

6th NATIONAL CONFERENCE ON "Frontiers in Combating Antibiotic Resistance Exploring Microbial Bioactives and Nanoparticles" (FCAR:EMBN)

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2025





Centre for Bioscience and Nanoscience Research

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461/3 Amman Nagar, L&T Bypass Road, Eachanari, Coimbatore - 641021

6th NATIONAL CONFERENCE ON
“Frontiers in Combating Antibiotic Resistance
Exploring Microbial Bioactives and Nanoparticles”
(FCAR:EMBN)

26 and 27 September 2025



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CENTRE FOR BIOSCIENCE AND NANOSCIENCE RESEARCH

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Vision and Mission Statement

Our motto is “Towards Excellence”

CBNR is a Centre for higher learning in the life sciences, provides all areas of academic and industrial need through research and development at affordable cost to the students. We aimed to develop the skills that are necessary to the students and research scholars in the field of life sciences, enable them for the placements and affinity towards the subject.

About US and Scope of the Institute

Centre for Bioscience and Nanoscience Research (CBNR) is affiliated to Bharathiar University to conduct Research Programme (M.Phil and Ph.D) and an ISO 9001:2015 certified, which was established in 2010 with the objective of providing need based and affordable quality training in the different disciplines of life science by the Educational Philanthropist – Visalakshi Educational Trust. CBNR has certified by BCIL, MSME and we are proud to introduce Coimbatore’s first of its kind integrated Biotechnology & Bionanotechnology research lab, offering a research and training solutions to the students of all branch of sciences and technology, research scholars and industries, in the area of Microbial Biotechnology, Enzyme technology, Food science, Food Technology, Bioremediation, Recombinant DNA technology, Agricultural microbiology and Bio nanotechnology, Biochemistry, Microbiology, Botany, Zoology and Phytochemical technology, with state of art laboratory facilities on par with RD centers. The laboratory facilities includes, separate lab for Microbial technology, Molecular Biology and Bio Nanotechnology. Young and vibrant minds are made mundane by piling up of mere theory rather than practice. In such a scenario, CBNR has taken a different route to embark upon quality training. **CBNR is Celebrating 15 Years of Research Excellence**

As CBNR Research Institute enters its 15th year of groundbreaking research, it continues to thrive under the visionary leadership of Prof. Dr. R.R. and the relentless dedication of its faculty members. Over the years, the institute has made significant contributions to the academic and research landscape, producing over **150 research papers** published in various indexed journals.

These efforts have resulted in an impressive **citation index of 1900**, an **h-index of 21**, and an **i-10 index of 35**, showcasing the impact of CBNR research on the global academic community.

CBNR Research Institute has also been a hub for knowledge-sharing and professional development, having successfully organized:

- **5 Faculty Development Programs (FDPs)**
- **6 National-level Conferences**
- **45 Workshops**

The institute has trained over **8000 students** and guided more than **800 students** in their major and minor research projects. In terms of advanced academic achievement, SSK has produced **5 Ph.D. scholars** and facilitated the completion of **over 55 external Ph.D. scholars**.

In the field of intellectual property, SSK has filed **4 patents**, with **4 published** and **1 granted**, further cementing its position as an innovator. Additionally, **two products are currently in the pipeline**, promising to bring new technological advancements to the forefront.

Highlights of CBNR

- More than 100 gene sequences submitted to NCBI
- More than 110 papers published in National and International Journals
- Conducted 26 workshops & 4 Faculty Development programme
- 10 MoU with leading colleges / Industry support for the placement
- 56 students got placement so far
- Acquiring latest Knowledge by hands-on training and research experience & exposure to the research field
- Fee concession and free training for the merit & economically weaker students
- Experienced research scientist / Eminent visiting scientists from industry and academia.
- Enrichment scientific knowledge / panel discussion with scientists
- Completed one project on Edible fruit coating

Laboratory facilities

We are equipped with the state of art facilities for pursuing research in the current thrust areas of Life sciences. We have separate labs for Microbiology, Animal cell culture, Bionanotechnology, Molecular biology and Bioprocess, with state of art laboratory facilities on par with RD centers.

Research Collaboration

CBNR collaborates with a number of National academic institution and industry to achieve the Research goals. There are number of eminent scientists who are the mentors or collaborators in our research projects. We encourage any research which can help the general humankind and are open to collaborate with the individuals and agencies with similar aim.

Benefit to the Society

Now a days there is a decline in number of students opting the bioscience courses due to lack of awareness and available of minimal number of technically skilled persons in the field. So we aimed to create awareness among undergraduate and post-graduate students in universities, colleges etc. on issues related to importance of Microbial biotechnology & its potential applications. The recent and continuing advances in life sciences clearly unfold a scenario energized and driven by the new tools of Microbial biotechnology. Microbial Biotechnology is a knowledge-driven technology, which needs to be driven by allow of new ideas and concepts in the development of new tools for research to generate green environment

Area of Research work carried out in CBNR

- **rDNA technology /Medical Molecular Microbiology/ Molecular Biology**
- **Bio nanotechnology – Synthesis of Silver/ Gold / CNTs nanoparticles and its Textile /medical applications**
- **Ethanobotany / Plant Biotechnology/**
- **Microbial enzyme technology / Bioremediation / Food Science**

- **Agricultural/ Food Microbiology/ Biotechnology / Bio preservative**
- **Aquatic stress management / Environmental Biotechnology**
- **Microbial diagnosis using rDNA technology / Plasmid mediated**
- **All types of Bioinformatics work / Protein Engineering /**
- **Bioactive compounds/ antioxidant/ characterization from Herbal plants/ Microbes /Phytochemistry/ Herbal drug formulation**
- **Animal cell culture / cancer biology**
- **Nanoparticle synthesis using biopolymer, biomolecules etc.**

Message from the Director

I'm delighted to learn that our CBNR to host the 6th National Conference on Frontiers in Combating Antibiotic Resistance Exploring Microbial Bio-actives and Nanoparticles (FCAR: EMBN) in Coimbatore.

Since technological breakthroughs are accelerating in today's world, it is even more essential for educational institutions to look into opportunities of interacting with experts to find out how their curricula may implement "Research Based Learning" . We can expect that sort of opportunities at this conference.

It also makes me happy to know that the conference will address a broad spectrum of life science subjects. Students, researchers, professionals, and academics will gather to exchange knowledge, skills, and experience on a variety of multidisciplinary challenges, including Medical microbiology, Biotechnology and Biochemistry and Pharmaceutical sciences.

I anticipate this national Conference to be an immense success and, on behalf of CBNR, I want to express my gratitude for all those who participated.

Prof. Dr. R. Ragunathan

Director and Research Supervisor

CBNR

Message from the Organizing Secretary

I am happy to heartily welcome participants to the 6th National Conference on Frontiers in Combating Antibiotic Resistance Exploring Microbial Bio-actives and Nanoparticles (FCAR:EMBN). The primary objective of this year's theme emphasizes how significantly the biological sciences have evolved right now. In order to expand the boundaries of biological sciences, this conference attempts at providing academics as well as researchers a platform on which they can present their work and work jointly.

I want to express my gratitude to the CBNR organizing team for planning this amazing occasion. I wish everyone participating a very productive and rewarding conference experience.

Dr. K. Thanga Mariappan, Ph.D.,

Organizing Secretary of FCAR:EMBN

Dept of Microbiology

CBNR

Table of Content

S. No.	Title
1	From Nature to Clinic: Translating Bioactive Compounds into Personalized Therapeutic Solutions <i>Dr. Vinaya K K</i>
2	Ethnobotanical insights into combating Antibiotic Resistance: Tribal Knowledge to Translational Medicine <i>Dr. C. Pavithra</i>
3	Studies on Pharmacognostical, Pharmacological activities and MicroPropagation of <i>Antidesma menasu</i> Miq. <i>Rama Bhat P</i>
4	Impact and Health benefits of Prebiotics and Probiotics in Food Industry <i>Prof. Dr. R. Ragunathan</i>
5	In Vitro Evaluation of Anticancer and Antimicrobial Properties of a Curcumin Plant Extract <i>Jesteena Johney, R. Ragunathan & Vishnupriya R</i>
6	Combat of Antibacterial Gram – Negative Bacteria using Secondary MetaboliteV <i>Abirami, Dr R. Ragunathan & Dr. Jesteena Johney</i>
7	Exploring the Role of probiotics in Modern Health and Wellness <i>Nihala. K, R.Ragunathan & Jesteena Johney</i>
8	Biopharmaceutical and it's Recent Developments <i>Aswathy P, R. Ragunathan & Jesteena Johney</i>
9	Phytochemical Screening, In Vitro Anti-Obesity activity and FTIR Profiling of Hydroethanolic tuber extract of <i>Amorphophallus paeoniifolius</i> (Dennst.) <i>Nicolson, R.Vasandhlakshmi & Dr. R. Karthiyayini</i>
10	Synthesis, Characterization and Evaluation of the Antioxidant and Antibacterial Activities of Selenium Doped Zinc Oxide Nanoparticles <i>Sareena Koppilan, Kavitha Balakrishnan & Nirmala Murugesan</i>

11	Isolation, Identification and Characterization of <i>Bacillus sp.</i> , from Soil Sample <i>Dr. R.Manju & Mr. S.Guruvayurappan</i>
12	Antimicrobial Activity of Marine Bacterial Organisms Isolated from the Coastal Areas of Chennai and Mandapam, India <i>Dr. K. Manimegalai & Dr. C. Abirami</i>
13	Effect of Anthocyanin enriched Edible Coating on the Shelf life of Brinjal <i>S.Bhargavi, Dr. N. Rajani & Dr. R. Ragunathan</i>
14	Formulation and Quality Assessment of Infant Food Powder Fortified with Nutraceuticals <i>Dr. N Nirmala Devi</i>
15	Sustainable Fabrication of Metal Nanoparticles for Biomedical Applications <i>Linima V. K, R. Ragunathan & Jesteena Johney</i>
16	Biochemical Composition of <i>Portunus sanguinolentus</i> and In Silico Docking of Chitin with Estrogen and Progesterone Receptors as a Potential Anticancer Agent <i>D. Abirami, K. Manimegalai, M. Sathiya Priya, V. Shenbaghaselvi & N. Sofiya Banu</i>
17	Clinical Characteristics of Human Rhinovirus Diagnosed by Molecular Testing in Hospitalized Children <i>Dr. Maharaja Pandian, Dr. Sundararajan, Dr. Nirmala & Ismath Jahan</i>
18	Bio nanofabrication at silver nano particles using <i>Kalanchoe pinnata</i> flower extract, anti oxidant, anti microbial and DNA damage studies <i>Jayavani M & Dr. R. Ragunathan</i>
19	A Green Synthesis of Magnesium Oxide Nanoparticles Using Beteland Moringa Leaves <i>Rashin S Kunder & Yogendra Nandikol</i>
20	Extraction and Evaluation of Antimicrobial Properties of Chitosan Derived from Marine Crab Shells <i>Reshma B.P & K.Narayanasamy</i>

21	Phytochemical, Antioxidant, Antimicrobial, and Anticancer Properties of Bimetal Nanoparticles Synthesized from <i>Leucas aspera</i> Flower <i>S. Seema, D. Nivethini, R. Ragunathan & Jesteena Johney</i>
22	Bioprospecting of Native Soil bacteria for Development of Eco-Friendly Biofertilizers <i>V. Subramaninan, Dr. R. Ragunathan & Jesteena Johney</i>
23	Antibacterial and Antifungal Activity of Soft Tissue Extracted From <i>Ariophanta bistrialis</i> Snail <i>Sumathi D, Litty Korla, Ragunathan R & Jesteena Johney</i>
24	Evaluation of Antibacterial and Antifungal Properties of Flower Extract and Its Characterization Studies <i>Sumi P & Dr. Nirmala Devi N</i>
25	Green Synthesis of Bismuth and Copper nanoparticles with <i>Punica granatum</i> fruit peel tannins and its anthelmintic activity screening <i>Dinesh. D, Madhu. C. Divakar</i>
26	Important of GABA Butyric Acid produced by <i>Lactobacillus species</i> <i>G. Rajesh & Dr. R Ragunathan</i>
27	Comprehensive Characterization and Drug Design for <i>Klebsiella pneumoniae</i> : From Clinical Identification to in silico Therapeutic Targeting <i>Dhanya. P</i>
28	Development and Characterization of Healthy Gummy Jellies Containing Natural Fruits <i>Najiya Nasrin TP</i>
29	Screening and Characterization of Probiotic Bacteria Producing Lactic Acid From Fermented Foods <i>Safa Minnath T.P</i>
30	Preparation of Edible Film using Fruit Waste Peel to Increase the Shelf Life of Vegetables <i>Shreya P Sarathy & Dr. Haripriya Ravikumar</i>

31	Application of <i>Bacillus spp.</i> to Increase the Nutritional Properties of Fermented Red rice <i>Pooja Pradeep & Dr. Indumathi Mullaiselvan</i>
32	Impact of Probiotics on Human Gut Health <i>Nimisha P & Dr. Indumathi Mullaiselvan</i>
33	Development and Evaluation of Edible Spoons Made from Protein-Based Biopolymers as Functional Carriers of Probiotic <i>Lactobacillus spp.</i> <i>Sharmilashree Venkidusamy & Dr. Haripriya Ravikumar</i>
34	Isolation and Molecular Identification of Soil Probiotics, Production of its Secondary Metabolites and its Application in Food and Biomedical Industry <i>Subhash Lawrence, Prof. Dr. R. Ragunathan & Dr. Jesteena Johney</i>
35	Effect of Short Term Exposure of Ethoxyquin on Hematological Parameters in Fresh Water Fish, <i>Oreochromis mossambicus</i> <i>Dr. Seena. P</i>
36	Valorization of Citrus maxima in Non-Dairy Probiotic Beverage Development: A Nutritional and Functional Insight <i>Gayathri Sanyasi, V. Lakshmi & R. Ragunathan</i>
37	Harnessing Endophytic fungi from <i>Lawsonia inermis</i> L. for Biocontrol of Basal Node Rot in rice: A Molecular and Functional Analysis <i>Divya R & Jisha MS</i>
38	A Comparative Study on Bio Active Efficacy of Silver Nanocomposites of Ipomoea Obscura.L <i>Dr. S. Dhiva</i>
39	Rapid Detection of Viral Pathogens Using Biosensors <i>Dr. Maharaja Pandian, Dr. Sundararajan, Dr. Nirmala & Ismath Jahan</i>
40	Probiotic Juice from Underutilized Wild Fruits of Manipur: A Source of Microbial Bioactive Compounds Against Antibiotic Resistance <i>Khomdram Babina Chanu</i>

From Nature to Clinic: Translating Bioactive Compounds into Personalized Therapeutic Solutions

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Abstract

Natural bioactive compounds derived from plants, marine organisms, and microorganisms have long served as invaluable reservoirs for drug discovery. Recent advances in *omics* technologies, high-throughput screening, and computational modeling have accelerated the identification and characterization of these molecules, revealing their multifaceted roles in modulating cellular pathways, epigenetic regulation, and immune responses. Despite their therapeutic promise, challenges remain in isolating active constituents, ensuring bioavailability, and overcoming inter-individual variability in pharmacokinetics and pharmacodynamics. Integration of nutrigenomics and pharmacogenomics now enables patient stratification and the tailoring of therapies, bridging natural product research with the paradigm of personalized medicine. Moreover, innovations in nanotechnology have enhanced the delivery, stability, and targeted action of bioactive compounds, transforming them into clinically viable therapeutics. Clinical applications are rapidly expanding across oncology, metabolic disorders, and neurodegenerative diseases, supported by an evolving regulatory framework that emphasizes quality, standardization, and safety. This translational trajectory from discovery to clinical implementation—underscores the transformative potential of natural bioactives in precision healthcare. Future directions lie in leveraging multi-omics datasets, artificial intelligence, and advanced delivery systems to expedite the development of personalized therapeutic platforms. Thus, the convergence of natural compound research and personalized medicine offers a promising frontier in the next era of clinical innovation.

Keywords: *bioactive compounds, therapy, Counseling*

Ethnobotanical insights into combating Antibiotic Resistance: Tribal Knowledge to Translational Medicine

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Abstract

Antibiotic resistance has emerged as a major public health crisis in India, where rising multidrug-resistant infections challenge both modern healthcare and traditional treatment practices. While synthetic antibiotics are losing efficacy, tribal knowledge systems across India offer a vast, underexplored repository of medicinal wisdom. For centuries, indigenous communities such as the Irulas, Santals, Bhils, Nagas, and Todas have relied on a rich diversity of medicinal plants to treat infectious diseases, wounds, and fevers—conditions now often complicated by resistant pathogens. Ethnobotanical studies in India reveal numerous plants with potent antimicrobial and resistance-modifying properties, including *Azadirachta indica* (Neem), *Ocimum sanctum* (Tulsi), *Curcuma longa* (Turmeric), *Andrographis paniculata* (Nilavembu), and *Terminalia chebula* (Haritaki). Many of these species exhibit bioactive compounds that act not only as antimicrobials but also as synergistic agents enhancing antibiotic effectiveness. This presentation explores how traditional tribal practices, validated through phytochemical and pharmacological research, can be integrated into translational medicine. By bridging indigenous knowledge with modern drug discovery, ethnobotany in India can play a pivotal role in combating antibiotic resistance while simultaneously preserving cultural heritage and biodiversity.

Keywords: Medicinal plants, Phytochemicals, Drug discovery, Antimicrobial

Studies on Pharmacognostical, Pharmacological activities and Micro Propagation of *Antidesma menasu* Miq.

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Abstract

Antidesma menasu is a folk lore plant used as medicinal and prove its medicinal properties scientifically needs accurate pharmacognostical and pharmacological activities of useful in authentication of the plant and quality assessment. A qualitative and quantitative phytochemical analysis using standard protocols as well as GC-MS analysis were performed to identify the active compounds present in crude drug. *In vitro* propagation of the plant also undertaken to showcase method for multiplication and to cope up alternative method helpful for drug preparations. Pharmacognosy studies like macroscopy and microscopy of the plant parts also revealed useful characteristics for identification with other genus/species. Antioxidant and antimicrobial studies on plant extract also revealed significant outcomes.

Pharmacological studies were carried out to predict the potential of leaf extracts as an anti-inflammatory, analgesic and anti-microbial agent. Acute oral toxicity (AOT) studies were also carried out to predict the adverse effect or toxic nature of the plant if any. Anti-inflammatory activity of both ethanol and aqueous extract were performed by Carrageenan induced rat paw oedema test. Analgesic activity was performed by using formalin test and acetic acid induced writhing test. Results of AOT reveal that, the crude drug is not at all toxic and there were no adverse effects produced by the extract till 2000mg/kg. No deaths were recorded and the lethal dose could be considered above 2000mg/kg. The results from anti-inflammatory and analgesic studies reveal that, the crude aqueous extract is having very good anti-inflammatory potential and moderate analgesic property when compare to ethanol extract.

This study supports the opinion of folklore practitioners about the anti-inflammatory and analgesic activities of *Antidesma menasu* as well as isolating the active compounds from the extract and their pharmacological activity in different animal models are necessary to evaluate the plant for clinical use. These findings validated the claim for the traditional use of this plant in the treatment of pain and inflammatory ailments. The above method could be applicable in producing large number of plants from the leaf explants in a short period of time. Since the plant has got anti-inflammatory, analgesic and anti-microbial property, secondary metabolites could be isolated from the callus or from *in vitro* generated plants. Isolation of secondary metabolites from the callus becomes easy rather than isolating it from natural plants. This work will be the primary step for developing anti-inflammatory, analgesic or anti-bacterial drugs from the plant *Antidesma menasu*.

Keywords: *Antidesma menasu*, pharmacognostical, pharmacological

Antimicrobial Resistance current scenario and diagnosis

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Abstract

Antimicrobial Resistance (AMR) manifests when microorganisms, undergo evolutionary processes leading to their resistance against antimicrobial medications, such as antibiotics, commonly employed for treating such infections. The current scenario is driven by the overuse and misuse of antimicrobials across humans, animals, and agriculture, particularly in low-income countries, leading to the emergence of "superbugs". Review on AMR projected that 10 million deaths caused by AMR could occur by 2050. Some pathogens described as "ESKAPE" bacteria, including resistant forms of *Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and *Enterobacter* spp., represent the most troublesome MDR threats facing hospitals today. The economic losses associated with AMR will reach \$100 trillion USD by 2050. Low-

and middle-income countries are expected to witness the most tremendous burden as bacterial resistance growth outpaces the development of new antimicrobial options.

Keywords: *Antimicrobial Resistance; ESKAPE; superbugs.*

Impact and Health benefits of Prebiotics and Probiotics in Food Industry

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Abstract

The integration of prebiotics and probiotics into food products has transformed the food industry by addressing consumer demand for health-promoting, functional foods. Probiotics, defined as live beneficial microorganisms such as *Lactobacillus* and *Bifidobacterium* species, support gut microbiota balance, enhance digestion, and strengthen immune responses. Prebiotics, including inulin, fructooligosaccharides (FOS), and galactooligosaccharides (GOS), are non-digestible food ingredients that selectively stimulate the growth and activity of these beneficial bacteria. Their combined application, known as synbiotics, provides synergistic health benefits and increases the functional potential of food products. Health benefits associated with probiotics include improved intestinal health, reduction in diarrhea and lactose intolerance, and enhanced protection against pathogenic infections. The food industry has widely adopted prebiotics and probiotics across multiple product categories including dairy products, bakery items, beverages, infant formulas, cereals, and nutraceuticals. Probiotics improve fermentation quality and flavour profiles in fermented foods, while prebiotics enhance product characteristics such as texture, stability, and moisture retention. Additionally, both play a role in extending shelf-life by reducing spoilage and improving microbial safety. Their incorporation has also created significant economic opportunities, with the global market for prebiotics and probiotics showing steady growth due to increasing consumer awareness and demand for natural, clean-label

ingredients. Despite these advancements, challenges remain. Ensuring the survival and stability of probiotic strains during processing and storage, identifying optimal dosages, and improving consumer understanding of their long-term benefits are critical for expanding their application. Future research should focus on discovering novel probiotic strains with targeted therapeutic properties, exploring sustainable plant-based prebiotic sources, and developing innovative synbiotic formulations.

In Vitro Evaluation of Anticancer and Antimicrobial Properties of a Curcumin Plant Extract

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Abstract

Medicinal plants have become an invaluable source of bioactive compounds that have a potential therapeutic role against cancer and infectious diseases. The current research examined anticancer potential and antimicrobial activity of a medicinal plant extract with particular consideration to its cytotoxic effect on cancer cell lines and its inhibitory effect on pathogenic bacteria.

Cell shrinkage, membrane blebbing and formation of apoptotic bodies were morphological alterations that further indicated the presence of apoptosis as the pathological cause of cytotoxicity. Moreover, the antimicrobial properties of the extract were studied by the agar well diffusion method against Gram-positive and Gram-negatives. The strong activity in Gram-positive strains can be explained by the variations in bacterial cell wall

composition that in many cases makes Gram-negative organisms less permeable to phytochemicals. All these findings indicate that the plant extract under investigation has two biological activities, namely, effective anticancer properties due to the induction of the apoptosis process and a wide spectrum of antimicrobial effects, especially against Gram-positive microorganisms. The combination of the two activities underscores the potential of the extract as a natural therapeutic candidate of treating cancer and microbial infections. Additional research on phytochemical characterization and *In-vivo* confirmation is justified to prove its clinical usefulness.

Keywords: *Curcumin, Antibacterial, Anticancer*

Combat of Antibacterial Gram – Negative Bacteria using Secondary Metabolite

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Abstract

The rise of antibiotic- resistant gram negative bacteria presents a major challenge for global health, requiring the investigation of different treatment approaches. Secondary metabolites produced by microorganisms, bioactive compounds from plants and various organisms have become potential candidates in the battle against these MDR pathogens. These bioactive substance show various mechanisms of action, such as disrupting bacterial cell membranes,

blocking proteins and wall synthesis hindering bacterial process like quorum sensing and biofilm development. Antibiotics like polymyxins and tetracyclines, in addition to bacteriocins, natural antibiotic peptides and plant compounds have shown effective against Gram-negative bacteria. Moreover the combined effects of secondary metabolites and traditional antibiotics present a possible approach to counteract resistance mechanisms such as efflux pumps. This underscores the promise of secondary metabolites as new antibacterial agents targeting Gram-negative bacteria, focusing on their various mechanisms of action and the contribution they make in addressing infections that are progressively harder to manage with conventional antibiotics.

Exploring the Role of probiotics in Modern Health and Wellness

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Abstract

Probiotics are considered to be live bacteria or micro-ecological regulators. When consumed in adequate amounts, probiotics can improve the health of the host by regulating the immune response and metabolism. Emerging evidence highlights their beneficial effects on gastrointestinal function, including the prevention and management of diarrhea, irritable bowel syndrome, and inflammatory bowel disease. Probiotics also modulate the gut microbiota, enhance intestinal barrier integrity, and exert immunomodulatory effects that may reduce the risk of allergies, infections, and certain metabolic disorders. However, the effectiveness of probiotics is strain-specific and influenced by dosage, host factors, and duration of administration. While

generally considered safe for healthy individuals, caution is advised in immune compromised populations. The most common types of probiotics are mainly from the genera *Bifidobacteria*, *Bacillus*, and *Lactobacilli*. By care in view, the real dosage, probiotics are being merged into many foods like beverages, ice cream, yogurt, bread, and many others by the food industry. The most important barrier associated with probiotics in the food industry is their susceptibility to processing conditions and sensitivity to gastrointestinal (GI) stresses. However, regarding their health benefits, the consumer always showed an inclined interest in probiotic products. Recent studies proved that consumption of probiotics leads to prevention of cancer (produce short chain fatty acids (SCFA) enhancing cell differentiation and apoptosis of cancerous cells) and reduce cholesterol level (increases the elimination of bile from body and more cholesterol is used to synthesize bile thereby, reducing the cholesterol level in the blood).

Biopharmaceutical and it's Recent Developments

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Abstract

Biopharmaceuticals have emerged as one of the fastest growing sectors in modern medicine, offering innovative solutions for the prevention, diagnosis, and treatment of a wide spectrum of diseases. These therapeutic products derived from biological sources such as plants, microorganisms and genetically engineered systems, have transformed health care by providing

safer, more effective, and highly targeted treatment options. Among them, plant-derived medicinal compounds hold special importance due to their structural diversity, bioactivity, and long history of use in traditional medicine. The irnatural origin, combined with lower toxicity profiles makes them promising candidates for the development of next-generation therapeutics. In recent years, advancements in biotechnology, molecular biology, genomics and bioinformatics have further accelerated the discovery and optimization of novel biopharmaceutical agents. The studies on plant-based bioactive molecules have highlighted their role in enhancing nutritional benefits, boosting immunity, and reducing the risk of chronic diseases, thereby bridging the gap between nutrition and therapy. This paper highlights the types of medicinal compounds, their potential applications in healthcare and nutrition, and the recent developments shaping the future of biopharmaceutical research. The growing integration of traditional knowledge with modern scientific approaches underscores the importance of biopharmaceuticals in addressing current and emerging health challenges.

Phytochemical Screening, *In Vitro* Anti-Obesity activity and FTIR Profiling of Hydroethanolic tuber extract of *Amorphophallus paeoniifolius* (Dennst.) Nicolson

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Abstract

Background

Obesity is a multifactorial metabolic disorder associated with excessive fat accumulation and related comorbidities. Bioactive compounds obtained from plants are increasingly explored as safe alternatives for managing obesity.

Objective

This study aimed to evaluate the phytochemical profile, *in vitro* anti-obesity potential and functional group characterization of hydroethanolic tuber extract of *Amorphophallus paeoniifolius*.

Methods

Freshly collected tubers were washed, shade-dried, powdered, sieved and stored in an airtight container. The powdered material was extracted by maceration using hydroethanolic solvent (water: ethanol, 1:1) and subjected to preliminary phytochemical screening for major bioactive constituents. Enzyme inhibitory activity against α -amylase and α -glucosidase was evaluated at concentrations of 50-250 $\mu\text{g/mL}$, and IC_{50} values were determined. Functional groups contributing to bio activity were identified using FTIR spectroscopy.

Results

The hydroethanolic tuber extract of *Amorphophallus paeoniifolius* revealed the presence of alkaloids, flavonoids, phenols, tannins, saponins and vitamin C, indicating a rich profile of bioactive phytoconstituents. Significant inhibitory activity was observed against α -amylase (IC_{50} : 6.25 $\mu\text{g/mL}$) and α -glucosidase (IC_{50} : 4.05 $\mu\text{g/mL}$) enzymes. The standard drug acarbose showed slightly stronger inhibition for α -amylase (IC_{50} : 3.86 $\mu\text{g/mL}$), but the tuber extract exhibited better activity against α -glucosidase (IC_{50} : 3.74 $\mu\text{g/mL}$). FTIR analysis displayed broad absorptions in the range 870–3300 cm^{-1} , confirming the presence of O–H stretching of alcohols, phenols and carboxylic acids, aliphatic C–H stretching, aromatic C=C vibrations, C–N/C–O functional groups, C–O stretching of alcohols, ethers, glycosidic linkages and aromatic ring bending, thereby confirming the presence of hydroxyl, aromatic and glycosidic functional groups, which suggest phenolic and carbohydrate derivatives in the extract.

Conclusion

These findings highlight the hydroethanolic tuber extract of *A. paeoniifolius* as a promising source of anti-obesity agents, with glucosidase inhibition and rich phytochemical composition contributing to its activity.

Synthesis, Characterization and Evaluation of the Antioxidant and Antibacterial Activities of Selenium Doped Zinc Oxide Nanoparticles

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Abstract

Zinc Oxide is an inorganic metal oxide that meets as medicine, a preservative in packaging, and an antibacterial agent without risk. Selenium is one of the micronutrients that are essential for animals, plants and microorganisms to remain functional. In this study, I developed Selenium-doped zinc oxide nanoparticles (Se-ZnO NPs) for antibacterial and antioxidant activities. This study focuses on the synthesis, characterization, and biological activities of Se-ZnO NPs at varying PH values (PH 10, 11&12) using the co-precipitation method. Various characterization techniques such as XRD, UV-Vis, FTIR, FESEM and EDX were performed to analyze the crystal structure, optical properties, functional group identification, elemental composition and surface morphology. The X-ray diffraction (XRD) patterns revealed the formation of hexagonal wurtzite crystal structure in all samples, through atomic substitutional incorporation in the Se-doped ZnO lattice. The presence of Se ions and their dissolution in the host ZnO crystal structure was supported by FTIR spectra. The existence of Se, Z, O elements was confirmed by EDX spectrum and the morphology by FESEM images. The antibacterial activity test showed that both PH 10 and PH 12 of Se-ZnO NPs exhibited the strongest inhibition zone against Escherichia Coli compared to Staphylococcus Aureus. The synthesized NPs were evaluated for their substantial in vitro antioxidant properties. Among the three samples PH 10 showed better DPPH activity (29.26%). This study provides an overview of the synthesis approaches, characterization techniques, and biomedical uses of selenium doped Zinc Oxide Nanoparticles.

Keywords: Nanoparticles, Se doped ZnO NPs, Antibacterial, Antioxidant

Isolation, Identification and Characterization of *Bacillus* sp., from Soil Sample

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Abstract

Bacillus is a genus of Gram-positive, rod-shaped bacteria, a member of the phylum Bacillota, with 266 named species. The term is also used to describe the shape (rod) of other so-shaped bacteria; and the plural Bacilli is the name of the class of bacteria to which this genus belongs. *Bacillus* species can be either obligate aerobes which are dependent on oxygen, or facultative anaerobes which can survive in the absence of oxygen. Cultured *Bacillus* species test positive for the enzyme catalase if oxygen has been used or is present. The organisms in soil sample were serially diluted and inoculated onto the agar plates. The isolated organisms were identified by means of various techniques. Gram staining technique was performed and small Gram positive bacilli were observed. Endospore staining technique was performed and red colour bacilli along with green colour spores were observed. Various Biochemical tests were done for the Identification of bacteria. Further identification of bacterial strain was done by Sanger sequencing method. The microbial strain was identified as *Bacillus subtilis*.

Keywords: *Bacillus*, Serial dilution, Inoculation, Identification, Gram Staining, Endospore Staining, Biochemical Tests, Sanger sequencing method, *Bacillus subtilis*.

Antimicrobial Activity of Marine Bacterial Organisms Isolated from the Coastal Areas of Chennai and Mandapam, India

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Abstract

Microbes account for all known life forms for nearly 50 to 90% of Earth's history-Life itself began in the ocean. Marine microbes play significant role in the Earth system. Among the microbes bacteria are most vital link directly and indirectly with human life. In the present study, to isolate and identify the marine bacterial organisms and antimicrobial activity of selected marine isolates. Two Marine water samples were collected from different locations (Chennai and Mandapam coastal areas) of South India. A total of twenty bacterial isolates were isolated on marine agar plates and purified from the collected sea water samples of these 20 isolates, it was observed that 14 isolates were Gram +ve and rest of the 6 isolates were Gram –ve in nature. The identified marine bacterial isolates are CC1 - *Pseudomonas* sp., CC2 -*Bacillus* sp., MC18 - *Acinetobacter* sp. And MC19 - *Alteromonas* sp. The four isolates viz., CC1, CC2, MC18 and MC19 showed varied levels of antibacterial activity against the tested ten bacteria. The isolates CC1 and MC19 were highly effective against *Serratia marcescens* with 16 mm and 18 mm zone of inhibitions, respectively. Whereas, CC2 and MC18 showed highest and equal effectiveness against *Serratia marcescens*, *Escherichia coli* and *Shigella* sp. with 14, 12 and 10 mm zone of inhibition. Among the bacteria tested, *Proteus mirabilis* and *Bacillus subtilis* were found to be least sensitive to the four isolates. The four isolates also showed equipotent antagonistic activity against *E. coli* and *Shigella* sp. This present study indicates that certain strains of bacterial it could be induced to produce antibiotics.

Keywords: Marine microbes, Antibiotics, Antimicrobial activity, *Pseudomonas* sp., *Bacillus* sp., *Acinetobacter* sp. and *Alteromonas* sp.

Effect of Anthocyanin enriched Edible Coating on the Shelf life of Brinjal

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Abstract

Anthocyanins, water-soluble flavonoid pigments found in fruits, vegetables, and flowers. Among various natural sources, banana (genus *Musa*) petals have recently gained attention as a potential alternative and sustainable source of anthocyanins which are often discarded as agricultural waste, these have antioxidant, anti-inflammatory, and antimicrobial properties. The extraction of these compounds supports sustainable practices and contributes to the development of functional foods and nutraceuticals. The Anthocyanin has been extracted using Water and Ethanol as Solvents. The extracted solvents are filtered and characterized using UV-Visible spec, FTIR and TLC. 3 Groups were made each with 21 samples. T1, T2 and T3, where T1 is the control batch, T2 is Water extracted anthocyanin enriched edible coating and T3 is Ethanol extracted anthocyanin enriched edible coating using Chitosan as the biopolymer. The shelf life of the Brinjal was studied, in which the T1 was contaminated by the 15th day where T2 and T3 were still fresh by 25th Day. The weight loss was studied, where T1 has shown most weight loss compared to T2 and T3. Where T1 has shown drastic change in the color followed by T3, T2 has shown significant retention of the color throughout the storage. Texture analyzer was used to measure the texture retention of the samples. T2 has shown the firmness of the samples till the 21st day where as T3 and T1 has shown decline in the firmness. Vit C content was studied were T1 has shown decrease in the content from 10th day, whereas T2 and T3 has retained most of the Vit C content till the last day. The results has shown that T2 was the experimental batch were all the properties were retained compared to T3 there by suggesting the Water extracted Anthocyanin enriched coating is suitable for the storage and preservation of Brinjal.

Keywords: Anthocyanin, Brinjal, Extraction, Physico-chemical properties, Shelf life.

Formulation and Quality Assessment of Infant Food Powder Fortified with Nutraceuticals

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Abstract

Nutrition plays a pivotal role in health maintenance and the prevention of numerous diseases, with micronutrient supplementation recognized as an effective intervention strategy, particularly in combating iron deficiency and anemia among infants and young children. The present study sought to formulate a nutraceutical powder derived from the various sprouts to harness its potential health benefits owing to its rich profile of vitamins, minerals, antioxidants, and dietary fiber. To ensure safety and functional efficacy, the microbial load of the sample was determined alongside antibacterial activity evaluation, verifying that the sprout powder maintained microbial safety standards and exhibited potential in inhibiting pathogenic bacteria. The objectives encompassed the systematic collection and botanical identification of nutraceuticals, preparation of crude extracts, and a thorough qualitative phytochemical screening to detect bioactive compounds contributing to health-promoting properties. The combined phytochemical, antioxidant, nutritional, and microbiological investigations suggest that the nutraceutical sprout powder is a promising functional food formulation. This study contributes valuable data supporting the broader application of nutraceuticals as a sustainable, health-promoting dietary supplement in preventive nutrition.

Keywords: *Nutraceutical, Antioxidants, Vitamins, Dietary fiber.*

Sustainable Fabrication of Metal Nanoparticles for Biomedical Applications

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Abstract

In recent years, numerous strategies have been developed for the biological synthesis of metal nanoparticles. Bionanoscience focuses on producing environmentally friendly, sustainable materials and establishing reliable, eco-friendly processes for nanoparticle synthesis. Green synthesis of iron and silver nanoparticles has been successfully achieved using various plant extracts, and their biological applications have been widely studied. Recent research highlights the strong antiviral and antimicrobial potential of these nanoparticles. In the present study, iron and silver nanoparticles were synthesized using leaf extracts of *Ricinus communis*, *Centella asiatica*, and *Desmodium triflorum*. The nanoparticles were characterized through multiple techniques, including UV-Vis absorption spectroscopy, Fourier Transform Infrared (FT-IR) spectroscopy, X-Ray Diffraction (XRD), Scanning Electron Microscopy (SEM) coupled with Energy Dispersive Spectroscopy (EDS) and Transmission Electron Microscopy (TEM). Furthermore, the biological applications of the synthesized iron and silver nanoparticles are discussed. The antimicrobial and anticancer activities of the nanoparticles suggest their promising potential in medical applications.

Keywords: Green synthesis, leaf extract, Nanoparticles, Antimicrobial activity and Anticancer activity.

Biochemical Composition of *Portunus sanguinolentus* and In Silico Docking of Chitin with Estrogen and Progesterone Receptors as a Potential Anticancer Agent

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Abstract

The present study focused on the edible crab *Portunus sanguinolentus* assessing both its nutritional composition and the medicinal potential of chitin extracted from its shell. The biochemical analysis showed that the crab muscle contains 3.08 mg/g of protein, 62.46 mg/g of carbohydrates, and 4.01 mg/g of lipids, while the shell provided 16.03% chitin. Since breast cancer is often linked with estrogen and progesterone receptors, chitin was studied using molecular docking to test its binding with these receptors. Docking results revealed good binding affinities, with hydrogen bond interactions at important amino acid sites of both receptors. Active site prediction confirmed suitable binding pockets, while ADMET analysis indicated that chitin is safe, non-toxic, and drug-like. These findings highlight that *P. sanguinolentus* is not only a nutritious seafood but also a potential source of anticancer agents. Further experimental and in vivo studies are required to validate the anticancer effects of chitin and explore its therapeutic applications in breast cancer treatment.

Keywords: *Portunus sanguinolentus*, chitin, biochemical composition, breast cancer, estrogen receptor, progesterone receptor, molecular docking, ADMET

Clinical Characteristics of Human Rhinovirus Diagnosed by Molecular Testing in Hospitalized Children

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Abstract

Introduction: Human rhinoviruses (HRVs) are a primary cause of respiratory illness in children, ranging from the common cold to severe lower respiratory tract infections (LRTIs) requiring hospitalization. The advent of molecular diagnostic tests, such as polymerase chain reaction (PCR), has dramatically increased the detection of HRVs, revealing their significant role in pediatric hospital admissions. This article provides a comprehensive overview of the clinical characteristics of HRV infections in hospitalized children, based on findings from molecular testing. Key findings include the association of HRV with bronchiolitis and pneumonia, particularly in infants and young children, and its strong link to asthma exacerbations. We also discuss the clinical relevance of co-infections with other respiratory pathogens and highlight how the different HRV species (HRV-A, HRV-B, and HRV-C) may present with varying clinical severity.

Aim: To detect and determine the prevalence of rhinovirus infection in pediatric patients with respiratory symptoms using RT-PCR, and to assess its clinical significance in a hospital-based setting.

Objectives: 1. To detect the presence of rhinovirus in pediatric patients presenting with respiratory symptoms using RT-PCR. 2. To determine the prevalence of rhinovirus infection among the tested cases. 3. To analyze the age-wise and symptom-wise distribution of rhinovirus-positive cases. 4. To provide baseline data for future viral respiratory surveillance in pediatric populations.

Materials and Methods: RNA extraction followed by RT-PCR using ICMR-approved kits targeting rhinovirus-specific genes.

Results: A total of 104 nasopharyngeal/throat swab samples were collected from pediatric patients presenting with respiratory symptoms at GMKMCH, Salem. Rhinovirus Positive Cases: 6 (5.8%) M:4(66.7%),F:2(33.3%) and Negative Cases:98 (94.2%)only.

Conclusion: The routine use of molecular testing in hospital settings is an essential tool for epidemiological surveillance, clinical management, and future research efforts aimed at reducing the burden of HRV-related pediatric respiratory disease.

Keywords: *Human rhinovirus, hospitalized children, molecular testing, clinical characteristics, bronchiolitis, pneumonia, and asthma exacerbation.*

Bio nanofabrication at silver nano particles using *Kalanchoe pinnata* flower extract, anti oxidant, anti microbial and DNA damage studies

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Abstract

In recent days, the silver nanoparticles have found wide applications in various fields of research. The present study aimed to synthesize silver nanoparticle using *Kalanchoe pinnata* flower extract and characterize them using UV-Vis spectroscopy, FT-IR and FESEM. The plasmon peak observed at 437nm confirmed the presence of silver nanoparticles. FT-IR analysis revealed CN & C-Br stretching vibrations, confirming the reduction of silver ions. The

nanoparticles were found to be pyramidal in shape with an average size of 57nm. Anti bacterial, antifungal, antioxidant and DNA fragmentation studies were carried out for the synthesised silver nano particles. The results obtained showed the pharmacological potential of the silver nano particles. The synthetic methodology and pharmacological effectiveness are to be discussed in detail.

A Green Synthesis of Magnesium Oxide Nanoparticles Using Beteland *Moringa* Leaves

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Abstract

A This study explores the green synthesis of magnesium oxide nanoparticles (MgO-NPs) using aqueous leaf extracts of *Piper betle* (betel leaf) and *Moringa oleifera* (moringa leaf), giving special importance to an eco-friendly approach that avoids toxic chemicals and harsh conditions. The selected plants are rich in bioactive compounds such as flavonoids, polyphenols, and proteins, which act as natural reducing and stabilizing agents during nanoparticle formation. Magnesium nitrate [Mg(NO₃)₂] served as the starting material, and synthesis was achieved under mild thermal conditions followed by centrifugation and washing. Nanoparticle characterization was conducted using the following analytical technique were UV–Visible spectroscopy, Fourier Transform Infrared Spectroscopy (FTIR), and Scanning Electron Microscopy (SEM). UV–vis analysis revealed distinct absorption peaks at 291.4 nm for betel-derived nanoparticles and 281.8

nm for moringa-derived ones, confirming successful synthesis. Protein estimation using Lowry's method indicated slightly higher protein content in moringa extract (162.2 µg/ml) compared to betel (159.6 µg/ml), suggesting potential influence on nanoparticle yield and stability. The study also proposes the application of these MgO-NPs in water purification, particularly for pollutant absorption, with an emphasis on environmental safety and biocompatibility. By integrating traditional medicinal plants with nanotechnology, this research highlights a sustainable route for nanoparticle synthesis that aligns with green chemistry principles.

Keywords: *Nanoparticle Synthesis, Magnesium Oxide, Betel Leaf, Moringa Leaf, Protein Estimation.*

Extraction and Evaluation of Antimicrobial Properties of Chitosan Derived from Marine Crab Shells

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Abstract

This study successfully produced chitosan from sea crab shells through a three-step procedure involving deproteinization, demineralization, and deacetylation. The synthesized chitosan was characterized using UV-Vis spectroscopy, which showed strong absorption peaks at 225.0 nm, 275.0 nm, and 310.0 nm, and FTIR spectroscopy, which confirmed the presence of key functional groups like amine, hydroxyl, nitrile, and alkene. The chitosan demonstrated potent antimicrobial activity, particularly against bacteria like *Bacillus cereus* and *Klebsiella pneumoniae*, and selective antifungal action against *Aspergillus terreus*. These findings highlight

the potential of sea crab shell-derived chitosan as a natural, renewable biopolymer with broad-spectrum antimicrobial properties, suitable for industrial applications. The study's results support the feasibility of utilizing crab shell waste to produce green chitosan, paving the way for its use as an effective antimicrobial agent in various industries.

Phytochemical, Antioxidant, Antimicrobial, and Anticancer Properties of Bimetal Nanoparticles Synthesized from *Leucas aspera* Flower

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Abstract

The present study focuses on the green synthesis of bimetal nanoparticles using *Leucas aspera* flower extracts and their evaluation for biological activities. The flowers were shade-dried, and an aqueous extract was prepared for nanoparticle synthesis. Bimetallic nanoparticles (TiO₂/ZnO) were synthesized by mixing 1 M zinc acetate and 1 M titanium dioxide with the plant extract under magnetic stirring, followed by overnight incubation. The preliminary confirmation of nanoparticle formation was indicated by distinct colour changes. Characterization was performed using UV–Visible spectroscopy, Scanning Electron Microscopy (SEM), and Fourier Transform Infrared Spectroscopy (FTIR). UV–Vis analysis confirmed the synthesis of TiO₂/ZnO nanoparticles, SEM revealed varied morphological structures, and FTIR verified the presence of functional groups involved in nanoparticle stabilization. The antioxidant potential of the extract was determined using the Phosphomolybdenum method. Antibacterial activity was tested against both Gram-positive and

Gram-negative bacteria by the well diffusion method, which revealed significant growth of inhibition. Antifungal assays indicated selective sensitivity among fungal species. The minimum inhibitory concentration (MIC) was determined through biofilm assay, confirming dose-dependent antimicrobial efficacy. These findings highlight that *Leucas aspera* mediated TiO₂/ZnO bimetal nanoparticles possess strong antioxidant, antibacterial, and antifungal properties, indicating their potential applications in biomedical formulations, disinfectants, and hand sanitizers.

Keywords: *Leucas aspera*, TiO₂/ZnO nanoparticles, Antioxidant, Antimicrobial, MIC, Green synthesis.

Bioprospecting of Native Soil bacteria for Development of Eco-Friendly Biofertilizers

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Abstract

The excessive use of chemical fertilizers in contemporary agriculture has resulted in deteriorating soil health, environmental damage, and higher production expenses. Biofertilizers, which contain living or dormant cells of beneficial microorganisms like nitrogen-fixing, phosphate-solubilizing, or other helpful microbes, present a sustainable option. This research focuses on bacterial biofertilizers, particularly strains like *Rhizobium*, *Azotobacter*, *Azospirillum*, and Phosphate-Solubilizing Bacteria (PSB), which promote plant growth and enhance soil

fertility. These bacteria boost nutrient availability by fixing nitrogen biologically, solubilizing phosphate, and producing phytohormones, reducing the need for synthetic fertilizers. The factors affecting how well bacterial inoculants work, such as soil conditions, crop type, and how microbes interact with each other. Advances in microbial biotechnology and how bio fertilizers are formulated are discussed to show their potential in sustainable farming the value of using bacterial bio fertilizers in regular farming to achieve lasting agricultural sustainability and protect the environment.

Antibacterial and Antifungal Activity of Soft Tissue Extracted From *Ariophanta bistrialis* Snail

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Abstract

Molluscs are a diverse group of species that have been recognized for their valuable contributions to pharmacology. These organisms are known to be important natural sources of novel bioactive compounds that have shown potential in various medicinal applications. Among these land snails are notable for their nutritional and medicinal uses. Land snails are not only a good source of protein but also play a significant role in traditional medicine. Moreover,

different components from land snails exhibit antimicrobial activities. In this study the soft tissue of extracts of acetic acid, methanol and chloroform was evaluated for antibacterial and antifungal properties. The antibacterial activity of *Ariophanta bistrialis* was tested against *Pseudomonas aeruginosa*, *Klebsiella pneumoniae*, *Escherichia coli*, *Bacillus cereus* and *Salmonella typhi*. Acetic acid extracts showed maximum inhibition against *Pseudomonas aeruginosa*, *Escherichia coli*, and *Bacillus cereus* (13 and 12 mm). *Ariophanta bistrialis* soft tissue extracts exhibited antifungal activity against, *Aspergillus flavus*, and *Aspergillus niger*, *Aspergillus terreus*. This study shows that the soft tissue of the snail *Ariophanta bistrialis* possesses antimicrobial compounds and can be used as promising antimicrobial agents.

Keywords: Antibacterial activity, Anti fungal activity, Snail

Evaluation of Antibacterial and Antifungal Properties of Flower Extract and Its Characterization Studies

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Abstract

The present study was undertaken to investigate the antibacterial and antifungal properties of the ethanolic extract obtained from the flowers of medicinal plant known for its traditional therapeutic applications. The growing concern regarding microbial resistance to conventional antibiotics and antifungal agents has necessitated the exploration of natural products as potential alternatives. The ethanolic extract of flowers was subjected to comprehensive phytochemical screening to identify the bioactive secondary metabolites responsible for its antimicrobial effects. The qualitative analysis revealed the presence of

alkaloids, flavonoids, steroids, and phenolic compounds, all of which are well-documented for their broad-spectrum biological activities. The study emphasized that plant-derived fungitoxic compounds offer promising eco-friendly alternatives for managing fungal pathogens, which are otherwise difficult to control due to the limitations and resistance associated with commercial antifungal agents. In addition to fungitoxic studies. The antibacterial activity of the extract was assessed against bacterial pathogens. Results indicated that flowers extract exhibited notable antibacterial efficacy

Characterization of the extract by UV-visible spectroscopy was performed to further elucidate its molecular attributes. The absorption peaks were observed in the range of 300–350 nm, which corresponds to the presence of conjugated aromatic systems, predominantly flavonoids and phenolic constituents. Further detailed investigations, including isolation and characterization of individual bioactive compounds, will be necessary to develop effective plant-based antimicrobial formulations for future applications.

Green Synthesis of Bismuth and Copper nanoparticles with *Punica granatum* fruit peel tannins and its anthelmintic activity screening

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Abstract

Punica granatum (Pomegranate) fruit peel is rich in polyphenolic compounds like hydrolysable tannins namely punicalagin, ellagic acid etc and small quantity of flavonoids like anthocyanins and catechins. These compounds are responsible for the peels diverse pharmacological properties, including anti-inflammatory, antimicrobial, and anthelmintic

activities. The present work focussed on the extraction of tannin fraction from the pomegranate fruit peels, green synthesis of Bismuth and Copper nanoparticles and their anthelmintic activity screening studies. The tannins and other polyphenolic compounds in the pomegranate fruit peel extract act as both a reducing agent for metal salt and a capping or stabilizing agent for the newly formed nanoparticles. The powdered dry fruit peel is macerated in a solvent mixture, (water/acetone, 1:1) for 1hr and the liquid extract identified as tannins by qualitative phytochemical tests and the percentage yield was calculated (23.5%), which is designated as PugPT (*Punica granatum* Peel Tannins). Bismuth and Copper nanoparticles were prepared by green synthesis with PugPT and characterized by their colour change during the formation and ultraviolet-visible (UV-VIS) spectrophotometer. The prepared nanoparticles designated as PugPT-BiNP, and PugPT-CuNP produced a percentage yield of 0.85 and 0.64 respectively in the green synthesis. PugPT- BiNP, and PugPT-CuNP showed a wavelength maximum of 332 nm and 403 nm respectively in UV spectrophotometric studies. The anthelmintic activity was carried out as per standard procedure. Adult Indian earthworm *Pheretima posthuma* has anatomical and physiological resemblance with the intestinal round worm parasites of human beings. The prepared nanoparticles (PugPT -BiNP and PugPT - CuNP) at concentrations (5 & 10 mg/ml) were screened for this study, and observed the time of paralysis and time of death of worms. Albendazole (10mg/ml) was used as the reference standard drug. The anthelmintic activity studies revealed that both PugPT-BiNP and PugPT-CuNP produced effective paralysis and killing of worms at 10 mg/ml concentration as compared to the reference standard albendazole and the fruit peel tannin extract PugPT. The present study revealed that both Bismuth and Copper nanoparticles can be prepared with ease by green synthesis with *Punica granatum* peel, which is found to be ecofriendly, cost effective and non-toxic.

Keywords: *Punica granatum* peel, PugPT, PugPT-BiNP, PugPT-CuNP, Anthelmintic activity

Important of GABA Butyric Acid produced by *Lactobacillus* species

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Abstract

Lactobacillus species are important producers of gamma-aminobutyric acid (GABA), a non- protein amino acid and the primary inhibitory neurotransmitter in the mammalian central nervous system. The GABA produced by these bacteria, particularly within the gut, is a key component of the gut-brain axis, influencing a wide range of physiological functions. Gamma-aminobutyric acid (GABA) is a non-protein amino acid that serves as the principal inhibitory neurotransmitter in the mammalian central nervous system. Its production by certain species of *Lactobacillus*, a genus of bacteria commonly found in fermented foods and the human gut, is of significant importance for health and wellness. These bacteria synthesize GABA from L-glutamic acid through the enzyme glutamate decarboxylase (GAD). This microbially- produced GABA has garnered attention for its potential therapeutic and health-promoting effects, including its ability to reduce anxiety, alleviate stress, and improve sleep quality by promoting a calming effect on the brain. While GABA is naturally produced in the human body, its production by specific strains of *Lactobacillus*—through the enzymatic conversion of L-glutamic acid—allows for the development of functional foods and probiotics. The consumption of these GABA-enriched products has been shown to offer several therapeutic benefits, including the reduction of anxiety and stress, improved sleep quality, and the regulation of blood pressure. Furthermore, this microbial production of GABA highlights a direct link between gut health and neurological function, demonstrating that a balanced gut microbiome, cultivated with GABA-producing probiotics, can positively influence mental well- being. This innovative approach to health and wellness offers a natural and accessible way to manage a variety of conditions related to the nervous system.

Comprehensive Characterization and Drug Design for *Klebsiella pneumoniae*: From Clinical Identification to in silico Therapeutic Targeting

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Abstract

Klebsiella pneumoniae (*K.pneumoniae*), a significant opportunistic pathogen, with a focus on its characterization and the development of in silico therapeutic strategies. The research begins with the clinical identification and isolation of various *K. pneumoniae* strains from patient samples. These strains are then subjected to phenotypic and genotypic characterization to understand their antibiotic resistance profiles and virulence factors. The study employs techniques like biochemical assays, PCR, and whole-genome sequencing (WGS) to identify key resistance genes, such as those encoding carbapenemases (e.g., KPC, NDM) and extended-spectrum β -lactamases (ESBLs). The core of the research involves using computational methods to identify and target essential *K. pneumoniae* proteins. A comprehensive proteomic analysis is performed to pinpoint crucial metabolic enzymes and virulence factors that are absent or significantly different in the human host. This approach ensures the potential for high specificity and minimal off-target effects. Therapeutic Targeting The study utilizes molecular docking and virtual screening to identify novel small molecules with high binding affinities to these target proteins. The identified lead compounds are then analyzed for their pharmacokinetic and pharmacodynamic properties using ADME (Absorption, Distribution, Metabolism, Excretion) predictions. The most promising candidates are further evaluated for their potential to inhibit bacterial growth in vitro and their efficacy in animal models. The ultimate goal is to generate a pipeline of potential new drugs that can effectively combat multidrug-resistant *K. pneumoniae* infections, providing a much-needed alternative to traditional antibiotics.

Development and Characterization of Healthy Gummy Jellies Containing Natural Fruits

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Abstract

This project aimed to develop and characterize healthy gummy jellies enriched with natural fruits and bioactive ingredients as an alternative to conventional sugar-rich confectioneries. Different formulations were prepared using fruit bases such as grape and orange, natural gelling agents, and sweeteners including. *Moringa oleifera* extract was incorporated to enhance nutritional and functional value due to its antioxidant and anti-diabetic properties. The developed gummies were evaluated for their physicochemical properties, microbiological safety, antioxidant capacity, and in vitro anti-diabetic potential through α -amylase inhibition assays. Results demonstrated that the formulations exhibited uniform texture, acceptable sensory attributes, and significant antioxidant activity. While maintaining reduced sugar content the products were safe for consumption and suitable for individuals with diabetes or those seeking weight management options. Overall, the study indicates that natural fruit-based gummy jellies can be positioned as functional foods with promising health benefits, though further stability and shelf-life studies are required for large-scale commercialization.

Keywords: *jellies, natural fruits, bioactive ingredients, Moringa oleifera, antioxidant*

Screening and Characterization of Probiotic Bacteria Producing Lactic Acid From Fermented Foods

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Abstract

The present study was undertaken for the screening, characterization and molecular identification of lactic acid producing probiotic bacterial candidates from fermented foods. The fermented food sample was collected, serially diluted, cultured on MRS agar medium and observed. Further test was carried out for the identifying the production of lactic acid. The bacterial colonies were microscopically determined by Gram staining which confirmed that the isolated colonies Gram positive rod shaped bacteria. MTP Assay was done by the identification of antibacterial activity of the lactic acid producing bacteria against any pathogens. Molecular method and bioinformatics tools are used for the identification of bacteria. The lactic acid bacteria are probiotic bacteria, it help to keep the body healthy and working well. The *Lactobacillus* is isolated from different fermented foods and it is cultured in MRS agar medium. It is a special media to grow lactic acid bacteria. *Lactobacilli* appeared as a large, white colonies on MRS medium. More *Lactobacillus* growth is observed in the Yogurt sample. *Lactobacillus* is Gram positive bacteria it appear in rod shaped violet colour in Gram staining. Estimation of lactic acid production by spectrophotometry method. It show 0.68 unit /ml of lactic acid production. Microtiter plate method is used for the identification of antibacterial activity of *lactobacillus* against *klebsiella* and *Vibrio*. In this test the *Vibrio* shows 50% inhibition than *Klebsiella*. Extraction and purification of the nucleic acid from the bacteria and done PCR followed by BLAST analysis. The bacteria species are confirmed by BLAST analysis, it show 100% similarity with *Lactiplant bacillus plantarium* strain.

Preparation of Edible Film using Fruit Waste Peel to Increase the Shelf Life of Vegetables

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Abstract

Food packaging edible films from fruit waste peels is a promising green development in food packaging, solving both environmental and food preservation issues. Fruit peels containing biopolymers like pectin, starch, mucilage, and polyphenols of citrus, mango, and pomegranate, respectively, endow films with structural, antioxidant, and antimicrobial activities. Optimised extraction processes acid hydrolysis, ultrasound, enzymatic, and subcritical water extraction-maximise yield, purity, and bioactive content, while chitosan, gelatin, or essential oil-based composite formulations enhance mechanical resistance, barrier, and antimicrobial performance. Vegetable shelf life was enhanced significantly, and reductions of microbial content, moisture, and nutritive loss of up to 9-28 days under controlled store conditions were documented. Although film performance depends on peel kind, formulation, and application, and consumability relies upon sensorial optimisation, there is robust lab-based evidence supporting the development of edible films from fruit waste peels as packaging materials. Industrial scale-up, however, is hindered by issues of uniformity, drying time, and mechanical reproducibility, as well as safety validation and registration gaps. Future prospects highlight standardisation of extraction procedures, scale-up production, and nanotechnology and smart packaging integration, and development of worldwide safety guidelines. Generally, edible films from fruit waste peels constitute a promising green packaging alternative, marrying waste utilisation and enhanced vegetable preservation.

Application of *Bacillus* spp. to Increase the Nutritional Properties of Fermented Red rice

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Abstract

Fermented red rice was traditionally used by Asian countries for centuries due to its therapeutic and nutritionally valuable qualities, and recent research highlights the role of *Bacillus* spp. to enhance its functional qualities. *Bacillus subtilis* and *B. amyloliquefaciens* increase protein, phenolic, flavonoid, and peptide levels, resulting in better antioxidant activity and possible antihypertensive activity. Co-fermentation by *Lactobacillus plantarum* improves bioactive contents, expands the content of important amino acids, and improves sense qualities. Mechanistically, proteolytic and β -glucosidase activities are extremely high among *Bacillus* strains, reducing allergenicity and releasing bioactive metabolites, and gene pathways allow metabolic adaptability. Fermentation production is controlled by variables such as temperature, pH, time, substrate addition, and new modalities such as blue LED light exposure, inducing phenolic and flavonoid production by upregulation of stress response and secondary metabolism networks. Established health advantages include antioxidant, lipid-lowering, anti-inflammatory, and metabolic effect, and clinical evidence for lipid profile and endothelial improvements. Even though promising outcomes have been observed, there remain deficiencies in standardization of fermentation processes, clarification of mechanism of action, and long-term clinical verification, particularly in regard to gut microbiota alteration. Future research focuses on large-scale clinical trials, omics-driven mechanism research, and hereditary manipulation of *Bacillus* strains. *Bacillus*-fermented red rice, in summary, holds huge promise for a future-generation functional food product of varied health applications.

Impact of Probiotics on Human Gut Health

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Abstract

Probiotics, live microorganisms that exert benefits upon intake in sufficient numbers, are important in modulating gut microbiota, strengthening barrier integrity, and controlling immune and metabolic processes. Their benefits are extremely strain-specific, and *Lactobacillus*, *Bifidobacterium*, and *Saccharomyces boulardii* exhibit documented therapeutic benefits for gastrointestinal conditions. Novel strains derived from ancient fermented foods widen the probiotic inventory, providing new mechanisms and promise of tailored interventions. Synbiotic combinations and newer delivery systems, such as microencapsulation, enhance the survival of probiotics, their colonisation, and clinical response. Mechanistically, probiotics exert their benefits through the production of metabolites, modulation of the immune system, and upregulation of tight junction proteins and exert influential action on the gut-brain axis through modulation of neurotransmitters and tryptophan metabolism. Clinical evidence promotes benefits in antibiotic-associated diarrhoea, inflammatory bowel disease, and postoperative care, though response depends on host genotype, diet, and environment. Although probiotics carry a good safety record, occasional adverse outcomes in immunocompetent individuals remind us of the precautions necessary for their use. Currently, needed advances include homogeneous protocols, disclosure of new strains, omics-driven elucidation of mechanisms, and development of selective delivery systems. Future work, in summary, holds promise for probiotics and functional foods, and wide application refers especially to gut health, metabolism, and neurobehavioral control.

Development and Evaluation of Edible Spoons Made from Protein-Based Biopolymers as Functional Carriers of Probiotic *Lactobacillus spp.*

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Abstract

The increasing demand for sustainable alternatives to single-use plastic cutlery has led to the development of edible utensils using biodegradable materials. This study focuses on the formulation of edible spoons using protein-based biopolymers such as casein and whey protein isolate, with the innovative incorporation of probiotic strains like *Lactobacillus rhamnosus* to deliver health benefits. The aim is to develop an eco-friendly, functional food product that serves both as cutlery and a probiotic carrier. The formulation includes protein as the main structural matrix, glycerol as a plasticizer, and prebiotics like inulin to support probiotic survival.

Probiotics were incorporated after partial cooling of the biopolymer matrix to preserve viability. The spoons were molded and dried at controlled temperatures to retain microbial functionality. Evaluations included mechanical properties (tensile strength, rigidity), probiotic viability during storage (up to 28 days at room and refrigerated conditions), and simulated gastrointestinal transit survival. Sensory evaluation was conducted to assess acceptability in terms of taste, texture, and appearance.

Results are expected to show that the edible spoons retain a viable probiotic count ($>10^6$ CFU/g) and sufficient mechanical strength for practical use, with favorable sensory characteristics. This dual-purpose innovation offers a novel solution to plastic waste while promoting gut health, and presents opportunities for application in functional food packaging and on-the-go consumption scenarios.

Keywords: *Edible spoon, protein-based biopolymer, probiotics, Lactobacillus, casein*

Isolation and Molecular Identification of Soil Probiotics, Production of its Secondary Metabolites and its Application in Food and Biomedical Industry

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Abstract

Soil is one of the richest and most diverse ecological niches harbouring microorganisms with significant potential as probiotics. Probiotic microorganisms are traditionally associated with gut health and food fermentation, but in recent years, soil-derived probiotics have gained attention for their robust adaptability, novel bioactive properties, and industrial applicability. This research project is designed with a multi-phase approach: (i) isolation and screening of soil probiotics, (ii) molecular identification using advanced genomic and phylogenetic tools, (iii) production and characterization of their secondary metabolites, and (iv) assessment of their application in food and biomedical industries.

In the first phase, soil samples from diverse ecological zones will be collected, followed by selective culturing, biochemical assays, and morphological characterization to isolate potential probiotic strains. Emphasis will be placed on evaluating probiotic traits such as acid and bile tolerance, antimicrobial activity. The second phase involves molecular identification through 16S rRNA gene sequencing and phylogenetic analysis, enabling precise taxonomic placement of the isolates and the discovery of novel probiotic candidates. Subsequently, the focus will shift toward the production of secondary metabolites, including bacteriocins, enzymes, and bioactive

peptides. These compounds will be extracted, purified, and analysed using chromatographic and spectroscopic methods to determine their structural and functional attributes. The bioactivity assays will explore antimicrobial, antioxidant, anti-inflammatory, and anticancer potentials of these metabolites.

Finally, the translational applications of soil-derived probiotics and their metabolites will be studied across two domains: food industry—where they can serve as natural preservatives, functional ingredients, and fermentation enhancers; and biomedical industry—where their metabolites hold promise in developing novel therapeutics, drug delivery systems, and biocompatible biomaterials. The study aims not only to expand the current knowledge on soil probiotics but also to provide a sustainable framework for harnessing their metabolites for human health and industrial innovations.

Keywords: *Soil Probiotics, Molecular Identification, Secondary Metabolites, Food and Biomedical Industry*

Effect of Short Term Exposure of Ethoxyquin on Hematological Parameters in Fresh Water Fish, *Oreochromis mossambicus*

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Abstract

Ethoxyquin (EQ, 6-ethoxy-1,2-dihydro-2,2,4-trimethylquinoline) is a synthetic antioxidant that is included in fish feeds in order to protect it against lipid peroxidation. Many unfavourable side-effects have been observed in animals fed with EQ-containing feeds. Studies

on the harmful effects of EQ on vertebrates are growing, but the effects of EQ in aquatic systems have rarely been described. In the present study LC_{50} 96 hr value of EQ to the freshwater fish *Oreochromis mossambicus* (Thilapia) was determined through Probit analysis. The bioassay found that the median lethal dosage in fish after 96 hours (LC_{50} -96h) was 11.37 mg/L. The fish were reared in sub-lethal concentration of the chemical for 24hr, 48hr, 72hr and 96hr. Blood was taken from the treated and control fish and haematological parameters were analyzed. It was found in the present study that RBC count and haemoglobin values in fish decreased significantly as a result of EQ application. Such a situation can be an indicator for haemolytic anaemia. An increase in white blood cells was noticed, which probably represent an adaptive response to help the organism to counteract the toxic effects of EQ. A significant increase in neutrophil count was noticed suggesting that the fish is trying to overcome the toxic effect of chemicals by leukocytosis mechanism.

Keywords: Ethoxyquin; Lethal Concentration; *Oreochromis mossambicus*; Haematological parameters; RBC and WBC count.

Valorization of *Citrus maxima* in Non-Dairy Probiotic Beverage Development: A Nutritional and Functional Insight

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Abstract

The growing demand for plant-based functional beverages has encouraged the exploration of unconventional fruits as promising substrates for probiotic delivery systems. In this context, the present study focuses on *Citrus maxima* (commonly known as Pomelo), a

nutritionally rich yet underutilized citrus fruit, as a novel medium for probiotic beverage development. The probiotic strain *Lactobacillus rhamnosus*, isolated from the fruit surface and identified through 16S rRNA sequencing with confirmation by NCBI BLAST alignment, was incorporated into the pomelo juice matrix. This fruit-surface inoculation approach was adopted to leverage the native adaptability of the strain, ensuring improved compatibility and stability within the fruit-based substrate. Unlike dairy-based probiotic products, which are often limited by issues of lactose intolerance, allergenicity, and cholesterol content, a fruit-derived medium such as pomelo juice provides a sustainable, non-dairy alternative in alignment with the growing consumer preference for plant-forward, functional beverages. Phytochemical screening revealed the presence of Carbohydrates (23.54 µg/mL), Protein (80.80 µg/mL), starch, steroids, glycosides, alkaloids, saponins and tannins underlining the complexity of the bioactive profile. Nutritional evaluation using AOAC standard methods confirmed significant amounts of Vitamin C (651 mg/100g), Potassium (1182.03 mg/kg), Calcium (160.28 mg/kg), Phosphorus (122.69 mg/kg), and Dietary Fiber (1.78g/100g), reinforcing the fruit's nutritional relevance. The total phenolic content, alongside robust antioxidant activity as demonstrated through DPPH (16.40 µg/g) and FRAP (36.67 µg/g) assays, highlighted the capacity of *Citrus maxima* to function as a natural antioxidant reservoir. Such antioxidant potential is of particular importance, as it may synergistically complement the probiotic's health-promoting effects by reducing oxidative stress and contributing to improved gut health. The incorporation of *L. rhamnosus* into pomelo juice not only maintained probiotic viability but also improved the beverage's functional quality. The presence of natural fiber and bioactive compounds may provide prebiotic effects, enhancing the overall synbiotic potential of the product. This study demonstrates that *Citrus maxima*, a traditionally overlooked fruit resource, can be effectively valorized as a substrate for probiotic beverage formulation. The findings underscore its potential to serve as a non-dairy, nutrient-rich, and consumer-friendly vehicle for probiotic delivery, thereby contributing to the broader goals of sustainable nutrition, health promotion, and the diversification of functional food products.

Keywords: *Citrus maxima*, non-dairy probiotic beverage, *Lactobacillus rhamnosus*, underutilized fruit, phytochemical analysis, nutritional composition, antioxidant activity

Harnessing Endophytic fungi from *Lawsonia inermis* L. for Biocontrol of Basal Node Rot in rice: A Molecular and Functional Analysis

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Abstract

Endophytic fungi are microorganisms that inhabit plant tissues asymptotically and are recognized as valuable sources of bioactive secondary metabolites. In this study, an endophytic fungal strain isolated from the medicinal plant *Lawsonia inermis* L. was investigated for its biocontrol potential against *Fusarium oxysporum* (ITCC 7739), a major rice pathogen responsible for Basal Node Rot. Dual plate assays demonstrated the antagonistic activity of the isolate against the pathogen. Molecular identification through PCR amplification of the D1/D2 region revealed 100% sequence similarity with *Aspergillus flavus* (Accession No. KX169162.1). The isolate was further subjected to phytochemical screening, antifungal assays, GC-MS analysis, and molecular docking studies. Phytochemical analysis of the chloroform extract revealed the presence of glycosides, tannins, and terpenes. The extract (5 mg/mL) exhibited significant antifungal activity in an agar well diffusion assay. GC-MS profiling identified eleven bioactive compounds, including 2,4-di-tert-butylphenol, 1-hexadecene, 1-octadecene, tetracosane, and octacosane — compounds known for their antimicrobial properties and potential use in biocontrol formulations. To understand the mechanism of antifungal action, key metabolites were docked with the *F. oxysporum* Avr1 protein. Docking analysis indicated strong binding affinities, with six ligand molecules showing stable interactions at the protein's active sites, suggesting their potential to inhibit pathogen virulence and contribute to disease suppression.

Keywords: *Fusarium oxysporum* protein Avr 1, Biocontrol, GCMS analysis, Molecular docking

A Comparative Study on Bio Active Efficacy of Silver Nanocomposites of *Ipomoea Obscura.L*

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Abstract

Medicinal plants has a vital part in traditional medicine systems around the world due to their therapeutic properties. *Ipomoea obscura* (Thiruthali), is a weed plant which has high medicinal values. Certain parts such as leaves and stems of *Ipomoea obscura* (Thiruthali) were used for the study. The aqueous and ethanol extracts were prepared using the plant parts. It was taken for further studies such as Phytochemical analysis using the standard procedures. The samples were further subjected to evaluate amylolytic and antimicrobial activity against bacteria like *Staphylococcus* sp., *Bacillus* sp. *Escherichia coli*, *Proteus vulgaris*, *Pseudomonas* sp., and *Micrococci*. Silver nano composite was prepared using the samples and it was further subjected to antimicrobial activity for a comparative study. Various phytochemical compounds such as alkaloids, glycosides, tannins, saponins and oils were determined. The result of the current study shows that the Leaf extract of the plant showed excellent amylolytic activity and antimicrobial activity of silver nanocomposite of aqueous leaf extract of *Ipomoea Obscura* showed significant a activity against *Staphylococcus aureus*, *E.coli*, *Bacillus*, *Pseudomonas*, *Micrococci* than the aqueous leaf extract with the zone of inhibition 18mm, 21mm, 20mm, 16mm, 19mm When compared with the silver nanocomposite of ethanol extract. Rather than randomly discarding the the plants it can be extensively used to extract raw drugs owing to possession of various medicinal properties.

Keywords: Amylolytic, nano composite, antimicrobial, Phytochemical

Rapid Detection of Viral Pathogens Using Biosensors

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Abstract

Introduction

The timely and accurate detection of viral pathogens is critical for managing outbreaks, preventing disease spread, and ensuring public health. Conventional methods like **PCR (Polymerase Chain Reaction)** and **ELISA (Enzyme-Linked Immunosorbent Assay)** are highly sensitive and specific but often suffer from drawbacks such as lengthy processing times, high costs, and the need for specialized laboratory equipment and trained personnel. These limitations highlight the urgent need for rapid, portable, and cost-effective diagnostic tools, especially for point-of-care (POC) testing.

Biosensors offer a promising alternative by integrating a **biological recognition element** (like antibodies, nucleic acids, or aptamers) with a **physicochemical transducer** that converts a biological signal into a measurable electronic or optical signal. This technology enables rapid, sensitive, and specific detection of viruses by targeting their unique components, such as proteins, antigens, or nucleic acids.

This review explores recent advancements in biosensor technology for the rapid detection of viral pathogens. We discuss various biosensor platforms, including **electrochemical**, **optical**, and **nanomaterial-based** sensors, highlighting their principles, advantages, and limitations. We focus on how nanotechnology, through the use of materials like gold nanoparticles and graphene, has significantly enhanced biosensor performance by improving sensitivity, selectivity, and

detection limits. The integration of biosensors with microfluidics and portable electronics is also examined, showcasing the potential for developing compact, user-friendly devices for on-site diagnostics. This paper concludes that biosensors represent a revolutionary approach to viral detection, with the potential to transform infectious disease surveillance and control.

Aim

The aim of this research is to develop and validate a rapid, portable, and highly sensitive biosensor platform for the detection of viral pathogens. The goal is to overcome the limitations of traditional laboratory-based diagnostic methods, such as long turnaround times and the need for specialized equipment, by creating a system suitable for point-of-care (POC) applications.

Objectives

1. Design and Fabricate the Biosensor: To engineer a biosensor that integrates a highly specific **biorecognition element** (e.g., antibodies, aptamers) with a signal transduction mechanism. This includes selecting and optimizing materials like **nanomaterials** (e.g., gold nanoparticles, graphene) to enhance sensitivity and performance.

2. Establish a High-Fidelity Detection Assay: To develop a robust assay protocol that ensures the biosensor can specifically bind to target viral antigens or nucleic acids, minimizing false positives and negatives.

3. Validate the Biosensor's Performance: To rigorously test the biosensor's analytical performance, including its **sensitivity** (limit of detection), **specificity**, and **dynamic range**, using both synthetic viral samples and clinical specimens.

Methods

1. Biosensor Fabrication: The biosensor will be constructed using a combination of **microfabrication** and **nanotechnology** techniques. This may involve a layered approach where

a sensing surface is functionalized with biorecognition molecules, followed by the immobilization of a transducer layer.

2. Sample Preparation and Analysis: A standardized protocol for sample preparation (e.g., viral lysis, nucleic acid extraction) will be developed to ensure compatibility with the biosensor platform. The prepared samples will then be analyzed by the biosensor, and the resulting signal will be measured and processed by an integrated electronic reader.

3. Data Analysis and Validation: The data obtained from the biosensor will be analyzed and compared against results from a gold-standard method, such as **Polymerase Chain Reaction (PCR)**. Statistical analysis will be used to evaluate the biosensor's accuracy, precision, and diagnostic performance.

Outcome

The expected outcome is a fully functional, easy-to-use biosensor capable of detecting viral pathogens within minutes. The device will be highly sensitive, with a low limit of detection, and highly specific to the target virus. The system's portability and ease of use will make it suitable for a wide range of applications, including POC testing in clinics, airports, and resource-limited settings.

Conclusion

This research will result in a novel biosensor technology that can revolutionize infectious disease diagnostics. By providing a rapid, accurate, and cost-effective alternative to traditional methods, this platform will enable faster response to viral outbreaks, improve patient management, and enhance public health surveillance globally. The successful implementation of this technology will mark a significant step forward in the fight against infectious diseases.

Keywords: *Rapid detection, viral pathogens, biosensors, nanomaterials*

Probiotic Juice from Underutilized Wild Fruits of Manipur: A Source of Microbial Bioactive Compounds Against Antibiotic Resistance

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Abstract

The global rise of antibiotic resistance necessitates the search for safe, natural, and sustainable alternatives to conventional antimicrobials. Probiotics and their bioactive metabolites are increasingly recognized for their potential in mitigating pathogenic infections. In this study, *Limosilactobacillus fermentum*, a promising probiotic strain, was isolated and evaluated for its functional and antimicrobial properties. The strain demonstrated tolerance to acid and bile conditions and exhibited inhibitory activity against foodborne pathogens, suggesting its ability to produce antimicrobial bioactive compounds. To develop a novel non-dairy probiotic carrier, juice was formulated from underutilized wild fruits (UWFs) of Manipur. The probiotic-enriched juice maintained viable cell counts above 10^6 CFU/mL during storage, with acceptable physicochemical stability (pH 3.5–5.0, consistent acidity) and favorable sensory attributes. Preliminary screening indicated antioxidant activity of the fruit matrix along with probiotic-derived metabolites, highlighting the synergistic potential of the formulation. This work demonstrates that UWF-based probiotic juice serves as a sustainable functional beverage with dual benefits nutritional enrichment and the delivery of microbial bioactive compounds. Such formulations may contribute to combating antibiotic resistance by providing natural antimicrobial alternatives and reducing reliance on synthetic antibiotics.

Keywords: Probiotics, *Limosilactobacillus fermentum*, wild fruits, bioactive metabolites, antibiotic resistance



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