulick



 **CRC Press**
Taylor & Francis Group
Boca Raton London New York

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First edition published 2023
by CRC Press
6000 Broken Sound Parkway NW, Suite 300, Boca Raton, FL 33487-2742

and by CRC Press
4 Park Square, Milton Park, Abingdon, Oxon, OX14 4RN

© 2023 selection and editorial matter, Shuvasish Choudhury and Debojyoti Moulick; individual chapters, the contributors

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Library of Congress Cataloging-in-Publication Data

Names: Choudhury, Shuvasish, editor. | Moulick, Debojyoti, editor.

Title: Response of field crops to abiotic stress: current status and future prospects / edited by Shuvasish Choudhury and Debojyoti Moulick.

Description: First edition. | Boca Raton, FL : CRC Press, 2023. | Includes bibliographical references and index.

Identifiers: LCCN 2022029321 (print) | LCCN 2022029322 (ebook) | ISBN 9781032191966 (hardback) | ISBN 9781032191973 (paperback) | ISBN 9781003258063 (ebook)

Subjects: LCSH: Crops--Effect of stress on. | Field crops--Effect of stress on.

Classification: LCC SB112.5 .R48 2023 (print) | LCC SB112.5 (ebook) | DDC 631.4/52--dc23/eng/20220822

LC record available at <https://lccn.loc.gov/2022029321>

LC ebook record available at <https://lccn.loc.gov/2022029322>

ISBN: 9781032191966 (hbk)

ISBN: 9781032191973 (pbk)

ISBN: 9781003258063 (ebk)

DOI: 10.1201/9781003258063

Typeset in Times
by codeMantra

INDIAN

3 2023

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Contents

Preface	vii
Editors	ix
Contributors	xi
1. Abiotic Stress Management through Elemental Biofortification in Field Crops	1
<i>Sudhakar Srivastava, Vartika Jain, and Kritika Sinha Nigam</i>	
2. Availing Engineered and Biosynthesized Metal-Based Nanoparticles to Alleviate Abiotic Stress	15
<i>Monolina Sarkar, Anindita Paul, and Debapriya Rajlakshmi Das</i>	
3. Arsenic Stress Sensitivity, Adaptation, and Mitigation Strategies in Field Crops	35
<i>Madhu Tiwari, Neelam Gautam, Yuvraj Indoliya, and Debasis Chakrabarty</i>	
4. Heavy Metals' Stress Responses in Field Crops	45
<i>Munish Kumar Upadhyay and Arnab Majumdar</i>	
5. Chromium Dynamics in Soil-Plant System	55
<i>Binaya Kumar Pattnaik and Chandan Sahu</i>	
6. Overview on the Effects of Heavy Metals on the Biological Activities of Leafy Vegetables	67
<i>Diyadyuti Das, Brahmashri Mondal, Archita Dey, Deepanjan Mridha, and Tarit Roychowdhury</i>	
7. Aluminum Toxicity and Ionic Homeostasis in Plants	79
<i>Bedabrata Saha, Bhaben Chowdhara, Umakanta Chowra, and Chetan Kumar Panda</i>	
8. Drought and Heat Stress Tolerance in Field Crops: Consequences and Adaptation Strategies	91
<i>Lalichetti Sagar, Subhashisa Praharaj, Sultan Singh, Meenakshi Attri, Biswajit Pramanick, Sagar Maitra, Akbar Hossain, Tanmoy Shankar, Jnana Bharati Palai, and Upasana Sahoo</i>	
9. Drought and High-Temperature Stress Tolerance in Field Crops	103
<i>Goutam Kumar Dash, Madhusmita Barik, Soumya Kumar Sahoo, Selukash Parida, Jagdish Jena, Mirza Jaynul Baig, and Padmini Swain</i>	
10. Improving Submergence Tolerance in Rice: Recent Progress and Future Perspectives	111
<i>Debabrata Panda, Jijnasa Barik, and Prafulla K. Behera</i>	
11. Salinity and Osmotic Stress in Field Crops: Effects and Way Out	123
<i>Dibakar Roy, Pawar Deepak Vishwanath, Dasari Sreekanth, Himanshu Mahawar, and Dibakar Ghosh</i>	
12. Compatible Solutes Engineering to Balance Salt (Na⁺) and ROS-Induced Changes in Potassium Homeostasis	139
<i>Dipankar Barman, Lekshmy Sathee, Birendra K. Padhan, and Archana Watts</i>	
13. Metabolomics and Molecular Physiology Perspective for Drought and Salinity Stress Tolerance	153
<i>Sagar Sudam Jadhav, Renu Kumari, Sanjeet Kumar Mahtha, Ravi Kiran Purama, Vinita Lamba, and Gitanjali Yadav</i>	
14. UV Stress in Plants: A Curse in Plant Productivity and Blessing in Food Security	167
<i>Jayjit Majumdar</i>	
15. Impact of Elevated CO₂ and O₃ on Field Crops and Adaptive Strategies through Agro-Technology	177
<i>Arkabane Mukherjee and Swati Hazra</i>	

Abiotic Stress Management through Elemental Biofortification in Field Crops

Sudhakar Srivastava and Vartika Jain
Banaras Hindu University

Kritika Sinha Nigam
Indian Academy Degree College

CONTENTS

1.1 Introduction.....	1
1.2 Heavy Metal Stress	2
1.3 Salinity Stress.....	3
1.4 Drought Stress.....	3
1.5 Heat (High Temperature) Stress.....	7
References.....	10

1.1 Introduction

Stress is any factor, biotic or abiotic, that exerts pressure on individual plant or community causing it to deviate from normal system functioning and alters its growth and development (Rhodes and Nadolska-Orczyk 2001). The plant life is dependent on its interactions with environment, including individual components of soil, water and air. Since plants are static organisms, when components of the environment like temperature, elemental concentrations and water availability are beyond the optimum range, they suffer from stress as they cannot move/migrate to another place of optimum conditions. The well-known abiotic stresses include salinity, drought, extreme temperatures and metal(loid) concentrations. Abiotic stresses interfere with various physiological processes, affect biochemical machinery and alter molecular functions to alter the growth and metabolic activities of plants leading to reduced biomass accumulation and yields. Today's increasing demand for crop products has led to the requirement of management of crop growth by the available resources effectively (Ahmed 2020).

Nevertheless, owing to continuous exposure to one or other type of abiotic stress during its life cycle, plants have devised several defense strategies to effectively cope with the stresses and grow and reproduce. These strategies can operate temporarily for a specific duration causing short-term modifications, such as to tackle extremes of temperature during summer and winter, respectively. On the other hand, to tackle lifelong stresses, like in salinity-affected area or to low water availability in a desert, plants have adapted themselves with development of new or modified organs and physiological mechanisms

(Tester and Bacic 2005; Pandey et al. 2017). Root growth or root architecture is a common feature that shows changes in response to a lot of abiotic stresses. In the case of drought conditions, root grows profusely to increase the surface area and root hairs for water uptake (Pavia et al. 2019). For metalloids stress like arsenic (As), the growth of roots may be reduced or specifically altered with induced growth of lateral roots or root hairs so as to reduce As uptake (Srivastava et al. 2021). The production of reactive oxygen species (ROS) as a byproduct of oxygen-dependent metabolism is a normal process. In fact, there are several pro-oxidant enzymes, which produce different ROS in their reaction, and these enzymes have a crucial role in normal plant growth (Grob et al. 2013). However, in the presence of most of the abiotic stresses, the production and quenching of ROS are disturbed and levels of ROS increase rapidly. ROS are highly reactive and can interact with proteins, lipids and DNA to start chain reaction of radicals and disturb structural features of cell (Mittler 2017). To fine-tune the ROS levels, plants are equipped with several enzymes and molecules having antioxidant functions. These include superoxide dismutase (SOD), enzymes of Asada-Halliwell pathway [ascorbate peroxidase (APX), dehydroascorbate reductase, monodehydroascorbate reductase, glutathione reductase (GR)], catalase (CAT) and peroxidases among enzymatic antioxidants and ascorbic acid (ASA), glutathione (GSH), carotenoids, proline, phenolics etc. among molecular antioxidants (Alscher et al. 2002; Shigeoka et al. 2002; Kováčik et al. 2011; Srivastava et al. 2016a; Awasthi et al. 2018). Another important feature of stresses is the reduction in photosynthetic efficiency due to altered gaseous and water vapor exchange that may be caused by stomatal closure or due to effects on

PROBIOTICS, PREBIOTICS & SYNBIOTICS – IMPACT ON HEALTH

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ABSTRACT:

Probiotics are live, nonpathogenic microorganisms that are given to patients to help with microbial balance, especially in the digestive system. They are controlled as dietary supplements and foods and are made of *Lactobacillus* and *Bifidobacterium* species or *Saccharomyces boulardii* yeast. Probiotics work to benefit the body through a number of processes, including as reducing intestinal pH, preventing the colonisation and invasion of the body by harmful organisms, and altering the host immune system. Benefits of probiotics linked to a particular species or strain may not apply to others. Probiotics may help prevent conditions such as antibiotic-associated diarrhoea, travellers' diarrhoea, irritable bowel syndrome (IBS), ulcerative colitis, Crohn's disease and vulvovaginal infections, hypertension, mental illness although more research is required to fully understand this. A probiotic should normally contain several billion germs to improve the likelihood that proper gut colonisation will occur, but there is no agreement on the minimum quantity of microorganisms that must be consumed to have a positive effect. Probiotics are typically seen to be safe and well tolerated, with bloating and flatulence being the most common side effects. Since systemic infections can infrequently happen, they should be used cautiously in patients who are very ill, highly immunocompromised, or those who have central venous catheters. Probiotics made from bacteria should be taken at least two hours apart from antibiotics.

Keywords: Probiotics, Traveller's diarrhoea, irritable bowel syndrome (IBS), Hypertension.

Introduction

The word "probiotics" is a Greek word that means "for life" Probiotics were described by an expert panel FAO (Food and Agriculture Organisation) and WHO commissioned as "live micro-organisms" which, when provided in sufficient proportions, impart a health benefit on the host. The bacterial genera *Lactobacillus*, *Bifidobacterium*, *Escherichia*, *Enterococcus*, *Bacillus*, and *Streptococcus* are the most frequently employed in probiotic formulations. Additionally, some *Saccharomyces*-related fungal strains have been utilised. Eli Metchnikoff, the 1908 Nobel Prize laureate, proposed that the long life of Bulgarian peasants was due to their consumption of fermented milk products, which is when the idea of probiotics first emerged. Lilly and Stillwell

**EVALUATION OF IN VITRO, ANTI-INFLAMMATORY AND ANTI-OXIDANT
ACTIVITY ON THE AQUEOUS AND ETHANOLIC EXTRACT OF LEAVES OF
HYGROPHILA BALSAMICA**

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Abstract

Introduction and Background: The abundance of thousands of species of medicinal plants

throughout a wide range of bioclimatic zones has earned India the title of "Emporium of medicinal plants." The current work seeks to characterize and investigate the phytochemical and pharmacological properties of *Hygrophila balsamica* leaf extracts both in aqueous and ethanolic mediums.

Material and Methods: The reagents, solvents, and chemicals employed in this study were of analytical grade and were obtained from Hi-media Laboratories Pvt. Ltd., Mumbai and Qualigens Fine Chemicals Pvt. Ltd, Mumbai. The foliage of *Hygrophila balsamica* was procured from agricultural terrain in Karnataka, in the month of January. Department of Zoology, conducted the authentication process on the gathered leaves.

Results: The investigation recognizes the presence of alkaloids, glycosides, flavonoids, steroids, tannin, carbohydrate, and protein in the aqueous and ethanolic extracts, while specifically omitting gums, mucilage, phenols, sterols, and terpenoids. The findings from the extracts demonstrated notable antioxidant and anti-inflammatory properties, hence indicating promising prospects for medicinal applications.

Conclusion: The primary objective of this study is to conduct a phytochemical analysis and assessment of the leaves of *Hygrophila balsamica* in order to ascertain the validity of their traditional medicinal properties. The results of this study are expected to generate additional research in the fields of phytochemistry and therapeutic application.

Keywords: *Hygrophila balsamica*, phytochemical, physical chemical analysis, anti-inflammatory, and antioxidant properties

INTRODUCTION

India is referred to as the "Emporium of Medicinal Plants" due to the presence of thousands of medicinal plants in various bioclimatic regions. Around 80% of people worldwide, according to the World Health Organization, get their medical care from herbal sources. Only 17% of the approximately 2,50,000 species of higher plants in the world have been studied for their potential as medicines [1, 2].

Plants are the source of close to one-fourth of pharmaceutical medications. As an illustration, study on the often used local plant *Glycyrrhiza glabra* led to the discovery of carbenoxolone, the first medication helpful in treating gastrointestinal ulcers. Gefarnate was discovered as a result of research on cabbage. Foxglove (*Digitalis purpurea*), a traditional herbal remedy from Europe, was successful, as British physician William Withering discovered in the 18th century. Cardiac glycosides make the heart contract more forcefully and give it more time to rest in between beats [3, 4]. From foxglove leaves, more than 30 cardiac glycosides, including digitoxin and digoxin, have been discovered in the 20th century. Reserpine, an alkaloid still used today to treat high blood pressure, was first isolated from *Rauwolfia* root in 1949 by German chemists. A Chinese chemist discovered artemisinin, a sesquiterpene lactone from the wormwood plant, in 1972. Artemisinin is the main biologically active ingredient in treating malaria. Alkaloids from *Catharanthus roseus* (Madagascar periwinkle), which are employed in chemotherapy for children leukemia and the

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A Study on the Sustainability Approach of ESAF Small Finance Bank-Loan Effectiveness for Restoration During and Post COVID

| Chapter | First Online: 16 July 2024

| pp 761–772 | [Cite this chapter](#)



[Artificial Intelligence \(AI\) and Customer Social Responsibility \(CSR\)](#)

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Abstract

This research examines the effectiveness of loan programs in aiding the recovery of customers' financial status during and post-COVID-19 crisis, with a particular emphasis on ESAF Small Finance Bank's initiatives. Specifically, it investigates the impact of microfinance provided to women in need, especially for their respective businesses. For the purposes of this research, we have conducted field visits with a total of 100 clients.



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Reviews

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Pages 438-455 | Published online: 05 Aug 2022

 Cite this article  <https://doi.org/10.1080/10408398.2022.2106545>

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Abstract

Various studies have shown that the microbial proteins are often more stable than belongs to other sources like plant and animal origin. Hence, the interest in microbial enzymes has gained much attention due to many potential applications like bioenergy, biofuel production, biobleaching, bioconversion and so on. Additionally, recent trends revealed that the interest in isolating novel microbes from harsh environments have been the main focus of many scientists for various applications. Basically, industrially important enzymes can be categorized into mainly three groups:

A STUDY ON THE IMPACT OF FINANCIAL LITERACY & FINANCIAL INCLUSION ON ENTREPRENEURSHIP INTENTION AMONG STUDENTS IN BANGALORE

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ABSTRACT

In the present scenario where there is a lack of job opportunities, as we know the demand and supply for the job are never the same, in such a situation imparting entrepreneurial skills to the youngster becomes a prerequisite. The basic requirement to become an entrepreneur is to have finance and having a literacy about the arrangement of it is the basic skill that is required foremost to become an entrepreneur. At the same time, financial inclusion plays a dominant role in persuading the youth to become an entrepreneur. This research is an attempt to study the role of financial literacy and financial inclusion in the willingness of students to become an entrepreneur. A total of 258 responses were collected from autonomous institutions undergraduate students of Bangalore through a structured questionnaire. The analysis is done by using the tools of measure of central tendency, SPSS, and SEM. The study reveals that the independent variable of financial literacy and financial inclusion is highly significant with the dependent variable willingness of entrepreneurship. The analysis support that a higher level of financial literacy and awareness about financial inclusion leads to entrepreneurship development. The suggestion for the same was included in the study.

Keywords: Financial Inclusion, Financial Literacy, Entrepreneurship willingness.

INTRODUCTION

In a developing country like India, more than 50% of its population is below the age of 25 and more than 65% is below the age of 35. In 2022 the average age of Indians is 28.7 years. The growth and upliftment of this young youth will facilitate the development of an economy. In a country like India, the youth unemployment rate is 22.90 % as of 2021(<https://tradingeconomics.com>). There is a need for entrepreneurship development to provide more & more job opportunities and overall upliftment. Financial literacy plays a dominant role in entrepreneurship development. Nowadays the financial product's extensive variety and complexity demand a high level of financial literacy to understand the benefits of these financial products & services offered by financial institutions for better financial planning and personal financial management. The young students must equip themselves with the knowledge of investment, saving, insurance, loans, tech finance, and various avenues for investment for retirement planning, which lead to confidence-building in making financial decisions that facilitate financial well-being.

Financial literacy and awareness about financial inclusion will facilitate and give ideas to young minds about the arrangement of funds for their business plan which boosts their morale to come forward and take the initiative to start up their business which promotes and persuade them to become an entrepreneur.

Aim of the Study

The study aims at understanding the present situation and the role of financial literacy and financial inclusion on the willingness of entrepreneurship among undergraduate autonomous students of Bangalore, it also focuses on analysing the impact of demographic factors on the main variables of the study and as well as the steps taken to overcome by suggesting suitable means.

Need for the Study

Entrepreneur development results in individual and over-country development. In a country like India where most of the market is still untapped, there is a large scope for new business and start-ups. So, therefore, the young mind should be motivated to be a job provider rather than a job seeker for which imparting knowledge of financial literacy and financial inclusion play a dominant role and this study intended to highlight the same.

Statement of the Problem

Since entrepreneurship is a need of the era, and it's a young youth who can be persuaded to become an entrepreneur which will be a solution to many economic and social problems. Finance is the main hindrance in starting a new business. This barrier can be removed from financial literacy and financial inclusion. There is much research conducted in this regard but there is no study found specifically with reference to the role of financial inclusion and literacy to support entrepreneurship decisions among college students in Bangalore.

Objectives of the study

- To study the impact of financial literacy on the willingness of entrepreneurship.
- To find the role of financial inclusion in persuading the entrepreneurship decision.
- To study the influence of demographic factors on the variables of the study.
- To provide suggestions to overcome the hindrances

Review of Literature

Neeta Baporikar (2020): This research is an attempt to find the financial literacy importance for the success of women's entrepreneurship. The researcher has adopted qualitative techniques and collected the data through interviews with 23 women entrepreneurs selected through purposive sampling based on two criteria, first, the business must be established for five years and second one is it must be started with a minimum of three employees. The finding reveals that there is a need for financial literacy and it has a great influence on the success of women entrepreneurs. Hence the research recommended group-based training focused on women entrepreneurs. The study concludes that women entrepreneurs must acquire knowledge, skills, and competencies in financial literacy so that their businesses become self-sustaining and profitable.

Yaya Koloma (2021): This study was conducted to examine the determinants of financial inclusion in youth and its impact on entrepreneurial intention in Mali. The World Bank's Global Findex database is used to perform Logit estimations and propensity score matching. It is found that financial inclusion among youth will be more determined by attaining a high level of financial education. The study found that the three main barriers to financial inclusion development were the cost of financial services, the lack of money, and the perception that financial services, savings, in particular, are not a necessity. The study also depicts that the saving and loan opportunities also impact the willingness to become entrepreneurs by path analysis. The study suggested having a strong public policy with the objective of expanding credit to youth, as it has a high impact on their willingness to engage in entrepreneurship in Mali

Habib Auwal Abubakar , (2015): The main purpose of the study is to analyse the level of financial literacy in Africa based on previous studies with the objective of finding how financial literacy impacts entrepreneurship development in Africa. The study focused on household behavior and the gender gap in financial literacy. To analyse this both quantitative and qualitative methods were used a survey on financial literacy conducted by Finscope OECD was used and analysed, apart from the other published data. The finding of results reveals that access to finance, access to the market, policies, and entrepreneur culture is the main hindrances to entrepreneurship. The other main issues are lack of entrepreneur training, unfriendly business investment decisions, and the gender gap.

Emmanuel Kojo Oseifuah, (2010): The study focused to assess the level of financial literacy and its impact on youth entrepreneurship in South Africa. The data was collected through both desk research and questionnaire through face-to-face interviews. The paper reveals that financial literacy among youth entrepreneurs in the Vhembe District appears to be above average and contributes meaningfully to their entrepreneurship skills. Further research is needed to verify in specific and practical terms, the level and impact of financial literacy on youth entrepreneurs in the Vhembe District. Practical implications – Education and training at both high school and tertiary levels with an emphasis on financial literacy and entrepreneurial skills may have significant implications for small-, micro-, and medium-sized enterprise development and growth for the youth entrepreneur in general in South Africa

Research Methodology

The research objective for this study includes exploration and description. The research design used in this study is a descriptive research design. Primary data is collected & with the help of a structured questionnaire from 258 students. The reliability test showed that the Cronbach alpha value is 0.83 which clearly states that the questionnaire is valid and reliable. The data collected is organized, classified, and analysed using a wide range of appropriate statistical tools like mean and standard deviation, correlation, and path analysis.

Research Instrumentation

The questionnaire of survey consists of 3 parts. The first part aims to find out the personal information of students. The second part aims to find out the level of financial literacy among students and awareness about financial inclusion. The third part discusses the intention to become entrepreneurs among college students.

VARIABLES OF THE STUDY

In the current study, the researcher has identified the willingness of entrepreneurship as a dependent variable and the role of financial literacy and awareness of financial inclusion as the independent variable. The researcher has found the role of financial literacy & financial inclusion on the willingness of entrepreneurship specifically with regard to the undergraduate students of an autonomous institution in Bangalore city.

LIMITATIONS OF THE STUDY

The study is restricted to undergraduate students of autonomous colleges of Bangalore city only and may not be applicable to other areas. The opinion of the students is based on the primary source of data only.

ANALYSIS AND INTERPRETATION

The analysis is carried out for the role of financial literacy and financial inclusion on the willingness to entrepreneurship among college students. The measures of central tendency, t-test & Anova, correlation, and structural equation modeling (SEM) path analyses have been used to draw the results from studying the variables and the analysis for the same is as follows;

Table 1.1 Mean & Standard Deviation of Impact of Financial Literacy on Entrepreneur willingness

Measuring Variables	Mean	S. D
I have enough knowledge to raise capital for starting the business.	3.98	0.990
I am not aware of the monetary rules & regulations involved in the starting of any new project/ business.	4.05	0.916

BIOLOGIC AND PHOTOCATALYTIC DEGRADATION OF UV PRETREATED MIXTURE OF DYES BY *CALOCYBE INDICA*

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Received: 10 September 2024, Revised and Accepted: 27 October 2024

ABSTRACT

The degradation of a mixture of dyes by photocatalytic process (TiO₂/UV) and as a pre-treatment to biologic degradation by *Calocybe indica* (milky white mushroom) was investigated. The fungus was capable of degrading 52.6% of the dye's mixture, within 10 days under static conditions at pH 7.5 and 30°C temperature and having 150 µg/ml dye concentration. The photocatalytic process was capable of degrading only 16.2% dye mixture when exposed to UV for 4 h at continuous stirring at 30°C temperature and 150 µg/mL dye concentration. A two-step treatment process, namely, photocatalytic treatment followed by biologic degradation, was assessed. The visual observations and ultraviolet-visible (UV-VIS) spectral analysis showed that the combined effects were most efficient in the removal of the dye (94.6%), which involved a complex interaction of enzyme activity, biosorption, and photocatalytic action. The biotransformation of the synthetic dye mixture was confirmed by UV-Vis spectroscopy analyses of samples before and after decolorization. The strain showed a high correlation between the dry weight and color removal percentage. Thus, the biodegradation of complex synthetic dye mixture to non-toxic metabolites using *C. indica* would be a better option for the biologic treatment of textile effluents.

Keywords: Mixture of dyes, Photocatalytic pre-treatment, Mycoremediation, TiO₂/UV

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INTRODUCTION

Synthetic dyes find extensive usage across industries, notably in textile dyeing, contributing significantly to wastewater pollution (Grassi *et al.*, 2011b). The color imparted by these dyes is a visible contaminant in water, with even minimal amounts (10–15 mg/L) affecting water esthetics and transparency (Robinson *et al.*, 2001). Textile industries are major consumers, accounting for two-thirds of the global dye and pigment production (Vijayaraghavan *et al.*, 2015). The inherent stability of synthetic dyes against light, water, and oxidizing agents poses challenges for their environmental degradation (Georgieva *et al.*, 2010). Their complex aromatic molecular structure renders biodegradation in aquatic systems arduous (Grassi *et al.*, 2011b), with untreated discharges posing hazards to both human health and aquatic ecosystems (Rajhans *et al.*, 2021). The colored effluents from the textile industries affect the photosynthetic processes of aquatic plants which reduce oxygen levels in water, and in severe cases, result in the suffocation of aquatic flora and fauna (Janaki *et al.*, 2015). Effluent treatment typically involves chemical and physical methods such as adsorption and coagulation, but these generate substantial sludge and incur high costs (Mechichi *et al.*, 2006). Consequently, there is a pressing need for cost-effective decolorization methods. Fungi have garnered attention for their efficient and economical degradation of organic pollutants, including synthetic dyes, through mycoremediation (Grassi *et al.*, 2011b; Perelo, 2010).

The treatment of dye effluents encompasses a range of chemical and physical methods, including adsorption, coagulation, oxidation, precipitation, photodegradation, filtration, and ionizing radiations, each with distinct decolorization capabilities, capital costs, and operational speeds. While coagulation and adsorption are commonly employed, they often yield large quantities of sludge, posing disposal challenges, and chemical degradation methods tend to be costly, time-consuming, and methodologically demanding (Grassi *et al.*, 2011b; Mechichi *et al.*, 2010). Hence, there exists a pressing need to develop an economically viable and efficient approach to decolorize textile dyeing waste.

In this regard, fungi have garnered significant attention for their capacity to efficiently and affordably degrade organic pollutants, including synthetic dyes. Mycoremediation emerges as an eco-friendly, non-invasive, cost-effective solution capable of reducing or transforming environmental hazards into non-toxic forms (Perelo, 2010). Mushrooms, recognized as powerful decomposers of by-products and integral components of the food web, exhibit remarkable prowess in interacting with recalcitrant substrates such as fats, chitin, and keratin, breaking them down into starches, hemicelluloses, celluloses, pectins, and other sugar polymers (Rhodes, 2012).

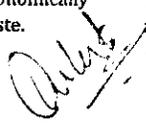
Recent interest has surged in heterogeneous photocatalytic oxidation processes for dye degradation, wherein irradiation of TiO₂ particles proves highly competent for wastewater treatment. This method facilitates the complete mineralization of organic compounds under mild conditions, sans sludge, or harmful by-products (Huang *et al.*, 2006). The TiO₂ catalyst, characterized by its affordability, high surface area, non-toxicity, chemical stability across a broad pH range, photostability, and capacity to utilize sunlight and air to generate reactive species such as hydroxyl radicals (HO), demonstrates efficacy in converting organic compounds into harmless species such as CO₂ and H₂O (Adams *et al.*, 2006; Su *et al.*, 2016).

While varying percentages of decolorization have been reported for different textile dyes, investigations into combined biologic-photocatalytic effects remain scarce. Hence, the primary objective of the present study was to optimize degradation conditions for the fungus *Calocybe indica* and explore the photocatalytic degradation of dye mixtures as a pre-treatment to enhance biodegradability. This holistic approach seeks to harness both biologic and photocatalytic mechanisms for effective wastewater treatment.

METHODS

Microorganism and cultivation conditions

The fungal strain *C. indica* was stored on PDA slants (potato dextrose agar consisting of glucose [10 g/L], agar [15 g/L], and 40% potato



Synthesis, Antimicrobial Activity, Drug-likeness, and Molecular Docking Studies of Novel 3-((2-(Benzylthio)-5-(phenylselanyl) pyrimidin-4-yl)amino)-2-(4-substituted phenyl)thiazolidin-4-ones

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ARTICLE HISTORY Received 29 November 2023; Accepted 16 March 2024

Pyrimidines possess numerous important biological activities, including anticancer, anti-viral, and antimicrobial properties.^{1–3} As a subset of these valuable compounds, 5-phenylselenenyl-substituted pyrimidines are known for their inhibition of dihydrouracil dehydrogenase, orotate phosphoryl transferase, thymidine phosphorylase, and uridine phosphorylase.^{4–5} 1-(Ethoxymethyl)-6-(phenylselenenyl)pyrimidines were effective against human immunodeficiency virus types 1 and 2.⁶ It is interesting to note that selenium nanoparticles themselves have been studied for their antimicrobial activity.⁷ Thiazolidinones are also known for their diverse biological activities.^{8–10} In view of the importance of pyrimidines, and in continuation of our own research on potent molecules^{11–14} we now report on the synthesis, antimicrobial character, drug-likeness, and molecular docking of new 3-((2-(benzylthio)-5-(phenylselenenyl)pyrimidin-4-yl)amino)-2-(4-substituted phenyl)thiazolidin-4-one analogs 5 and 6.

Our studies began with the use of 2-(benzylthio)-4-chloro-5-(phenylselenenyl) pyrimidine (1) (Scheme 1). Compound 1 was subjected to treatment with hydrazine hydrate in ethanol and underwent nucleophilic substitution to obtain compound 2 (80%). The reaction of compound 2 with substituted aromatic aldehydes (4-methoxybenzaldehyde and 2-chlorobenzaldehyde) in the presence of hydrochloric acid gave the desired Schiff bases, namely the 4-arylidinehydrazino-5-phenylselenenyl-2-benzyl pyrimidines 3 (81%) and 4 (72%). In terms of functional group characteristics, compound 4 showed IR absorption peaks at 3353 and 1597 cm^{-1} for N-H and C=N structural units. The ¹H-NMR gave signals at δ 8.26 (s, 1H, C₆H), 7.72–7.22 (m, 16H, 14-Ar-H, 1 N=CH, 1 N-H), and 4.37 (s, 2H, S-CH₂-Ph). In the mass spectrum, there were molecular ion peaks at m/z 510 (M⁺), 512 (M⁺) and significant fragment peaks at 475 and 357. Subsequent cyclization of these Schiff bases in the presence of thioglycolic acid and zinc chloride in benzene produced the target compounds 5 (55%) and 6 (52%), each of which was fully characterized, including satisfactory ($\pm 0.40\%$) elemental analyses (see Experimental section and Supplementary Materials Figures S1–13).

Review

Insight on Heterocycles as p53-MDM2 Protein-Protein Interaction Inhibitors: Molecular Mechanism for p53 Activation

Dr. N. Jeelan Basha  R. M. MohanFirst published: 06 March 2024 | <https://doi.org/10.1002/slct.202304525>

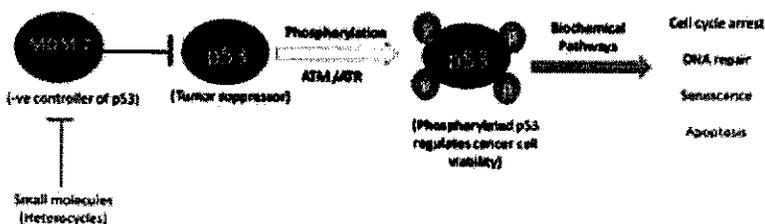
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Graphical Abstract

The tumor suppressor protein p53 plays a vital role in gene regulation in normal conditions. Apart from this, phosphorylated protein regulates cancer cell viability by various pathways. However, MDM-2, a negative controller of p53, deregulates the normal functioning of p53. This review encompasses the molecular mechanism of p53 and heterocycles which are in clinical trial as p53-MDM-2 protein-protein interaction inhibitors. Also, accomplish recent reports on potent heterocycles that target

MDM-2 and activate p53.



Abstract

Transcription factor p53, also known as tumor suppressor protein. Encoded by the TP53 gene, the guardian of genome p53 regulates many gene pathways. Nevertheless, the molecular mechanisms of p53 functioning have been known for a few decades, and the exact role of p53 in cancer therapy is unclear. Also, comprehensive literature on heterocycles as p53-MDM2 protein-protein interaction inhibitors is limited. This review covers the molecular mechanism for the p53-MDM2 interaction and its inhibition by the heterocyclic small molecules. We hope the present comprehensive study will help to develop heterocycles as anticancer drugs that induce apoptosis in tumor cells.

Conflict of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.



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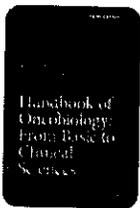
Recent advancements in cancer research have led to improved methods for early detection, prognostic monitoring, and innovative therapeutic interventions, resulting in a reduction in overall mortality rates among cancer patients. The identification of crucial proteins, metabolites, and miRNAs that play a significant role in the regulation and proliferation of cancer cells has revolutionized the clinical approach to cancer treatment. The utilization of nucleotide sequencing, gene targeting/editing, cell and tissue engineering, and bioinformatics has provided novel perspectives in comprehending this multifaceted ailment. The promising treatment of various solid tumors and

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Abstract

Recent advancements in cancer research have led to improved methods for early detection, prognostic monitoring, and innovative therapeutic interventions, resulting in a reduction in overall mortality rates among cancer patients. The identification of crucial proteins, metabolites, and miRNAs that play a significant role in the regulation and proliferation of cancer cells has revolutionized the clinical approach to cancer treatment. The utilization of nucleotide sequencing, gene targeting/editing, cell and tissue engineering, and bioinformatics has provided novel perspectives in comprehending this multifaceted ailment. The promising treatment of various solid tumors and hematopoietic

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Alcohol-induced hormonal and metabolic alterations in plasma and erythrocytes—a gender-based study

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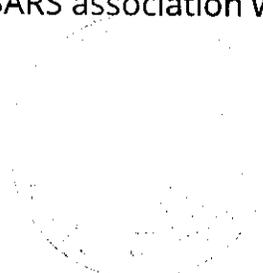
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Abstract

Purpose

This study aimed to understand the gender-specific alcohol-induced biochemical changes and TBARS association with the endocrine system.

Methods



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Anti-atherogenic role of green tea (*Camellia sinensis*) in South Indian smokers

Venkateswarlu Reddy Kanu ^a, Swetha Pulakuntla ^a, Gouthami Kuruvalli ^a,
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Highlights

- Green tea is consumed as a beverage worldwide due to its beneficial effects.
- Green tea consumption lowers oxidative stress and normalizes lipid profile in smokers.
- Molecular docking studies revealed green tea catechins' inhibitory activity on HMG-CoA reductase and SREBP1c.
- *In vitro* studies revealed that green tea possesses anti-platelet aggregation and anti-thrombotic functions.
- The protective effects reported can be attributed majorly to catechins.



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Abstract

Ethnopharmacological relevance: Green tea (*Camellia sinensis*) is a popular beverage consumed all over the world due to its refreshing nature and health benefits. Many of these beneficial effects of green tea are attributed to polyphenols, particularly catechins. **Aim of the study:** The present study focuses on anti-platelet aggregation, anti-thrombotic, and anti-lipidemic mechanisms of green tea in South Indian smokers. **Materials and methods:** We selected 120 South Indian male volunteers for this study and collected the blood and categorised them into four groups; control group healthy individuals (Controls), smokers, healthy control individuals consuming green tea, and smokers consuming green tea. Smokers group subjects have been smoking an average 16–18 cigarettes per day for 7 years. The subjects (green tea consumed groups) consumed 100 ml of green tea each time, thrice a day for a one-year period. **Results:** LC-MS analysis revealed the presence of multiple phytochemicals along with catechins in green tea extract. Increased plasma lipid peroxidation (LPO), protein carbonyls, cholesterol, triglycerides, and LDL-cholesterol with decreased HDL-cholesterol levels were observed in smokers compared to the control group and the consumption of green tea showed beneficial effects. Furthermore, docking studies revealed that natural compounds of green tea had high negative binding energy with 3-hydroxy-3-methyl-glutaryl-CoA reductase (HMG-CoA) when compared to their positive controls, whereas (-) epigallocatechin-3-gallate (EGCG) and (-) epicatechin-gallate (ECG) had high negative binding energy with sterol regulatory element-binding transcription factor 1 (SREBP1c). Further, our ex vivo studies showed that green tea extract (GTE) significantly inhibited platelet aggregation and increased thrombolytic activity in a dose dependent manner. **Conclusion:** In conclusion, in smokers, catechins synergistically lower oxidative stress, platelet aggregation and normalize an aberrant lipid profile. Furthermore, molecular docking studies supported green tea catechins' antihyperlipidemic efficacy through strong inhibitory activity on HMG-CoA reductase and SREBP1c. The mitigating effects on cardiovascular disease risk factors in smokers that have been reported can be attributed majorly to catechins or to their synergistic effects.

Note:

Funding declaration: The authors thank DST-SERB and ICMR for providing financial assistance to Dr. V. Damodara Reddy under the Ramanujan Fellowship (SB/S2/RJN-043/2014). Dr. Kameswara Rao Badri acknowledges the research grant funding support from NIH/NIMHD, NS1GM141937.



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Anticancer Potential of Bioactive Molecule Luteolin and Its Analogs: An Update

N. Jeelan Basha  & S. M. Basavarajaiah 

Pages 3958-3976 | Received 29 Dec 2021, Accepted 12 May 2022, Published online: 28 May 2022

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Abstract

Literature evidence that natural products are potential bioactive components for lead compounds in drug discovery. These molecules have distinctive chemical structures that play a significant role in identifying and developing drugs for different diseases as therapeutics. Further, natural products have been known for both medicinal and biological activities. One such natural product, luteolin, a wonder molecule, belongs to the class of flavonoids. A dietary flavonoid, luteolin exhibits potent anticancer, antioxidant, anti-inflammatory, and antiviral activities. This review covers comprehensive insight into the anticancer potential and structural activity relationship of luteolin and its analogs. This review also summarizes the recent

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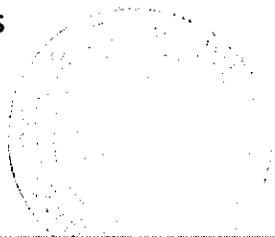
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COMPARATIVE ANALYSIS OF ACETYLCHOLINESTERASE ACTIVITY AND ISOLATION AND CHARACTERIZATION OF ACETYLCHOLINESTERASE INHIBITOR FROM INDIAN MEDICINAL PLANT AND ITS APPLICATION ON HUMAN HEALTH

September 2023

DOI:10.13140/RG.2.2.13511.68001

Authors:

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Indian Academy Degree College Autonomous Bangalore North University

Pushpalatha



Veekshitha

Abstract

Acetylcholine Esterase (AChE) hydrolyses the neurotransmitter acetylcholine (ACh) to acetate and choline promoting the termination of signals from nerve cells to muscle cells. A comprehensive investigation of Acetylcholine Esterase (AChE) activity, aimed to elucidate the potential health benefits derived from selected Indian herbal medicinal plants. A comparative analysis of AChE activity levels and isolation and characterization of a potent AChE inhibitor from this native plant source was envisaged. Furthermore, it delves into the application and implications of this inhibitor for human health. The first phase of the initial study involved measuring and quantifying AChE activity in various biological samples, including tissues and serum, using the most advanced biochemical assays. By analyzing a diverse set of specimens, the study aimed to establish a basic understanding of AChE activity in different physiological contexts, thereby providing valuable insight into the importance of AChE, its importance to human health. The study then focused on the isolation and purification of a novel AChE inhibitor from a selected Indian medicinal plant. Using advanced chromatographic techniques and spectroscopic analysis, the study elucidated the chemical structure and functional properties of the isolated compound. Elucidation of the chemical structure and functional properties of the isolated product was done using advanced chromatographic techniques and spectroscopic analysis. Exploration of practical applications of AChE inhibitors in the field of human health was attempted by studying the effects of inhibitors on the regulation of neurotransmitters, synaptic function, and cognitive processes. Besides, current research on the evaluation of the possibility of using inhibitors in the treatment of neuro-degenerative disorders, such as Alzheimer's disease, in which dysregulation of AChE is a prominent feature is being done. In summary, this study provides a multidimensional view study of AChE activity and its modulation via inhibitor obtained from Indian medicinal plants is presented here. The study by providing comparative analysis, chemical characterization and insights into its application to human health, this study contributes significantly to our deeper understanding of the potential benefits of this study of natural compounds derived from native flora. Ultimately, this opens up new avenues for the development of novel therapeutic interventions targeting AChE-related health problems. **Keywords:** Acetylcholin Esterase, enzyme activity, inhibitors, neuro-degenerative disorders, drug development, therapeutic applications.

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