National Poet Kuppalli Venkatappa Puttappa (Kuvempu)

* ಮನುಜಮತ	The Religion of Man
* ವಿಶ್ವಪಥ	The Universal Path
* ಸಮನ್ವಯ	The Welfare of All
* ಸರ್ವೋದಯ	Reconciliation
* ಪೂರ್ಣದೃಷ್ಟಿ	The Holistic Vision

With Best Compliments From

Kuvempu University

VALYOU Products Pvt. Ltd, (Amrith Noni) Shivamogga.

KSN University of Agricultural & Horticutural Sciences, Shivamogga.

ICNBH - 2025

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BIOLOGICAL SCIENCE DEPARTMENTS

Jnana Sahyadri, Shankaraghatta, Shivamogga Dist. Karnataka State, India - 577451

In Collaboration with

VALYOU Products Pvt. Ltd, (Amrith Noni) Shivamogga.

KSN University of Agricultural & Horticutural Sciences, Shivamogga.

THREE DAY INTERNATIONAL CONFERENCE ON

"RESEARCH TRENDS ON NONI AND SUSTAINABLE UTILIZATION OF BIODIVERSITY FOR HUMAN WELLNESS"

10th- 12th April, 2025

SOUVENIR

KUVEMPU UNIVERSITY

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Biological Science Departments

Jnanasahyadri, Shankaraghatta, Shivamogga - 577451

Three Day International Conference on

Research Trends on Noni and Sustainable Utilization of Biodiversity for Human Wellness

In Collaboration with

VALYOU PRODUCTS Pvt. Ltd, Shivamogga.

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10th – 12th April, 2025

KUVEMPU UNIVERSITY

International Conference on

Research Trends on Noni and Sustainable Utilization of Biodiversity for Human Wellness

10th – 12th April, 2025

SOUVENIR

Organized by

BIOLOGICAL SCIENCE DEPARTMENTS, KUVEMPU UNIVERSITY

In association with

KELADI SHIVAPPANAYAKA UNIVERSITY OF AGRICULTURAL AND HORTICULTUAL SCEINCES

VALYOU PRODUCTS PVT. LTD.

International Conference on

Research Trends on Noni and Sustainable Utilization of Biodiversity for Human Wellness – ICNBH-25

Published by

BIOLOGICAL SCIENCES DEPARTMENTS, KUVEMPU UNIVERSITY

Chief Editors

Prof. V. Krishna, Senior Professor, Department of Biotechnology, Kuvempu University, Jnanasahyadri, shankaraghatta – 577451

Dr. H. S. Santosh Kumar, Associate Professor, Department of Biotechnology, Kuvempu University, Jnanasahyadri, shankaraghatta – 577451

Prof. A. N. Rajeshwar Achur, Senior Professor, Department of Biochemistry, Kuvempu University, Jnanasahyadri, shankaraghatta – 577451

Prof. B. Thippeswamy, Professor, Department of Microbiology, Kuvempu University, Jnanasahyadri, shankaraghatta – 577451

Editorial Assistance

Dr. Ravikumar S. Lecturer, Department of Biotechnology, Kuvempu University, Jnanasahyadri, shankaraghatta – 577451

Mr. Divakara R. Lecturer, Department of Biotechnology, Kuvempu University, Jnanasahyadri, shankaraghatta – 577451

Ms. Deepthi S. Research Student, Department of Biotechnology, Kuvempu University, Jnanasahyadri, shankaraghatta – 577451

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Conveners

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Prof. B. Thippeswamy, Professor, Department of Microbiology, Kuvempu University, Jnanasahyadri, shankaraghatta – 577451

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(O) : 08282-256222
Fax : 08282-256255
E-mail : vc@kuvempu.ac.in
Website : www.kuvempu.ac.in

ಪ್ರೊ. ಶರತ್ ಅನಂತಮೂರ್ತಿ, ಎಂ.ಎಸ್ಸಿ., ಎಂ.ಎಸ್., ಪಿಹೆಚ್.ಡಿ.,
ಕುಲಪತಿ
Prof. Sharath Ananthamurthy, M.Sc., M.S., Ph.D.
Vice Chancellor

ಜ್ಞಾನ ಸಹ್ಯಾದ್ರಿ, ಶಂಕರಘಟ್ಟ–577 451,
ಶಿವಮೊಗ್ಗ ಜಿಲ್ಲೆ, ಕರ್ನಾಟಕ
Jnanasahyadri, Shankaraghatta-577 451,
Shivamogga Dist., Karnataka

MESSAGE

The three-day International Conference we are hosting & partnering with ValYou Products Pvt. Ltd., explores the research happening globally on utilizing biodiversity sources through sustainable practices for the benefit of humankind.

A particular focus is on validating through the lens of modern science and technology, certain products derived particularly from herbal sources. An important question that this conference will hopefully address in the deliberations, is 'What is it that makes herbal based treatments safer than modern synthetic drug based routes' and more importantly the question of 'what forms the scientific basis behind these assumptions'.

We are enthusiastic about hosting this conference and we keenly look forward to three days of intellectual excitement!

(Prof. Sharath Ananthamurthy)

Email : vc@uahs.edu.in
Web : www.uahs.edu.in

Cell : 9480838999
9449411434

ಕೆಳದಿ ಶಿವಪ್ಪ ನಾಯಕ ಕೃಷಿ ಮತ್ತು ತೋಟಗಾರಿಕೆ ವಿಜ್ಞಾನಗಳ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಶಿವಮೊಗ್ಗ
KELADI SHIVAPPA NAYAKA UNIVERSITY OF AGRICULTURAL AND HORTICULTURAL SCIENCES, SHIVAMOGGA

Dr. R.C. Jagadeesha
M.Sc.(Agri.), Ph.D.,
Vice-Chancellor

Iruvakki - 577 412, Sagara Taluk
Shivamogga District, Karnataka, India

MESSAGE

It is my immense pleasure to extend a warm welcome to all distinguished delegates, eminent scientists, researchers, academicians, and industry professionals participating in the International Conference on "*Research Trends on Noni and Sustainable Utilization of Biodiversity for Human Wellness.*" This prestigious event, organized by Kuvempu University in collaboration with ValYou Products Pvt. Ltd. and Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, provides a dynamic platform for intellectual exchange and collaborative research in biological sciences.

In an era where sustainable solutions and natural products are gaining paramount importance in global healthcare, this conference aims to explore the untapped potential of Noni and biodiversity for human wellness. India, being one of the world's biodiversity hotspots, holds immense opportunities for scientific exploration in traditional medicine, conservation, and novel biotechnological advancements. I firmly believe that the deliberations and research outcomes presented here will contribute significantly to scientific knowledge, policy formulation, and industrial applications in herbal medicine, biotechnology, and environmental conservation.

I extend my heartfelt appreciation to the organizing committee, partnering institutions, and esteemed speakers for their efforts in making this conference a grand success. May this event inspire groundbreaking research, foster collaborations, and contribute to the sustainable well-being of humanity.

Wishing you all an intellectually stimulating and fruitful conference.

Place: Iruvakki
Date: 27.03.2025

(R.C. Jagadeesha)
Vice Chancellor

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(O) : 08282-256221
(M) : 9449825221
E-mail : kureg14@gmail.com
reg.admn@kuvempu.ac.in
Website : www.kuvempu.ac.in

ಎ.ಎಲ್. ಮಂಜುನಾಥ್, ಕೆ.ಎ.ಎಸ್., (ಸೂಪರ್‌ಟೈಂ ಸ್ಕೇಲ್)
ಕುಲಸಚಿವರು
A.L. Manjunath, KAS (Super Time Scale)
Registrar

ಜ್ಞಾನ ಸಹ್ಯಾದ್ರಿ, ಶಂಕರಘಟ್ಟ-577 451,
ಶಿವಮೊಗ್ಗ ಜಿಲ್ಲೆ, ಕರ್ನಾಟಕ
Jnanasahyadri, Shankaraghatta-577 451,
Shivamogga Dist., Karnataka, India.

Message

With immense pride and enthusiasm, I extend my heartfelt congratulations to the organizers of the International Conference on "Research Trends on Noni and Sustainable Utilization of Biodiversity for Human Wellness" at Kuvempu University. This esteemed event stands as a testament to our unwavering commitment to academic excellence, pioneering research, and global collaboration.

This international conferences serve as a cornerstone of intellectual exchange, uniting scholars, researchers, and experts from diverse disciplines and backgrounds. They provide an invaluable platform for disseminating groundbreaking knowledge, exploring emerging trends, and fostering meaningful collaborations that transcend geographical boundaries. By hosting this distinguished gathering, Kuvempu University reaffirms its dedication to academic progress and its vision of contributing to global research and sustainable development.

I deeply appreciate the relentless efforts of the organizing committee, Chairman's and faculty members of Biological Sciences Departments, who have worked tirelessly to bring this conference to fruition. Your dedication and meticulous planning have created an exceptional opportunity for scholars and students to engage with transformative ideas and drive the advancement of knowledge.

4/4/25

(A.L. Manjunath)

Live Long Live Strong

ValYou Products Pvt Ltd
Ramenakoppa, Hosahalli Post, Shimoga - 577202
CIN:U85320KA2019PTC125628
www.valyouproducts.com
office@valyouproducts.com
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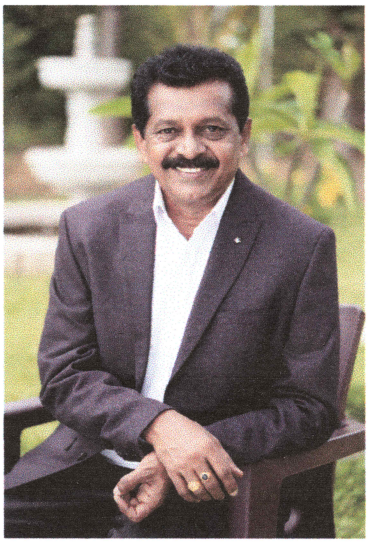

To all researchers, scholars, and industry professionals present here, I encourage you to engage in meaningful discussions, exchange ideas, and explore new avenues for research and development. Let us work together to create solutions that not only honour our ancient traditions but also meet the needs of modern healthcare. As we commence this journey of knowledge-sharing and collaboration, I am confident that this conference will serve as a catalyst for groundbreaking advancements in Ayurvedic pharmaceuticals and holistic wellness. The future of healthcare lies not in choosing between Ayurveda and modern science but in harmonizing them. By building this bridge, we honour both tradition and progress, ensuring a healthier world for generations to come.

Dr. A K Srinivasamurthy

Prof. Suchada Sukrong

[1]Executive Director of Chulalongkorn School of Integrated Innovation, Chulalongkorn University, Bangkok, Thailand
[2]Department of Pharmacognosy & Pharmaceutical Botany, Faculty of Pharmaceutical Sciences, Chulalongkorn University, Bangkok, Thailand

Message

"Step into the future of herbal innovation! Explore cutting-edge advancements in photochemical analysis, drug development, and sustainable biodiversity. Connect with experts, bridge tradition with science, and drive innovation for a greener, healthier future. Join us to turn knowledge into real-world impact!"

Prof. Suchada Sukrong

Prof. Sajeewa Maharachchikumbura
School of Life Science and Technology,
University of Electronic Science and Technology of China,
Chengdu, 611731, China

MESSAGE

It gives me immense pleasure to learn that Kuvempu University, in collaboration with ValYou Products Pvt. Ltd. and the Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, is organizing the **International Conference on "Research Trends on Noni and Sustainable Utilization of Biodiversity for Human Wellness"** from **10th to 12th April 2025** at Jnana Sahyadri, Shankaraghatta, Karnataka, India.

In the modern age, where synthetic products dominate the healthcare landscape, the importance of natural remedies and biodiversity-based solutions has re-emerged with renewed interest. Noni and other herbal resources offer immense potential for promoting human wellness, sustainable healthcare, and environmental harmony. Biodiversity, particularly that of the Western Ghats, provides a vast resource base for developing novel therapeutics and nutraceuticals.

I sincerely appreciate the organizers for focusing this conference on interdisciplinary areas – from noni research and biotechnological innovations to biodiversity conservation and food technology. This platform will inspire meaningful discussions, foster collaborations between academia and industry, and generate actionable ideas that advance sustainable healthcare and environmental stewardship. The diverse subthemes reflect the commitment to achieving a significant impact through science.

I congratulate the organizing committee, advisory members, and all participants for their dedicated efforts in making this event a success. I extend my best wishes for a productive and inspiring conference.

I wish the conference a grand success.

Sajeewa .

(Sajeewa Maharachchikumbura)

28th March 2025
Chengdu, China

Prof. V. Krishna
Organizing secretary

Prof. B. Thippeswamy
Convener

Dr. H. S. Santosh Kumar
Convener

Message from the organizers:

It is with immense pride and enthusiasm that we welcome you to the **International Conference on Research Trends on Noni and Sustainable Utilization of Biodiversity for Human Wellness (INCBH-25)**, hosted at **Kuvempu University** in collaboration with **ValYou Products Pvt. Ltd** and **Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences**. This conference serves as a crucial platform for global scholars, researchers, and industry leaders to exchange ground-breaking ideas that shape the future of sustainability and wellness.

Biodiversity conservation, climate resilience, and biotechnological innovation have never been more vital. As we navigate the challenges posed by environmental shifts, the significance of **Noni**, a medicinal plant with extraordinary healing properties, cannot be understated. Its potential in **traditional and modern healthcare systems** reflects the essence of this conference—where scientific inquiry meets practical solutions.

Our goal is not just to discuss research findings but to **ignite actionable change**. This conference offers a unique opportunity to foster collaborations, inspire innovative approaches, and create a collective vision for a more sustainable future. The conversations and partnerships formed here will ripple beyond academia, influencing industries, policies, and grassroots initiatives aimed at environmental conservation and human wellness.

We extend our deepest gratitude to **our speakers, participants, and organizing committees**, whose dedication and expertise have shaped INCBH-25 into a landmark event. To our attendees, your presence and engagement are what make this gathering truly impactful. We hope this conference encourages new perspectives, deepens scientific discussions, and lays the foundation for meaningful advancements in biodiversity utilization and sustainable living.

Together, let us embark on this transformative journey—one that bridges **science, tradition, and innovation** for the betterment of society and our planet.

Welcome to INCBH-25, where knowledge meets sustainability!

ABOUT THE ORGANIZING INSTITUTIONS

Kuvempu University, established in 1987, is a UGC-recognized State University named after the esteemed Kannada writer and Jnanapitha awardee, Shri Kuvempu. The university embodies his blend of tradition and modernity, symbolized by its emblem, Gajahamsa—a mythical creature representing the integration of knowledge and wealth. Serving the Shivamogga and Chikkamagaluru districts, it offers undergraduate, postgraduate, and Ph.D. programs across 35 departments in Arts, Commerce, Education, and Science & Technology. Located on a picturesque 230-acre campus at Jnana Sahyadri in Shankaraghatta, just 28 km from Shivamogga town and 2 km from the Bhadra Reservoir, the pollution-free environment fosters an ideal setting for higher education and research. Recognized as one of the premier universities in India, Kuvempu University is accredited by NAAC with an 'A' grade.

ValYou Products Pvt. Ltd., is an ISO, AYUSH and GMP certified quality conscious Company. It came into existence with the intention of providing the best of health products and serving the society for more than 14 years. Valyou Products Private Limited was founded in the year 2009 by Mrs. Ambujakshi Srinivasamuthy and Dr. Srinivasamuthy. A.K. The Company is located at a very picturesque and natural plush of green lands at Ramenakoppa, Shivamogga District of Karnataka state and it is wasestablished with an aim of bringing about a positive health culture and awareness of healthy living. The ValYou family of Ayurveda doctors, Researchers & Workers pledge for the quality of Noni products. It's a pleasure to stand before you today to share the remarkable journey of our Ayurvedic pharmaceutical company ValYou Products Private Limited popularly known as 'Amrith Noni', a beacon of innovation and tradition in the world of natural medicine. Our mission has always been to provide holistic solutions that promote health and well-being, respecting both time-honoured practices and modern scientific advancements.

The **University of Agricultural and Horticultural Sciences (UAHS),** now renamed Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences (KSNUAHS) as of 26-07-2021, was established by splitting from the University of Agricultural Sciences (UAS), Bengaluru, and University of Horticultural Sciences (UHS), Bagalkote. The university's jurisdiction covers seven districts in Karnataka: Shivamogga, Chikkamagaluru, Udupi, Dakshina Kannada, Kodagu, Davanagere, and Chitradurga. UAHS began operations on 21-09-2012 under a special ordinance and functioned independently from 1st April 2013. The University was renamed in honour of Shivappa Nayaka, a significant ruler in the Keladi Dynasty, to recognize his contributions to agriculture reforms. KSNUAHS is the first integrated university in Karnataka focusing on Agriculture, Horticulture, and Forestry. The University's headquarters is located in the Iruvakki campus in Sagara Taluk, Shivamogga, surrounded by biodiversity hotspots and near the United Nations World Heritage Centre.


KUVEMPU UNIVERSITY


ValYou Products
Live Long Live Strong
AMRITH NONI


ಕೃಷಿ ಮತ್ತು ತೋಟಗಾರಿಕೆ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಶಿವಮೊಗ್ಗ
UNIVERSITY OF AGRICULTURAL AND HORTICULTURAL SCIENCES, SHIMOGA

ABOUT THE CONFERENCE

Herbal medicine is staging a comeback and a renaissance is happening all over the globe. The herbal products today symbolise safety when compared with the synthetic drugs that are regarded as unsafe to humans and are usually associated with various side effects. Although herbs have been priced for their medicinal, flavouring and aromatic qualities for centuries, the synthetic products of the modern age have surpassed their importance in the past decade. Over three-quarters of the world's population relies mainly on natural medicines for health care. India is one of the world's 12 biodiversity centres with the presence of over 45000 different plant species. India's diversity is unmatched due to the presence of 16 different agro-climatic zones, 10 vegetation zones, 25 biotic provinces and 426 biomes (habitats of specific species). Of these, about 15000-20000 plants have good medicinal value. However, only 7000-7500 species are used for their medicinal value by traditional practitioners. The drugs are derived either from the plants animal parts and microbes. Even the Allopathic system of medicine has adopted a number of drugs derived from natural sources, which form an important segment of the modern pharmacopoeia.

As a part of the collaborative research program with ValYou Products Pvt. Ltd (Amrith Noni) and International Noni Science organization, Kuvempu University is organizing this three day International Conference on "Research Trends on Noni and Sustainable utilization of Biodiversity for Human Wellness" at Jnanasahyadri, Shankaraghatta, India. Renowned Scientists, Industrialists and Researchers from different parts of the world are going to participate in the conference and create a platform useful for the faculty, scientists, pharmaceutical industrialists and budding researchers to witness the event and re-design their future research in the area of biological sciences.

CONFERENCE THEMES:

1. Recent trends in Noni research

- Noni as value added product for health and wellness.
- Cultivation and industrially developed products of noni.
- Pharmaceutical investigation on Noni.

2. Conservation of Biodiversity

- Diversity of flora, fauna & microbes of the Western Ghats.
- Impact of climate changes on biodiversity.
- Human-wildlife conflict mitigation.

3. Novel Biotechnological innovations

- Micropropagation and *in vitro* production of therapeutic compounds.
- Phytochemical screening and pharmacological investigations.
- Animal cell culture and bioinformatics.

4. Microbial interactions & therapeutic applications

- Host-microbe interactions.
- Novel methods of control & management of MDR pathogens.
- Mechanistic insights of tropical diseases and pathogenesis.

5. Research advances in Biochemistry & Food Technology

- Nutraceuticals and value added foods.
- Nanotechnology and its applications.
- Research in clinical biochemistry and cancer biology.

KUVEMPU UNIVERSITY

INTERNATIONAL CONFERENCE
ON

"Research Trends on Noni and Sustainable Utilization of Biodiversity for Human Wellness"

10th to 12th April, 2025

Organized by
Biological Science Departments, Kuvempu University
In collaboration with Amrith Noni, ValYOU Products Pvt. Ltd., Shivamogga and KSN University of Agricultural and Horticultural Sciences, Shivamogga

PROGRAMME SCHEDULE

DAY-1: 10th April, 2025		
Registration	**8 am to 10 am**	
Inaugural session	**Time: 10.00 am**	**Venue: Basavasabha Bhavana**

1. Invocation	
2. State Anthem	
3. Welcome Speech – Prof. V. Krishna	**15min**
4. Inauguration	**05min**
5. Inaugural address - Prof. Appa Rao Podile Former Vice Chancellor, Senior Professor, Dept. of Plant Sciences, University of Hyderabad Hyderabad	**10min**
6. Keynote address - Prof. Suchada Sukrong Executive Director, Chulalongkorn University, Bangkok, Thailand.	**20min**
7. Chief guest address – Prof. Sajeewa Maharachchikumbura School of Life Science and Technology, University of Electronic Science and Technology of, China	**10min**
8. Chief Guest address – Prof. R.C. Jagadeesh Vice Chancellor, KSNUAHS, Shivamogga.	**20min**
9. Chief Guest address – Dr. A.K. Srinivasamurthy Managing Director, ValYou Products Pvt., Ltd.	**10min**
10. Conference Souvenir, Noni Product, Book release & Vermicompost product release	**20min**
11. Chief Guest address – Shri. A.L. Manjunatha Registrar, Kuvempu University	**10min**
12. Honor of the Guests	**20min**
13. Presidential address – Prof. Sharath Ananthamurthy Vice Chancellor, Kuvempu University	**20min**
14. Vote of Thanks – Prof. B. Thippeswamy, Convener, ICNBH-2025	**10min**
15. National Anthem	**05min**
LUNCH BREAK -1.00pm to 2.00pm	

LEAD TALK	**2:00pm to 3:30pm**	
Chair- **Co-Chair-**	**Prof. S. M. Gopinath, Professor,Department of Biotechnology, Davanagere University** **Prof. Shyamkumar V.- Karnataka University**	
1. Prof. Suchada Sukrong Executive Director, Chulalongkorn University, Bangkok, Thailand.	**Herbal Authentication: A Comprehensive Strategy for Quality and Safety**	**02:00pm to 02:45pm**
2. Prof. Sajeewa Maharachchikumbura University of Electronic Science and Technology of, China, China	**Fungi as unseen contributors to sustainable living and the urgent need for conservation**	**02:50pm to 03:30pm**
TEA BREAK- 03:30 pm to 03:45 pm		
PLENARY TALK: 03:45 pm to 05:00 pm		
Theme-1: Research Trends on Noni & Biodiversity		
Chair- Prof. B. Hemla Naik, Director of Education, KSN Agri. & Hort. University, Shimoga **Co-Chair- Prof. C.S. Karigar, Dept. of Biochemistry, Bangalore University, Bengaluru**		
3. Prof. D. Thippesha Dean (Agri.), College of Agriculture, KSNUAHS, Shivamogga	**Noni (*Morinda citrifolia* L.): A Miracle Fruit for Health and Prosperity**	**03:45pm to 04:30pm**
4. Dr. Prabhakara. B.T Department of Biotechnology, Sahyadri Science College, Kuvempu University.	**Amrith Noni Canci- Care: Driving novel formulation to test tumor vulnerabilities**	**04:30pm to 05:00pm**
Theme-1	**Oral Presentation**	**5.00 to 5.45pm**
Poster presentation Theme-1 and Theme-2		**03:00pm to 05:00pm**
Cultural Program		**05:45pm to 8:00pm**
Technical session; DAY-2; 11th April, 2025		
PLENARY TALK:	**10:00am to 05:00pm**	
Theme-3: Novel Biotechnological Innovations		
Chair- Prof. Riaz Mahmood, Former Professor, Kuvempu University **Co-Chair-Prof. Vadlapudi Kumar, Davanagere University**		
5. Dr. Darshan S.C, (Online) University of Alabama At Birmingham, Birmingham, USA.	**UALCAN: Harnessing Public Gene Expression Data for Advancing Cancer Research**	**10:00am to 10:45am**
6. Dr. Rajaguru Aradhya School of Biotechnology Amrita Vishva Vidyapeetham Amritapuri Campus Kollam, Kerala.	**Drosophila, a favorite invertebrate model to study cancer biology - An update in the era of genomics.**	**10:50am to 11:35am**
	TEA BREAK	

Theme-2	**Oral Presentation**	**11:35am to 12:30pm**
Theme-3	**Oral Presentation**	**12:35pm to 1:30pm**
Theme-3	**Poster Presentation**	**11:00pm to 1:00pm**
LUNCH BREAK- 01:30pm to 02:00pm		
Theme-4: Microbial Interaction and Therapeutic Applications		
Chair- Prof. Nagaraja, Dept. of Applied Zoology, Kuvempu University **Co-Chair- Prof. Sreenivas M Y, Dept. of Microbiology, University of Mysore**		
7. Dr. Mahadeva Kumar. S. Botanical Survey of India, Andaman and Nicobar Regional Centre, Haddo	**Biodiversity of Andaman and Nicobar Islands: Mycological Research Perspectives and Challenges**	**02:00pm to 02:45pm**
8. Dr. Anu Appaiah. K. A Senior Principal Scientist (Rtd), CSIR-CFTRI, Mysore.	**Are our biodiversity products microbiologically safe with sustainable Packing and Nutritional information?**	**02:50pm to 03:35pm**
TEA BREAK- 03:35pm to 03:40pm		
Theme-5: Research Advances in Biochemistry and Food technology		
Chair- Prof. Dushyanth Kumar, KSN Agri. & Hort. University, Shimoga **Co-Chair- Prof. A. N. Rajeshwara Achur, Dept. of Biochemistry, Kuvempu University**		
9. Dr. Thulasiram H. V. Principal Scientist: Organic Chemistry, NCL, Pune	**Studies on Metabolomics and Limonoid Biosynthetic Pathway in Neem, *Azadirachta indica***	**03:40pm to 04:25pm**
10. Prof. N.B. Ramachandra Retd., Senior Professor Dept., Zoology, University of Mysore, Mysore.	**Genetics Today: An overview**	**04:30pm to 05:15pm**
Theme-4	**Oral Presentation**	**05:20pm to 06:00pm**
Theme-5	**Oral Presentation**	**06:00pm to 06:30pm**
Theme-4	**Poster Presentation**	**02:00pm to 03:30pm**
Theme-5	**Poster Presentation**	**03.30pm to 05:00 pm**
Cultural Program		**06:30pm to 08:00pm**
DAY-3- 12th April, 2025		
Theme-2: Conservation of Biodiversity		
Chair- Prof. Prof. J. Narayana, Dean, Faculty of Science, Kuvempu University **Co-Chair- Prof. Vijayakumar, Dept. of Wildlife & Management, Kuvempu University**		
11. Dr. Sanjay Gubbi Senior Scientist, Nature conservation foundation, Bangalore.	**Bridging science and action; The role of collaborative, non-traditional partner engagement for conservation.**	**10:00am to 10:45am**
12. Prof. R. Vasudeva Dean, Forestry, College of Forestry, Sirsi, Uttara Kannada.	**Bioprospecting Potential of the Western Ghats: Issues and Case Studies**	**10:45am to 11:30am**

DAY-3- 12th April, 2025		
TEA BREAK		11:30am to 11:45am
13. Dr. A.K. Srinivasamur	Research and Innovation at ValYou Products Pvt. Ltd.	11:45am to 12:45am
LUNCH BREAK- 12:45pm to 1:30pm		
Valedictory Program	1:30pm to 3:30pm	
Invocation		05min
Welcome Speech- Prof. B. Thippeswamy, Convener ICNBH-2025		10min
Valedictory address by the Chief Guests		
Prof. B. Abdul Rahman Former Professor, Department of Biotechnology, Kuvempu University		10min
Dr. Thippesh D Dean (Agri.), College of Agriculture, KSNUAHS, Shivamogga		10min
Shri. A.K. Srinivasamurthy M D., ValYou Products Pvt Ltd. Shivamogaa		10min
Prof. S.M. Gopinath Registrar Evaluation, Kuvempu University		10min
Prof. H. N. Ramesh Finance Officer, Kuvempu University		10min
Smt. Inchara Nadig CEO, ValYou product PVT. Ltd.		10min
Shashikanth Nadig Legal Head, ValYou product PVT. Ltd.		05min
Opinion from the Participants		10min
Distribution of Prizes and Certificates		20min
Prof. V. Krishna Organizing Secretary		10min
Presidential Address- Prof. Sharath Ananthamurthy Vice Chancellor, Kuvempu University		10min
Vote of Thanks – Dr. Santhosh Kumar H S Convener ICNBH-2025		10min
National Anthem		05min
Distribution of Certificates		

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Inaugural & Keynote Address

Inaugural Address

Significance of microbial diversity and microbiome in well-being of humans

Prof. Appa Rao Podile

Senior Professor, Dept of Plant Sciences, University of Hyderabad, Hyderabad – 500 046, Telangana, India
(podilerao@gmail.com; podilerao@uohyd.ac.in)

Biodiversity is a much broader term that includes diversity within species, between species and across ecosystems, representing the genetic makeup of plants, animals, microorganisms and the complexity of ecosystems. Human health relies on fresh water, food and fuel sources; the regulation of crop pests and diseases; and the regulation of air, water and soil quality. Diversity of microorganisms, flora and fauna provides extensive benefits for biological, health, and pharmacological sciences. Biodiversity, in fact, serves as the foundation of healthy sustainable food systems as it directly influences the availability and nutritional value of food. Utilizing the potential of larger genetic pool is not only improves food quality but also supports community health and well-being. However, intensified food production practices affect global nutrition and health. Biodiversity degradation occurs through activities such as excessive use of irrigation, fertilizers and pesticides. In this conference on 'Research trends on noni and sustainable utilization of biodiversity for human wellness' the relevance of microbial diversity and microbiome for human wellness will be present. Research on gut-microbiome and phytomicrobiome enhanced our understanding of the complex interactions between humans/animals/plants and microorganisms. Researchers have intensively studied, the structure and functions of microbiome as well as the genetic, biochemical, physical and metabolic factors that influence the beneficial traits of microbiota. Research in my lab for the past decade explored the potential of microbiome-based solutions across multiple crops. In pigeon pea, root microbiomes showed a strong association with soil edaphic factors, and nodule microbiomes are impacted by macro- and micronutrients. Synthetic communities derived from pigeonpea root endophytes enhanced plant survival under abiotic stress, and rhizosphere studies highlight the dominant influence of fungal communities over bacteria. These findings demonstrate the transformative potential of microbiome-based strategies to optimize plant-microbe interactions for sustainable agriculture and ecological restoration. A comparative study of wild and cultivated microbiomes revealed significant variations in microbiome composition, with distinct microbial taxa associated with specific origins. These findings highlight the influence of biogeography on seed microbiomes and their potential applications in sustainable agriculture and crop improvement. Our studies, highlight the role of ancestral microbiome in shaping early agricultural systems and its adaptation to diverse environmental conditions.

Keynote address

Sustainability in Herbal Product Development: Integrating Science, Environmental Responsibility, and Economic Viability

Prof. Suchada Sukrong

[1]Executive Director of Chulalongkorn School of Integrated Innovation, Chulalongkorn University, Bangkok, Thailand
[2]Department of Pharmacognosy & Pharmaceutical Botany, Faculty of Pharmaceutical Sciences, Chulalongkorn University, Bangkok, Thailand

The sustainable development of herbal products requires a multidisciplinary approach, including ethnopharmacological research, responsible sourcing, green extraction technologies, and standardization. The scientific study of traditional medicinal knowledge is crucial for preserving indigenous wisdom while validating its therapeutic potential. By identifying high-value medicinal plant sources, controlled cultivation can replace unsustainable wild harvesting, mitigating overexploitation and habitat destruction. Implementing Good Agricultural Practices (GAP) ensures the production of high-yield, high-quality raw materials while minimizing environmental impact. Additionally, adopting green extraction technologies enhances sustainability by reducing reliance on organic solvents, optimizing processing efficiency, and incorporating solvent recycling and byproduct utilization. This contributes to a closed-loop production system that minimizes industrial waste and ecological harm. To ensure the quality, safety, and efficacy of herbal products, standardization is essential. Biochemical markers help maintain batch-to-batch consistency, reinforcing consumer trust and regulatory compliance. Rigorous efficacy validation through well-structured clinical trials or equivalent assessments strengthens the credibility of herbal medicines in healthcare applications. Furthermore, advancements in pharmaceutical formulation facilitate the development of diverse healthcare products tailored to specific consumer needs, enhancing market competitiveness and global expansion. This consumer-driven demand, in turn, promotes sustainable agricultural practices by creating economic incentives for farmers to cultivate high-quality medicinal plants. By integrating these strategic approaches, the herbal industry can achieve a balance between scientific innovation, environmental responsibility, and economic sustainability—ensuring long-term growth while preserving biodiversity and traditional medicinal knowledge.

Lead Talks

Herbal Authentication: A Comprehensive Strategy for Quality and Safety

Prof. Suchada Sukrong

[1]Executive Director of Chulalongkorn School of Integrated Innovation, Chulalongkorn University, Bangkok, Thailand
[2]Department of Pharmacognosy & Pharmaceutical Botany, Faculty of Pharmaceutical Sciences, Chulalongkorn University, Bangkok, Thailand

The growing demand for herbal products has exacerbated concerns over adulteration, substitution, and compromised quality, presenting significant risks to both consumer safety and therapeutic efficacy. Ensuring the authenticity of herbal materials is pivotal for maintaining rigorous quality standards and regulatory compliance. A variety of authentication techniques, including macroscopic, microscopic, chemical, and molecular approaches, are employed, each with its respective limitations. Macroscopic and microscopic examinations remain foundational but require significant expertise for precise identification. Chemical profiling, while extensively used in the herbal industry, is susceptible to variability arising from environmental conditions, developmental stages, and processing techniques. Molecular techniques, particularly DNA-based methods, have greatly enhanced the accuracy of species identification. DNA barcoding is a widely used method for authentication; however, its applicability is reduced in the case of mixed or processed products. Next-Generation Sequencing (NGS) offers a more comprehensive solution by enabling species identification in complex herbal formulations[1]. Despite its advancements, universal DNA barcoding may fail to distinguish closely related species, such as those in the genus Curcuma, necessitating complete chloroplast genome sequencing for more robust differentiation[2]. Metabolomics, which examines chemical fingerprints, provides complementary data for distinguishing chemotypes within species, further enhancing authentication accuracy. An integrative approach is indispensable, as no single technique can comprehensively resolve the complexities of herbal authentication. Combining microscopy, NGS, and chemical analysis provides a robust strategy for detecting hidden species in herbal supplements, ensuring both accurate identification and regulatory compliance[3]. Additionally, rapid detection

technologies, such as lateral flow immunochromatographic assays, are critical for identifying toxic or restricted plants, enabling quick forensic and safety evaluations. The integration of these advanced methodologies is crucial for maintaining the quality, safety, and authenticity of herbal products in the global market.

Fungi as unseen contributors to sustainable living and the urgent need for conservation

Prof. Sajeewa Maharachchikumbura

[1]School of Life Science and Technology, University of Electronic Science and Technology of, China.
[2]Faculty of Technological Studies, Uva Wellassa University, Sri Lanka

Fungi are fascinating organisms with incredible diversity and a wide range of ecological roles, including essential functions as decomposers and pathogens. They are vital to life on Earth, playing critical roles in nutrient cycling, improving soil health, and providing practical benefits in healthcare, agriculture, and environmental restoration. Fungi are also essential for maintaining biodiversity and supporting human welfare. Their adaptability and ease of genetic modification make them invaluable resources for developing pharmaceuticals, biofuels, pest control solutions, and food, all of which contribute to human well-being and environmental sustainability.

Despite their importance, fungal biodiversity is under significant threat from habitat loss, climate change, and human activities, necessitating urgent conservation efforts. Long-term studies of tropical fungi, particularly in tropical Asia, are crucial for uncovering their full species diversity, ecological roles, and contributions to conservation; however, such studies are almost entirely absent. This presentation underscores the ecological roles of fungi, their contributions to human well-being, the knowledge gaps in tropical regions, and the urgent need for dedicated efforts in fungal conservation and research to unlock their full potential for human and ecological benefit.

Plenary Talks, Oral & Posters

Theme – 1

Recent Trends on Noni Research

Noni (*Morinda citrifolia* L.): A Miracle Fruit for Health and Prosperity

Dr. Thippesha, D.

College of Agriculture, Navile, Shivamogga
thippeshad@uahs.edu.in

Noni (*Morinda citrifolia*) is a small evergreen tree belongs to the Rubiaceae family. It is a tropical fruit also known as Indian mulberry, widely cultivated in the tropical and subtropical countries, including Polynesia, Vietnam, Malaysia, India, Cambodia, Costa Rica, South America and China. People have formed a long and profound relationship with noni for hundreds of years, recognizing its historical and modern contexts. Therapeutic properties of noni are attributed to the presence of phytochemicals and so far, more than two hundred bio-active compounds have been reported in noni fruits. *M. citrifolia* can be found growing in a wide range of habitats including coastal and littoral forests, disturbed forests, dry to mesic forests, deciduous forests, xerophytic habitats, grasslands, open areas near shoreline, abandoned pastures and plantations. The plant can grow in wide range of soils *viz*., acidic, saline and alkaline soil conditions. Noni has been accepted as a liquid dietary supplement in the United States of America, a novel food by the European Commission and a new botanical food resource by the Ministry of Health, People's Republic of China. Functional foods and health products, including fruit beverage, fermented juice, fruit wines, seed oil and leaf tea have been developed using Noni and its by-products as raw materials. The noni market is undergoing a period of robust transformation fuelled by evolving consumer preferences and technological advancements. In recent years, the market has emerged as a dynamic field characterized by rigorous innovation, expansive research and an increasing demand for natural wellness solutions. This report provides a comprehensive outline of the key elements that are shaping the noni landscape. It outlines essential trends and offers insights that bridge traditional market knowledge with contemporary data-driven analysis.

Amrith Noni Cancer Care: Driving novel formulation to test tumor vulnerabilities

Dr. B.T. Prabhakar.

Molecular Biomedicine Laboratory, Department of Biotechnology, Sahyadri Science College, Kuvempu University.

Herbal formulations are increasingly recognized for their potential role in cancer care as complementary therapies. They can support cancer treatment by reducing symptoms, enhancing immunity, and improving chemotherapy outcomes. Noni, scientifically known as *Morinda citrifolia*, is a tropical fruit-bearing tree belonging to the Rubiaceae family has been utilized in traditional medicine for over 2,000 years, particularly in Southeast Asia. The fruit leaves, and roots of the noni plant are used for various health benefits. Noni is a powerful medicinal plant with rich history in traditional medicine, various formulations, particularly those from Amrith Noni, are gaining popularity for their potential health benefits. Understanding its health benefits, efforts were made to prepare Noni based formulations along with other traditional medicinal plants "**Amrith Noni Cancer Care (ANCC)**" for effective cancer therapy. High throughput cell based screening results against multiple cancer cell lines illustrated that, ANCC has significant cytotoxic effect against many cancer cell lines, without altering its normal counterpart as verified through MTT assay. The mechanism of anti-proliferation through apoptotic assays such as DAPI, Annexin-V stain, COMET, TUNEL, MOMP assays and anti-angiogenesis through CAM, Matrigel plug assay, rat corneal assay, migration and invasion assay proved it efficiency against cancer lines. The gene expression profile wherein supportive to phenotypic changes modulated due to ANCC treatment. The results were validated through *in-vivo* assays as well as tumour models. In conclusive, results postulates that, ANCC herbal formulations presents a promising avenue for alleviating the side effects of chemotherapy, thereby improving the quality of treatment for cancer.

Noni fruit as potential source of probiotic bacteria and plant growth promoting rhizobacteria

Pruthviraj[1&4*], M. K. Naik[2], Sreenivasa[3] and Dhanuja, J[4]

[1] - *Department of Plant Pathology, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga*
[2] - *Department of Plant Pathology, University of Agricultural Sciences, Raichur*
[3] – *Applied Mycology Lab, Department of Studies in Microbiology, University of Mysuru*
[4] - *Department of Plant Pathology, College of Agricultural Science Applied Research (CASAR), Bharatiya Engineering Science & Technology Innovation University, Andhra Pradesh*
E-mail: pruthvigowda6794@gmail.com

Abstract:

Noni fruit (*Morinda citrifolia*) is known for its medicinal properties, making it a valuable source of probiotics. This study aimed to assess the probiotic potential, plant growth promotion, and bio-control activity of *Limosilactobacillus sp.* isolated from noni fruit, a plant with known health benefits but underexplored microbial properties. Eight isolates were obtained from noni fruit, and one, MYSN3, was selected based on its antibacterial activity for further study. The MYSN3 isolate exhibited inhibitory effects on plant pathogenic bacteria such as *Xanthomonas oryzae*, *Ralstonia solanacearum*, and *Pectobacterium carotovorum*. The cell-free supernatant (CFS) of MYSN3 showed inhibition rates of 63.60%, 69.98%, and 69.12% against these pathogens. Characterization of MYSN3 revealed its survival under gastric and bile conditions and susceptibility to most antibiotics. The isolate demonstrated strong adhesion properties with 90.04% cell surface hydrophobicity and auto-aggregation between 9.79% and 29.48%. Additionally, MYSN3 produced indole acetic acid (35.18 µg/ml), gibberellic acid (23.45 µg/ml), solubilized phosphate, potash, zinc, and silicon, while also showing positive results for protease and siderophore production. PCR and 16S rRNA sequencing identified it as *Limosilactobacillus sp.* The findings suggest that MYSN3 has promising probiotic, plant growth-promoting, and bio-control properties, highlighting its potential as a bioinoculant and bio-control agent for future applications.

Key Words: Lactic Acid Bacteria, Antibacterial Activity and Nutrient Solubilization

Phytochemical composition and antioxidant activity of Noni Fruits (*Morinda citrifolia*)

Raghavendra S[1], Madhusudana Somegowda[1] and D. Thippesha[2]

[1]*Department of Plant Biochemistry, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga – 577204, Karnataka, India.*

[2]*Department of Studies and Research in Horticulture, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga – 577204, Karnataka, India*

Abstract:

Noni fruit (*Morinda citrifolia*) is a tropical plant that has been widely used nutraceutical and therapeutic effects and used in the traditional treatment of several ailments. It is native to Southeast Asia (especially Indonesia), Papua New Guinea and northern Australia. The study identified phytochemical constituents, evaluated the antioxidants activity of Noni juice by different solvents. The tested juice contains alkaloids, cardiac glycosides, reducing sugar, flavonoids, saponins, tannin, quinones, terpenoids, steroids, and phenols. The Noni fruit is exhibits antioxidant activity of about 48.80± 0.05% & 62.5± 1.03% measured via its ability to scavenge free radical 1,1-diphenyl-2-picryl hydrazyl (DPPH) and total antioxidant capacity (TAC). The results of the total phenolics content expressed in mg/100 g of gallic acid equivalent (GAE) showed that the aqueous extract has significantly ($p < 0.05$) higher phenolics content (35 ± 1.13) than the methanol and chloroform extracts. The total flavonoid was containing 6.7±0.001 mg quercetin equivalent/g methanol extract comport to aqueous (6.2±0.005) and chloroform extract (5.3±0.011).

Key Words: *Morinda citrifolia,* 1,1-diphenyl-2-picryl hydrazyl (DPPH), Gallic acid, quercetin, Antioxidants.

Noni as a Value-added product for Health and Wellness

Jayashree C Kundagolmath

K L E Society's College of Education, Vidyanagar Hubballi. Email: kamalavaibhav@gmail.com

Abstract:

Noni, scientifically known as *Morinda citrifolia*, is a small evergreen tree native to the Pacific Islands, Southeast Asia, and Australia, primarily known for its large, somewhat pungent fruit that has been used for centuries in traditional medicine, due to its potential health benefits including antioxidant and anti-inflammatory properties the fruit, leaves, bark, and roots of the noni plant can be consumed in various forms, most commonly as a juice, though scientific evidence supporting all its purported medicinal uses remains limited. Noni is noted for its extremely wide range of environmental tolerances. It can grow in infertile, acidic and alkaline soils and is at home in very dry to very wet areas. It grows naturally in relatively dry to mesic sites or lowland areas in close proximity to shorelines. The medicinal applications, both traditional and modern, span a vast array of conditions and illnesses, although most of these have yet to be scientifically supported. Noni is well suited for intercropping within traditional agroforestry subsistence farming systems or as a monocarp in full sun. It has attained significant economic importance worldwide in recent years through a variety of health and cosmetic products made from leaves and fruits. These results suggest that noni may warrant further study for various diseases. Noni has been used widely as a complementary and alternative therapy in many countries owing to its potent antioxidant activity and proven health benefits.

Keywords- Noni, Anti-oxidants and Medicinal Benefits

Theme – 2

Conservation of Biodiversity

Bridging Science and Action: The Role of Collaborative, Non-traditional Partner Engagement for Conservation

Dr. Sanjay Gubbi

Programme Head, Holématthi Nature Foundation
135, 30th Cross, 14th Main, Banashankari 2nd Stage, Bengaluru.

Wildlife research is fundamental to evidence-based conservation, providing critical insights into species ecology, population dynamics, habitat requirements, and threats. While this knowledge should inform targeted conservation strategies addressing biodiversity loss, ecosystem degradation, and human-wildlife conflicts, a significant gap exists in India between wildlife science and its practical implementation. Technological advancements such as remote sensing, genetic analysis, and telemetry have revolutionized wildlife studies, enabling researchers to track species movements, assess genetic diversity, and monitor environmental changes in real time. However, these advancements have yet to fully translate into effective on-ground conservation, as habitat loss and species decline continue to pose major challenges. Effective conservation requires an interdisciplinary approach that integrates ecological research with socio-economic and policy considerations. Engaging a broad network of stakeholders beyond the traditional conservation community is essential. Community participation and stakeholder engagement play a crucial role in ensuring long-term conservation success. While many organizations emphasize community involvement, these efforts must be supported by a comprehensive understanding of social dynamics, economic factors, and empirical evaluations of conservation interventions to maximize their effectiveness. Historically, activism has played a key role in shaping conservation policies in India, contributing to species recovery and habitat protection. However, the evolving landscape of conservation advocacy requires a balance between awareness efforts and scientifically grounded actions that drive meaningful change. This paper presents empirical evidence from our work in Karnataka, highlighting both successes and challenges in conservation implementation through collaborative efforts with diverse partners. These initiatives include the establishment of new protected areas, mitigation of habitat fragmentation threats, development of conservation policies, and other impactful interventions. Success was achieved through inclusive stakeholder engagement and the use of evidence-based approaches to address differing perspectives and foster consensus. Conservation efforts must be data-driven, adaptive, and collaborative, incorporating modern scientific methodologies and diverse partnerships. By fostering cooperation among conservation organizations, governmental agencies, and research institutions, scientific knowledge can be effectively translated into action. Strengthening these connections will enable the implementation of sustainable conservation measures that protect species and ecosystems for future generations. The future of biodiversity conservation depends on

our ability to integrate scientific research with proactive, inclusive, and solution-oriented approaches, ensuring a harmonious coexistence between humans and wildlife.

Bio prospecting Potential of the Western Ghats: Issues and Case Studies

Prof. R. Vasudeva

Dean (Forestry), College of Forestry, Sirsi,
University of Agricultural Sciences, Dharwad
vasukoppa@gmail.com

Plants have long been a major source of pharmaceutically significant compounds worldwide. In the Western Ghats a mega diverse region about 100 medicinal plant species, including 58 globally threatened ones, face endangerment due to excessive extraction. Without alternative and sustainable methods, the current rate of extraction to meet global demand is unsustainable. Despite these opportunities, challenges such as deforestation, climate change, and ethical concerns related to benefit-sharing must be addressed. Legal frameworks, including the Biodiversity Act of 2002, play a pivotal role in regulating bio prospecting activities. Through case studies, we highlight successful community-led initiatives and discoveries, showcasing strategies that integrate conservation and economic benefits. One of the critical challenges in bio prospecting is the overharvesting of species with high pharmaceutical value. *N. nimmoniana*, a primary source of camptothecin (CPT), is currently listed as endangered due to excessive extraction from the wild. To sustainably meet the global demand for CPT, several initiatives must be pursued. Development of Clonal Orchards: Establishing high-yielding elite clones to ensure a sustainable supply; Utilization of Renewable Biomass: Harvesting leaves and fruits instead of uprooting entire plants. This presentation aims to bridge sciatic exploration, economic opportunities, and conservation efforts through a holistic approach to bio prospecting. It emphasizes collaborative strategies involving Academic institutions to drive scientific innovation, Indigenous communities to incorporate traditional knowledge and ensure benefit-sharing, Policymakers to develop frameworks that support ethical bio prospecting and prevent bio piracy. He proposed framework not only highlights scientific opportunities but also addresses broader challenges such as: Bio piracy prevention: Ensuring equitable benefit-sharing with local communities, Habitat conservation: Protecting ecosystems from overexploitation and Sustainable development: Balancing economic growth with ecological integrity.

Impact of seasonal changes in Zooplankton biodiversity in Gaare Narasaiah's Lake, Tumakuru, Karnataka, India, and potential future implications of climate change

Darshan Kumar T., Parimala B. and Varsha V. Rajapuri

Department of Studies and Research in Zoology, University College of Science, Tumkur University, Tumakuru, Karnataka, India.
Email: darshankumartresearch@gmail.com

Abstract

Zooplankton are an essential component in the pelagic food web, linking primary production to higher trophic levels, thereby playing a key role in the functioning of aquatic ecosystems. They are crucial elements of freshwater lake ecosystems as they occupy the center of the aquatic food web and being as an important food for almost all freshwater fish species at some stage in their life history. Changes in zooplankton abundance, species diversity and community composition can indicate the change or disturbance of the environment. So, they serve as an ecological indicator of aquatic environment due to their rapid response according to environmental changes. The diversity of zooplankton taxa was studied for a period from June 2024 to November 2024 on seasonal basis. During this time period, in total, 28 species of zooplankton were noticed, which includes 9 species of each *Rotifera* and *Cladocera* and 5 species of *Copepoda* and *Ostracoda*. In this present observation, total abundance of *Rotifera* was found to be predominant with 35%, followed by Cladocera 29%, *Copepoda* 29% and *Ostracoda* 7%. The population density of various group of zooplankton was observed, and it was found to be following order *Rotifera* > *Copepoda* > *Cladocera* > *Ostracoda*. The high and low population densities were recorded in summer and early monsoon season respectively. This higher zooplankton population density in summer might be due to the temperature acceleration in the Gaare Narasaiah's Lake. The present study revealed that zooplankton productivity was found to be higher in the Gaare Narasaiah's Lake when the temperature was increased in premonsoon season. It indicates that the temperature has influence on the zooplankton diversity. Therefore, increased temperature due to global climate change might have an influence. on the zooplankton production.

Key words: Climate change, Biodiversity, Zooplankton, Gaare Narasaiah's Lake, Cladocera, Conservation.

Analyzing Five Years of Human-Tiger Conflict: Spatial and Temporal Trends in Nagarahole Tiger Reserve, Karnataka, South India

Harsha Patlapati Subhash and Vijaya Kumara

Department of PG studies and Research in Wildlife and Management, Kuvempu University, Shankaraghatta, Shivamogga 577451.
Email: harshaips@gmail.com

Abstract

The study investigates the spatial and temporal dynamics of human-tiger conflicts (HTC) in Nagarahole Tiger Reserve, India, from 2019 to 2023. We focus on livestock depredation as a primary driver of conflict, aiming to understand its patterns and identify factors contributing to its occurrence. We analyzed livestock predation data, conducted household surveys, and employed spatial analysis techniques to investigate the spatial and temporal distribution of HTC. We also examined socio-economic factors influencing conflict dynamics. Cows were the most frequently targeted livestock (74.52%), followed by oxen (11.54%), buffaloes and calves (4.81%), and goats (4.33%). Areas with heightened conflict incidence were identified, and a seasonal pattern was observed with decreased incidents during the monsoon months. Understanding the spatial and temporal patterns of HTC is crucial for developing effective mitigation strategies. Our findings highlight the need for targeted interventions in identified areas of heightened conflict incidence, focusing on livestock protection, community engagement, and habitat management to promote coexistence between humans and tigers.

Keywords: Human-Tiger Conflict, Livestock Predation, Nagarahole Tiger Reserve, Tiger Conservation, Wildlife Conflict

Conservation and Breeding Ecology of the Largest Documented River Tern Colony in Bhadra Reservoir, Karnataka, India

Karthik N. J. and Vijaya Kumara

Department of P.G. Studies and Research in Wildlife and Management, Kuvempu University, Jnana Sahyadri, Shankarghatta-577451, Shivamoga, Karnataka.
Email: Karthiknjwildlife@gmail.com

Abstract

The River Tern (*Sterna aurantia*) faces a worrying "Near Threatened" status due to global population decline, as acknowledged by the International Union for Conservation of Nature (IUCN). India serves as a vital refuge, yet understanding their breeding ecology remains regional. In Bhadra Wildlife Sanctuary, Karnataka, a remarkable ecological phenomenon unfolds during the river tern breeding season. Our extensive study, spanning February to June 2023, reveals Bhadra as the world's largest documented river tern breeding colony, defying conventional norms in terms of size and concentration, with 1258 nests across three islands. Island 3 is preferred, hosting 65.2% of nests, with Islands 1 and 2 at 21.6% and 13.2%. These findings align with earlier research by Ali (1983), emphasizing the appeal of Island 3's ample rock formations.We employed cautious approaches to protect these nests, avoiding direct intervention to prevent potential harm. Innovative techniques, such as GIS software and binoculars, were used to safely count nests and study materials. Our research delved beyond enumeration, documenting clutch size, nesting success, predation risks, human disturbances, and more. Nest materials and mollusk shells were cataloged. We also studied river tern feeding habits by collecting fish samples from local fishermen. This discovery highlights Bhadra's river tern colonies as globally significant, emphasizing the intricate interplay between nature and wildlife in this region. Urgent conservation efforts are needed in Bhadra to preserve this breeding colony, essential for river tern and ecosystem conservation. Our study reconfirms Bhadra, Karnataka, India, as the largest documented river tern breeding colony, offering vital insights for global river tern conservation.

Keywords: River Tern, Bhadra Wildlife Sanctuary, Breeding Ecology, Nesting Preferences, Reproductive Success, Bhadra Reservoir, Nesting Islands.

Angiosperm Composition, Stand Structure and Ecology of Jatagappanaban Sacred Grove, Sharavathi River Basin, Central Western Ghats, Karnataka

Savinaya Malve Sathisha[1], Shreeloka Bennatte Shreeharsha[2], Jogattappa Narayana[2], Venkatarangaiah Krishna[3]

1 Srishti Manipal Institute of Arts, Design & Technology, ManipalAcademy of Higher Education, Yelahanka, Bengaluru
2 Department of P.G. studies & Research in Environmental Science, Jnansahyadri, Kuvempu University, Shankarghatta
3 Department of P.G. studies & Research in Biotechnology, Jnansahyadri, Kuvempu University, Shankarghatta
Email: savinaya.ms@manipal.edu

Abstract

Sacred groves, remnants of virgin forests in the Western Ghats, are critical habitats for endemic and threatened species. Despite extensive studies on their diversity across India, limited research has explored the ecological characteristics, vegetation structures, and microclimatic impacts within individual groves. This study examines angiosperm diversity and habitat dynamics in the Jatagappanabana Sacred Grove, Sharavathi River basin, Karnataka. In a 50-hectare area surveyed using the transect-quadrate method, 124 species from 88 genera across 41 families were identified. Dimocarpus longan was the most abundant species, followed by *Euonymus indicus*. The herb layer included seedlings of *Dimocarpus*, *Combretum latifolium*, and *Vepris bilocularis*, with only *Dimocarpus* showing successful sapling development. The understory canopy featured *Euonymus indicus, Aporosa cardiosperma*, and *Memecylon*, while the upper canopy was dominated by *Bischofia javanica, Aglaia elaeagnoidea*, and *Persea macrantha*. *Canarium strictum* emerged in the top layer with a girth exceeding 70 cm. Ficus nervosa recorded the highest basal area coverage, followed by *Bischofia* and *Dimocarpus*. Poor basal area cover was observed for endemic swamp species *Syzygium travancoricum*, along with *Prunus ceylanica*, *Celtis*, and *Syzygium laetum*. *Combretum latifolium* dominated lower altitudes, while deciduous species like *Ficus nervosa* prevailed at higher elevations. Insights on community composition and microclimatic effects underscore the importance of preserving sacred groves, offering critical refuge for biodiversity amidst habitat changes.

Keywords: Community composition, Diversity, Endemism, Ecology, Habitat dynamics, Micro-climate.

Evaluation of Amylase Producing Microorganisms from Rhizosphere Soil

Aishwarya R, Shreya S., Falken, Rakshith, Samarth G. S., Rithu R., Shilpa S., Venugopal T. M., and Mallikarjun N.

Department of Microbiology, Sahyadri science college, Shivamogga 577 203.
Email: shilpasshivakumargs@gmail.com

Abstract

Soil microorganisms, particularly bacteria, play a crucial role in biogeochemical cycles and are essential for life on Earth. They are known for their ability to produce industrially valuable enzymes, such as amylase, cellulase, protease, lipase, pectinase, and chitinase. Microorganisms represent a vast reservoir of resources and are the most important source of enzyme production. Amylases are enzymes that convert starch into glucose, a key component in various industrial application. They are produced by various living organisms, including bacteria and fungi, and are classified into two classes: endoamylases (αamylase) and exoamylases (glucoamylase). Approximately 3000 enzymes are known, but only a few have been exploited in industries. Microorganisms are widely present in nature, and they can be easily screened and tested in laboratory conditions for amylase production. Based on these key points, the study was aimed on isolation, identification and characterization of amylase producing bacteria from soil samples. Soil samples were collected from the garden of Sahyadri science college Shivamogga, for amylase producing bacterial isolation. Initial screening was done by inoculating the serially diluted soil sample onto starch agar media for the isolation of amylase producing organisms. After initial screening the bacterial samples were identified by biochemical characters and further, they were subjected for submerged fermentation for mass production of amylase enzyme. The results of this study reveal that, out of 25 isolates, 6 were identified as amylase producers. The best amylase-producing isolate showed highest enzyme activity, making it a promising bacterium for industrial-scale production. The study found that isolate No. 6 and 4 isolates can be used for industrial-scale enzyme production. Thus, this study reveals that the identification and characterization of bacteria from soil samples is capable of producing amylase enzyme which is a crucial step for production of industrially important enzymes.

Keywords: Soil enzymes, amylase and industrially important enzymes

Bioremediation of Textile Industry Effluent Using a Bacterial Strain: A High-Resolution LCMS Analysis (OHRLCMS)

Srinivasa Naik and Hina Kousar

Department of P.G. Studies and Research in Environmental Science, Kuvempu University, Jnanasahyadri, Shankaraghatta - 577451, Shivamogga, Karnataka, India.

Abstract

Textile industrial effluent pollution represents a significant environmental challenge, primarily due to the presence of persistent organic pollutants. The present research aims to isolate a bacterial strain from soil contaminated by textile industrial effluent and identification by molecular characterization. The isolated bacterium was subsequently utilized for bioremediation over a 96-hour duration. To assess the targeted and non-targeted chemicals in both untreated and treated effluent, high-resolution Orbitrap liquid chromatography-mass spectrometry (OHR-LCMS) analysis was conducted. The analysis of untreated effluent samples identified a wide array of organic pollutants, such as Boron sulfide, Hexadecanamide, 3-Hydroxyfluorene, Mono(2-ethylhexyl) phthalate (MEHP), and various nitrogen-containing compounds, highlighting significant industrial pollution and the presence of complex organic molecules that resist natural degradation processes. Following treatment with bacteria, a marked decrease in the concentration of these compounds was noted. Specifically, Butylparaben, 2-Hydroxy-1,4-naphthoquinone were completely eliminated from the treated samples, indicating effective degradation. The reduction of plasticizer compounds underscores the metabolic activity of the bacterial strains, demonstrating the active microbial breakdown of complex organic pollutants. The present study highlights the efficiency of microbial bioremediation in industrial wastewater treatment by breaking down hazardous pollutants into less toxic metabolites. The HR-LCMS analysis provides valuable insight into the metabolic pathways involved, supporting the application of bioaugmentation strategies for sustainable environmental management.

Keywords: Bioremediation, Textile industry effluent, Target and Non-target screening, Orbitrap – High resolution mass spectrometry

Diversity of Fish Fauna in Hanumanthapura Lake, Tumakuru District, Karnataka State, India

Mamatha H. C. and Parimala B.

Department of Studies and Research in Zoology, University College of Science, Tumkur University, Tumakuru,Karnataka, India
Email: mamathaphd.2023@gmail.com, parimala.bb@gmail.com

Abstract

Freshwater biodiversity constitutes a vitally important component of the planet as compared to the species richness of both terrestrial and marine ecosystems. It is estimated that freshwater habitats are among the world's most threatened ecosystems with about 25% of the global vertebrate diversity. Fish has a vital role in the socioeconomic structure of South Asian nations and is a valuable source of protein. India is one of the twelve countries in the world with the highest level of biological diversity due to its vast biological heritage. Since the turn of the century, researchers have focused on the 2,546 species of fish that make up the fish population as well as the fish in the Indian subcontinent's inland waterways. The ichthyofauna's lack of knowledge is a major barrier to the popularization of lesser-known fish species in a given environment. Therefore, it is necessary to assess the fish species linked with various freshwater habitats in order to plan production and successful exploitation strategies. The goal of the current study is to better understand the fish diversity in Hanumanthapura lake between Feb-2024 and Jan-2025. The present fish biodiversity study revealed the occurrence of fifteen freshwater fish species belonging to six families and five orders. The order Cypriniforms was most dominant with six fish species followed by order Siluriformes with three species, order Channiformes, Perciformes and Anabantiformes with each two species. Several anthropogenic activities like barrages, waste water dumping, overfishing, habitat alteration, water pollution, exotic species and sedimentation were found to threaten the fish diversity. Physicochemical characteristics are also responsible for the occurrence and distribution of fishes in this water body. It is necessary to take up sustainable steps to monitor and conserve fish health.

Keywords: Freshwater, Hanumanthapura Lake, Fish diversity, Species, Cypriniforms Anthropogenic pressure

Diversity of Xylariaceae in Thirthahalli taluk of Karnataka, India.

Nandan Patel K. J. and M. Krishnappa

Department of Botany, Sahyadri Science College, Shivamogga, Karnataka, India.577203
Email: nandanpatelkj@gmail.com

Abstract

The family Xylariaceae is large and possess well known ascomycetes with worldwide distribution, The members are saprobes or weak pathogens and many are endophytes in wood and bark, Xylariaceae members plays an important role in plant litter decomposition in forest ecosystems through soil nutrient recycling and regeneration of soil organic matter by decomposition of lignocellulose matrix. Xylariaceae members are characterized by sac-like perithecia, ascocarp, and variable number of ascospores arranged in chains of asci. Several researchers have studied on macrofungi and their diversity but not particularly on floristics of Xylariaceae, Sampling was done using transect method each measuring 50×20 m, sporocarp were made hand section using sharp blade microscopic characters like size, shape, colour of perithecia, ascospors were studied. The species, *Xylaria hypoxylon, X. polymorpha, X. carpophila, X. minuta, X. hill, X. tentaculata, X. grammica, X memecylonii, X obovata, Annulohypoxylon multiforme, Rhopalostroma africanum* and *Daldinia concentrica* were documented.

Keywords: Ascomycetes, Xylariaceae, Documentation, Diversity

Vegetation Structure and Distibution in Shettihalli Wildlife Sanctuary of Western Ghats, Shivamogga District, Karnataka, India

Deepak Kadappa Phashi and J. Narayana

Department of PG Studies and research in Environmental Science, Jana Sahyadri Kuvempu University Shankaraghatta email: deepakphashi9945@gmail.com

Abstract

Forest ecosystem is one of the most important terrestrial ecosystems of the world composed of varieties of flora and fauna. Vegetation diversity serves as a critical indicator of ecosystem health, particularly in the context of rapidly changing climates. Hence, the data was collected through the Grids followed by quadrates sampling. A total of 297 species were observed from the study area and are grouped according to their order and family. Order Sapindales distributed most abundant number (38) of species followed by Fabales (35), Malpighiales (33), Rosales (30), Gentianales (29), Lamiales (20), Myrtales (15), Malvales (14), Ericales (13) and Laurales (12); remaining orders being least contributed to the diversity. The family Fabaceae shows most abundant number (35) of species and followed by Moraceae (19), Rubiaceae (15), Rutaceae and Apocynaceae (12), Meliaceae and Malvaceae (10) and remaining are moderate and less in the area. This vegetation understanding helps to know plant communities within the WLS and also the faunal community residing in the Wildlife Sanctuary especially the herbivores.

Keywords: Central western Ghat, Floral diversity, Forest ecosystem, Plant community, Shettihalli

Drosophila diversity with respect to altitude of Kemmannugundi hills, Chikkamagaluru, Karnataka

Aishwarya B. H.[1], and Nagaraja K.[2]

[1]*Department of studies and Research in Zoology, Tumkur University, Tumakuru, Karnataka, India.*
[2]*Department of Applied Zoology, Kuvempu University, Shivamogga, Karnataka, India.*
**Email ID: bhaishwarya5@gmail.com*

Abstract

Drosophila is the most abundant genus and comprises 76 genera with more than 3952 species throughout the globe. The changes in altitude, temperature, and season will affect the rate of population growth and survival of *Drosophila* species. A study was conducted to analyze the *Drosophila* community at different altitudes of Kemmannugundi hills, Chikkamagaluru district, Karnataka, India for one year duration. A total of 1601 flies were collected at three different altitudes *viz*., 650, 850 and 1400 meters, and temperature ranges from 12°C to 32°C with relative humidity of 76 to 93%. The commonly found 4 species were *Drosophila melanogaster* (59.00%), *D. ananassae* (28.57%), *D. bipectinata* (4.96%) and *D. malerkotliana* (7.45%) at different altitudes. The density decreased with increasing altitude, 650m>850m>1400m thus the *Drosophila* community was affected by elevation. The difference in the biodiversity of *Drosophila* at different altitudes could be due to variation in the temperature and altitude. *Drosophila* population was further analyzed using ecological indices like Simpson (D), Berger-Parker (1/d) and constancy index. The lower altitude of 650 m has a lower value of D (0.151) and higher value of 1/d (1.24) indicating more biodiversity compared to the higher altitude of 1400 m. *D. melanogaster* was considered as a constant species (C ≥ 50) whereas *D. bipectinata* and *D. malerkotliana* were the accidental species (C < 25). Thus, the population density of *Drosophila* was varied in all the three altitudes as sequence mentioned as 650 > 850 > 1400m.

Keywords: Drosophila species, Ecological indices, Altitude, Density, Humidity

Preliminary study on diversity, distribution and host preference of entomopathogenic fungi in Kuvempu University Campus.

Kiran M., S. Sushmita, G.R. Sowmya, Vijayakumara

Department of PG studies and Research in Wildlife and Management, Kuvempu University Shankarghatta, Shimoga 577451, kiranmalgimani10@gmail.com sushmithasshiva@gmail.com

Abstract

Fungi play a very important role in the terrestrial ecosystem. *Cordyceps* are the fungi species which are known for their medicinal property in the oriental societies of Asia. *Cordyceps* are categorised under four genera based on molecular phylogeny *Cordyceps* (fam. Cordycipitaceae), *Elaphocordyceps* and *Ophiocordyceps* (fam. Ophiocordycipitaceae) and *Metacordyceps* (fam. Clavicipitaceae) in the Order Hypocreales of Phylum Ascomycota of the Kingdom Fungi. *Ophiocordyceps* are one of the entomopathogenic fungi. The current study on diversity, distribution and host preference of entomopathogenic fungi was done by opportunistic field survey during the time period from June to December 2024. Observations were made by lifting leaf litter, examining the tree trunks and underside of the leaves. Photographs were taken for the evidence and infected specimens were collected and brought to laboratory for further characterization and pathogens were identified based on host species. The results revealed that a total 23 specimens were collected among which seven spiders, two beetles, two wasps, two stink bugs, 3 cicadas including nymph and 3 ant hosts were listed. Infection was more among spiders and 4 entomopathogenic fungi were identified to genus level based on host. *Ophiocordyceps* mainly depend on living insects to complete their life cycle hence the conservation of micro-fauna plays a vital role in maintaining the ecosystem balance.

Key Words: Fungi, Entomopathogens, *Ophiocordyceps*, Insects

Living with the wild: Can we find a solution for Human Wildlife Conflict

Roshni A. J. and Vijaya Kumara

Department of PG Studies and Research in Wildlife and Management, Kuvempu University, Shankaraghatta, Shivamogga 577451Email: roshniaj@yahoo.co.in

Abstract

Major cause for human wildlife conflict is increasing human population adjoining wildlife habitats. Frequency and intensity of conflict increases due to rise in human population and demand on limited resources, which is manifested by increasing encroachment, and destruction of wildlife habitats. Thus, populations of wild species, which are unable to adapt to altered habitats gradually decline in their number. Human wildlife conflict is a reciprocal process, humans and animals are negatively affected by the conflict and it is one of the most complex and urgent issues facing wildlife management and conservation, especially outside protected areas. Inorder to reduce the negative interactions on human wildlife conflict it is necessary to work towards finding solutions that maximise conservation success and necessary to include positive interactions, co-existence and attitudes of tolerance towards wildlife. Wildlife damage to agricultural and horticultural crops, human life, damage to property is a serious concern affecting much of the world today. Reduction in the availability of natural prey/food sources leads to wild animals seeking alternate sources. Alternately, new resources created by humans draw wildlife resulting in conflict. The escalating conflict between humans and wildlife is pressing concern that has resulted in significant losses on both sides. Root causes of these clashes can be traced back to rapid urbanization, population explosion, inadequate protected spaces for wildlife, and expanding transport networks. These factors not only disrupt the ecological balance but also impede sustainable development and biodiversity. However, several strategies can be implemented to mitigate this problem.

Keywords: HWC, Conservation, Ecological balance, Mitigation of HWC

Occurrence of *Ophiocordyceps Unilateralis Sensu Lato* (Zombie-ant Fungus) in Shivamogga, Chikkamagaluru and Hasan districts

Lavanya V. and Darshan N.

Department of P.G Studies and Research in Applied Botany, Kuvempu University, Shankaraghatta-577451 Email: lavanyavsringeri2002@gmail.com

Abstract

A field survey was conducted from December 2024 to January 2025 was carried out to explore the existence of *Ophiocordyceps unilateralis sensu lato* in the forest areas of Agumbe, Hosanagara, Sakaleshpura, covering Shivamogga, Chikkamagaluru, and Hasan districts, Karnataka, India. It is an entomopathogenic fungus specific to *Myrmica* ants, commonly called as Zombie-ant fungi. Transect sampling and visual inspection of branches at about 6 meters height revealed infected specimens within the surveyed areas. A representative specimen was preserved for future reference in the Department of Applied Botany laboratory, Kuvempu University. These findings are one of the first confirmed reports of the presence of this fungal pathogen within the specific geographic locations surveyed. Further research is needed to find out the species life cycle and to identify its medicinal importance.

Keyword*: Ophiocordyceps Unilateralis Sensu Lato,* Zombie-ant fungi, Myrmica ants

Comparative Study of Natural Forest and Plantation in Lakkunda Village, Tirthahalli Taluk, Shivamogga

Sumukha K. S.

Department of P.G Studies and Research in Applied Botany, Kuvempu University, Shankaraghatta-577451, Email: sumukhalohithrao@gmail.com

Abstract

The present study examines tree diversity, species distribution, and basal area in Lakkunda, comparing natural forests with plantations. A total of 51 tree species were recorded, with an average of 20.5 species per transact (250 x 4 m) and 475 individual trees sampled. Diversity indices show that natural forests support greater biodiversity than plantations. The Simpson's Diversity Index (1-D) was 0.8835, showing high species diversity, while the Dominance Index (D) was 0.1165, indicating that no single species dominates the ecosystem. The total taxa richness was 20.5, reflecting a well-balanced forest composition. Species distribution analysis revealed that most species, including Acacia auriculiformis and *Aporosa lindleyana*, followed an aggregated pattern, suggesting habitat preference. Basal area assessments showed that natural forests contributed significantly to biomass, with species like *Hopea ponga* having higher basal area values. In contrast, plantation forests exhibited lower basal areas, indicating lesser structural complexity. These findings highlight the importance of conserving natural forest patches to maintain biodiversity and ecological balance in Lakkunda.

Keywords: Lakkunda, Diversity indices, *Hopea ponga*

Seasonal Dietary Composition of Sloth Bear (*Melursus ursinus*) in Daroji Sloth Bear Sanctuary, Hospet, Karntatak, India

Harisha, M. N., B. B. Hosett and Vijaya Kumara

P.G. Studies and Research in Departments of Wildlife and Management, Kuvempu University, Jnana Sahyadri, Shankaraghatta-577451, Shivamogga, Karnataka, India
Email: harishwild@gmail.com

Abstract

Most bears are opportunistic omnivores; their diets consist of fruits, other vegetative material, and in lesser amounts, mammals, fishes, and insects. Sloth bears (*Melursus ursinus*) are the only species of ursid specifically adapted to feed on insects, especially termites and ants, although they also feed on fruits when available. This study analyzed the diet of Sloth bears during February 2010–January 2011 in Daroji Sloth Bear Sanctuary, Karnataka, an area characterized by fragmented forests interspersed with agricultural fields and human settlements. A total of 132 scat samples were examined, identifying 17 plant species and various animal components, including insects (*termites, ants, Apis dorsata, beetles*) and unidentified remains (*bone, hair, tissues*). A year-round frequency of occurrence of animal matter was higher than the plant matter i.e., 63% and 37% respectively. Animal matter constituted 67% of scats during monsoon and 64% during summer, but dropped to 60% during winter. On percent dry-weight basis, plant matter was greater than animal matter in scats in all seasons. Fruits of *Grewia* species were more during summer (22%) followed by *Ziziphus* species during winter and both were also high in percent weight in all seasons. During the monsoon, *Canthium* and *Carissa* spp. were the primary plant foods, supplemented by *Annona*, *Grewia*, and *Syzygium* spp. The reliance on *Grewia* spp. was particularly notable when alternative food sources were limited due to crop unavailability or unfavorable foraging conditions. The presence of groundnut and corn (maize) in diets during the monsoon suggests crop damage by bears, thereby increasing chances of human-bear conflict.Sound understanding of Sloth bear food habits and ecology is needed to develop effective conservation policies to protect or restore its habitat and to reduce bear-human conflict.

Keywords: Sloth bear, *Melursus ursinus,* Daroji Bear Sanctuary, Feeding ecology, Scat analysis

Study on Behavioral Ecology of Mahseer using Advanced Telemetry System in Cauvery River, Karnataka, India.

Pavan G.[1], Bhavya B. Desai[1], Naren Sreenivasan[2] and Vijaya Kumara[2]

[1]*Department of PG studies and Research in Wildlife and Management, Kuvempu University, Shankaraghatta, Shivamogga 577451:*
[2] *Conservation Biologist and Lead Researcher, WASI (Wildlife Association of South India): conservation@wasiindia.com*
Email: pavang0411@gmail.com

Abstract

The Humpback Mahaseer, "The Tiger of the Cauvery" is regarded as one of the 20 freshwater mega fishes on the Planet. It is endemic to the Cauvery River system and is currently listed as "critically endangered" under the IUCN Red List of Threatened species. Monitoring the movements and activities of wild animals can be difficult, especially when species are cryptic or move over large areas. With an objective to accurately track the movement of the fish to monitor its habitat utilization, environmental impact monitoring and to implement conservation planning including Research and development an Advanced Telemetry System (ATS) method was adopted by Wildlife Association of South India at Cauvery Wildlife Sanctuary. The ATS uses Fish external mount transmitter, antenna and an advanced telemetry system receiver using triangulation. And other devices for data collection includes Multimeter, Digital Lux meter, Digital wire sensor thermometer, Turbidity tube, range finder and Deeper smart sonar. The ATS developed in this study has demonstrated its potential to revolutionize our understanding of fish migration patterns and habitat utilisation. By providing accurate, real-time data on fish movement and environmental parameters, this system can inform conservation and management efforts, ultimately contributing to the sustainability of this Mahseer species. It also aids in assessing the impact of climate change, pollution and effect of anthropogenic activities on the masher population.

Key Words: Advanced Telemetry system, Mahseer, Endemic, Triangulation, real time data.

Comparative analysis of acoustic pattern in *Dinopium benghalense* and *Chrysocolaptes socialis* in selected areas of central Western Ghat, Shimoga district, Karnataka, India

Sowmya G. R and Vijaya Kumara

Department of PG Studies and Research in Wildlife and Management, Kuvempu University, Shankaraghatta -577451 Email: Sowmya95ph@gmail.com

Abstract

Woodpeckers are an indicator of forest health as well as a good indicator of avian diversity in the forest. Woodpeckers are coming under order Piciformes comprises three major families such as Megalaimidae (Barbets), indicatoridae (Honey-guide) and Picidae (wryneck, piculates and woodpeckers). The current study on comparative analysis of acoustic pattern in *Dinopium benghalense* and *Chrysocolaptes socialis* results in variation in different frequencies Black rumped flameback (*Dinopium benghalense)* shows high to low frequency contact call with metallic notes which appear like slight bow shaped curve in the waveform. Duration for the reply call was short compared to the message call. Fligh call is nasal form has series with 14 to 16 notes, where duration of 12 notes are high 0.023s with equal frequencies and 2 low frequencies notes end in 0.002s. Malabar flameback (*Chrysocolaptes socialis)* has more nasal and metallic contact calls; the series varies from 10 to 18 notes in multiple clutch of calls. The clutch has a pack of different duration calls varying from 0.01s to 0.007s. Which starts with low frequency and ends with high frequency appear like a half bow in wave form. Flight call is nasal and has more plasticity. It has two different flight call patterns one starts with long note 0.02s and ends with short note 0.005s another one is 2 combined long notes 0.005s ends with single short note 0.0001s. These parameters helps in species identification, helps the birds to identify themselves and to remark their territorial boundary

Keywords: Woodpecker, vocalization, acoustic, frequencies

Orchidarium construction at K P Purnachandra tejasvi pratishtana, Kottigehara, Mudigere Taluk, Chikkamagaluru

Darshan N.

Department of P.G Studies and Research in Applied Botany, Kuvempu University, Shankaraghatta-577451. Email: darshandacchu316@gmail.com

Abstract

A field survey was carried out in July 2024 in Devaramane peak, Menasinahadya, and Soojigudda forests, Mudigere Taluk, Chikkamagaluru District, Karnataka, India, to set up an orchidarium at K.P. Purnachandra Tejasvi Pratishtana, Kottigehara. Opportunistic sampling of orchids was made from disturbed and undisturbed habitats. Thirty-seven epiphytic orchid species belonging to 21 genera and six terrestrial orchid species belonging to five genera were collected. Twenty-three epiphytic species were collected from disturbed habitats, such as dead trees and fallen twigs, and 14 species were collected from living host trees directly to ensure the presence of varied genetic material. All the terrestrial orchids were collected from un-disturbed grassland habitats. Among the nine host tree species from which epiphytic orchids were collected, *Terminalia tomentosa* and *Tectona grandis* were fallen. From these two trees, 63 individuals representing eight orchid species were collected. Nine species of *Dendrobium* were identified, making it the most frequently collected genus. Identification keys were prepared for the purpose of species identification. The constructed orchidarium offers a podium for ex situ conservation, education, and public participation in orchid diversity initiatives. This work emphasizes the role of incorporating in situ collection alongside ex situ approaches to conserving orchid diversity.

Keywords: K.P. Purnachandra Tejasvi Pratishtana, epiphytic orchids, orchidarium

Study on Diversity of Millipedes at Kuvempu University, Shankaragatta, Shivamogga, Karnataka, India

Raghavendra Gowda H. T and Vijaya Kumara

Department of PG studies and Research in Wildlife and Management, Kuvempu University, Shankaraghatta, Shivamogga 577451
Email: raghuwlm18@gmail.com vijay15675@gmail.com

Abstract

Millipedes are arthropods belonging to the class Diplopoda, which contain about 10,000 described species. The animals have a long-distinguished history on our planet, spanning over 400 million years. They are detritivores, meaning they feed on dead plants and animals. The health and survival of every deciduous forest depends on them, since they are one of the prime mechanical decomposers of wood and leaf litter, especially in the tropics. Diplopoda (Millipedes) comprise the third most diverse class of terrestrial arthropods. With an objective to prepare a checklist and to know the abundance and distribution of millipedes, study was carried out from March to September 2024, using Quadrate, opportunistic survey and direct count method. Study revealed the presence of 13 species of millipedes and 155 individuals from 5 families and 1 suborder. Abundant family Harpagophoridae (65) followed by Sphaerotheriidae (58) and list in Arthrosphaeridae & Suborder juliform (5 individuals). Findings of the study demonstrate that the millipede population is not only diverse but also plays a crucial role in maintaining soil health and ecosystem balance. The variations in species distribution suggest the influence of environmental factors and habitat types within the university's ecosystem also emphasizes the need for continued monitoring and conservation efforts to protect these vital organisms, as they can serve as important indicators of environmental change.

Keywords: Millipede, Diversity, distribution, Ecological role

Conservation of Biodiversity

Preeti M. Nandoor

K L E College of education, Hubballi Email: preetimnandoor@gmail.com

Abstract

Biodiversity is the 'Full variety of Life on Earth'. It includes diversity within species, between species and ecosystems. Biodiversity conservation will lead to strengthening of ecosystem resilience and will improve the ability of ecosystems. This paper basically discusses the importance of biodiversity, the consequences faced by the plants, animals, humans and ecosystem owing to climate change and also control measures or strategies should be taken for the conservation of biodiversity which can protect the earth from the consequence of climate change. Biodiversity plays an important role in climate regulation. Many studies in recent years have investigated the effects of climate change on the future of biodiversity. In this, we first understand the different possible effects of climate change that can operate at individual, population, species, community, ecosystem and biome scales, notably showing that species can respond to climate change. India's West Coast is bordered by the Western Ghats, which occupy a region of 180000 square kilometers. A mega biodiversity zone and biodiversity hotspot with a wide variety of flora, fauna, and landscape are known as the "Western Ghats". We also can understand microbial diversity of Western Ghats, emphasizing the prospects of exploiting them. Human-wildlife conflict brings economic losses to the tune of millions of rupees to the rural communities in India every year. Mitigation of human-wildlife conflict is thus becoming one of the key issues of concern for both wildlife managers and the scientific community.

Keywords: Biodiversity, Climate Change, West Coast, Mitigation, Human wildlife

Behavioural study of Sloth bear (*Melursus ursinus*) with Respect to Enclosure Parameters in Tyavarekoppa Lion and Tiger Safari, Shimoga, Karnataka

Ganesh Darshan C. M.[1], Pramod A. F.[1], Vijaya Kumara[1] and Murali Manohar[2]

[1]*Department of PG studies and Research in Wildlife and Management, Kuvempu University, Shankaraghatta, Shivamogga 577451 Email: ganeshdharshan567@gmail.com*

[2]*Veterinary officer, Tiger and Lion Safari, Thyavarekoppa, Shimoga*

Abstract

Captive animals are subjected to an environment that differs greatly from their natural habitat, often restricting them to performing natural behaviors. The restrictions in the expression of normal behavior in captive animals often lead to stress and frustration, which are detrimental to their welfare. Experimental enrichment programs often involve the improvement of the physical characteristics of enclosures. Tiger and Lion Safari, Tyavarekoppa, Shimoga is located in the state of Karnataka, India, with an area of 250 hectares. Study intended to inform and encourage further personality research, and to provide a reliable and practical tool for the quick assessment of zoo animals. Behavioral patterns that are repetitive, invariant and apparently functionless are a common place in captive zoo animals, and are of growing concern due to their negative implications. With an objective to know the influence of enclosure design & enrichment on behavior sloth bears 6 bears housed in the zoo were studied by adapting Focal sampling method and Time activity budget methods, behavior variations in both old and new enclosure were studied during January to October 2024. To calculate the time activity budget, we used Kruskal Wallis test. Behavior patterns of sloth bears were divided into three groups (Active, passive and abnormal behavior). Zone usage of captive sloth bears in enclosure was also checked during the study by classifying the enclosure into zones and data was calculated using participation index and SPI, which has a range of 0 to 1 Where 0 means individual is using the enclosure evenly. Study on captive behavior and examination based on enclosure parameter, provide insight information on the effects of environment on the wellbeing of captive animals as it evaluates the parameters such as space, feeding ecology, social interactions enrichment etc in this context such studies highlight the improve of enclosures with naturalistic features for improving physical and physiological health of captive animals.

Key Words: Captive, Cage, Enclosure, Enrichment

Understanding the Seasonal Impact on Water Quality in Yelugere lake, Tarikere Taluk: A Study of Environmental Factors

Latha C. and Basavarajappa S. H.

Department of PG Studies and Research in Environmental Science, Bioscience block, Kuvempu University, Jnanasahyadri, Shankaraghatta- 577451

Abstract

Water quality is a crucial determinant of aquatic ecosystem health and the safety of water resources for human use. This study investigates the seasonal variation in the water quality of Yelugere Lake, located in Tarikere Taluk, focusing on key parameters such as pH, dissolved oxygen (DO), turbidity, temperature, and concentrations of nutrients (nitrogen and phosphorus). Water samples were collected over different seasons to assess the impact of environmental factors, anthropogenic activities, and natural processes on water quality. Results indicated clear seasonal patterns, with temperature fluctuations, nutrient loads during rainfall, and variations in biological activity significantly influencing water quality indices. The findings emphasize the importance of seasonally monitoring water quality to understand the dynamics of lake ecosystems and support management strategies for water conservation. This study offers valuable insights into how seasonal changes affect the physical, chemical, and biological properties of Yelugere Lake, providing a framework for better water quality management in the region.

Keywords: Water quality, Yelugere Lake, Tarikere Taluk, seasonal variation, nutrients, aquatic ecosystems, environmental monitoring

Diversity of Agaricaceous fungi in Central Western Ghats

Kantharaja R.[1] and M. Krishnappa[2]

[1] *Department of Botany and Seed technology, Sahyadri Science College, Shivamogga – 577 203.* [2]*Department of Botany, Kuvempu University, Jnana Sahyadri, Shankaraghatta–577451, Karnataka*

Email: kanthrajkanthu46@gmail.com

Abstract

The study presents 27 species from the family Agaricaceae collected during field work in Western Ghats forests of Karnataka State, of which 11 species (*Agaricus chiangmaiensis*, *A. flocculosipes, A. langensis, A. leucocarpus, A. punjabensis, A. sinoplacomyces, Battarrea phalloides, Cystolepiota pseudofumosifolia, Lepiota brunneolilacea, Leucoagaricus japonicas* and *L. tangerinus*) are newly recorded from India and 5 species (*Agaricus bressadolanus*, *A. impudicus, Leucoagaricus orientiflavus, L. rubrotinctus* and *Leucocoprinus cepistipes*) are newly recorded from Karnataka. The specimens were described based on morphological and microscopic characteristics. The molecular phylogeny of the collected specimens based on nuclear ribosomal rRNA sequences supported their identification.

Keywords: *Battarrea*, Basidiomycetes, molecular phylogeny, Western Ghats,

Preliminary Study on Ethology of Jungle Babblers (*Argya striata*) at Kuvempu University Campus, Shankaraghatta, Shivamogga, Karnataka

Roopa C. and Vijaya Kumara

Department of PG studies and Research in Wildlife and Management, Kuvempu University, Shankaraghatta, Shivamogga 577451 Email: roopac463@gmail.com

Abstract

Jungle Babbler (*Argya striata)* are cooperatively breeding passerines that breed throughout the year, belonging to the order Passeriformes and family Leiothrichidae. They are widely distributed throughout the Indian subcontinent, mostly found foraging in the leaf litter of dry deciduous closed-canopy woodland and well-wooded gardens. Group members engage in many social behaviors such as cooperative brood care, collective foraging, anti-predator behavior, allogrooming etc. With an objective to assess behavioral ecology, study was carried out from August 2024 to February 2025, with focal, ad-libitum and scan sampling techniques. Group members were observed when they were most active, with fixed time intervals at a distance of around 100-150 meters using binoculars in their natural habitat. According to the study an ethogram of 12 kinds of behavior patterns exhibited by jungle babblers were listed out. Time activity budget revealed that, babblers spend majority of the time foraging (39%) and roosting (37%) and least time spent was shower/drinking water (3%). Social behaviors such as play, allogrooming, inter and intra group communication, co-operative foraging, defense, resource sharing were also observed and recorded. Babblers play predominant roles in the ecosystem as pest controllers and also as seed dispersals, slight variation in the ecosystem reflecting on the behavior of the species those houses there. Learning about the behavior provides insights into evolution, ecology and conservation efforts, helping to protect species and their habitat.

Keywords: Ethogram, time activity budget, behavior, social organization.

Phenology of Tree Species in Sahyadri College Campus, Shivamogga City, Karnataka, India

Prema S. S.

Dept of P.G Studies & Research in Environmental Science, Kuvempu University, Shankaaghatta-577451, Shivamogga, Karnataka, India

Abstract

Phenology, the observation of periodic biological events such as flowering and fruiting, offers a sensitive indicator of the responses of plant species to climate variability and change. In urban regions urbanization and climate change are the two major drivers that can alter vegetation growth processes. Plant phenology study in urban regions might be helpful for exploring new aspects of urban ecology. Research on plant phenology has largely focused on natural ecosystems, leaving a significant knowledge gap in understanding plant phenology in urban settings. In this context, this research work was undertaken to find out urban native and invasive plant species responses to local and global climate change. Woody stems of 60 tree species belonging to 28 families comprising 194 individuals were identified. Observations were made at monthly intervals from Mar-2023 to till date for leafing, flowering and fruiting phenophases. Phenophases were recorded qualitatively and quantitatively. Each stage was scored qualitatively on a 0 to 100 % scale. The phenophases of selected individuals are statistically analysed with weather parameters to know the significance level. The present study reveals that except leaf senescence all the other phenophases of tree species were significantly seasonal. A species-specific relationship was observed between the deciduous period and the onset of seasonal rainfall and warm periods. The peak leaf maturity occurred during the rainy season, while leaf fall primarily took place in winter, preceding the intense dry period. Reproductive phenology, including flowering, fruiting, and fruit obsession, varied significantly across seasons among the selected species. Additionally, human activities such as firing, and plucking of leaves, flowers, and fruits were found to impact various phenophases in some tree species. The timing of pollinator and frugivore varies with availability of nectar and fruit were recorded.

Key words: Climate change, Phenology, Phenophases, Urban ecology, Urbanization

Avifaunal Dynamics: A Vital Tool to Assess Forest Degradation - Need of the hour for Western Ghats - A Review

Srikantha A.V[1], Veeresh S.J[1], Asha S.K[2]

[1]*Department of Studies in Environmental Science, Davangere University. Davanagere.*
[2]*Department of Studies in Biotechnology, Sahyadri Science College, Shivamogga.*
Email: sri.biogem@gmail.com

Abstract

Birds provide essential services for ecological balance by serving as pollinators, seed dispersers, and natural pest controllers, which helps maintain the health of both natural and artificial ecosystems. The Western Ghats, recognized as one of the global biodiversity hotspots, hosts hundreds of bird species, many of which are endemic and under significant threat. However, this invaluable habitat for birds is currently threatened by habitat degradation resulting from deforestation, forest fires, agricultural expansion, monocultures, mining, and invasive species. Hence, there is an urgent need for a comprehensive assessment of Avifaunal dynamics in Western Ghats area to develop mitigating measures to implement at the earliest to protect a critical ecological hotspot. In this review document supporting the structure of bird communities serves as an indicator of environmental health. Such research aids in monitoring forest degradation and helps in evaluating the effects of climate change. Numerous studies have shown a declining trend in bird populations within forests that are experiencing degradation. Each cause of global climate change is known to trigger changes in the composition, structure, and function of avian community. Assessments related to habitat quality have documented significant changes in birds' distribution ranges, diets, nesting behaviors, breeding practices, and habitat occupancy. The loss and fragmentation of forest habitats lead to decline in bird populations at both micro and macro levels. Ecologists worldwide have reached a consensus, based on extensive field experiments, that studying avifaunal community dynamics reflects the degree of habitat degradation.

Keywords: Diversity of avifauna, deforestation, community ecology, climate change, Western Ghats

Preliminary Survey on Diversity of Fish fauna in Chikka Thotlukere Lake, Tumkur District, Karnataka

Mythri V. and Lalitha H. M.

Department of Studies and Research in Zoology, Tumkur University, Tumakuru, India-572103
Email: mythriv284@gmail.com

Abstract

Aquatic ecosystems include a broad spectrum of freshwater, brackish water and marine biotopes characterized by their distinct biodiversity, biotic and ecological features. Among freshwater ecosystems, ponds, lakes, tanks and other small lentic ecosystems form an integral part of the biosphere. Fishes are the prime indicators of ecological health and maintain a balance in the food chain by consuming planktons, and small animals and become food for many other animals. Fish is a rich source of food, providing proteins, fats, minerals, vitamin A and D, phosphorus and other nutrients. Fishes are preferred in our diet due to their high nutritional values. The present study was conducted for a period of six months from July 2024 to December 2024 in Chikka Thotlukere Lake, Tumkur District, Karnataka. Fishes were collected mainly by using gill nets of different mesh sizes which varied from 10 to 100 mm with the assistance of local fishermen. Fishes were brought to the laboratory and preserved in 10% formalin solution in separate specimen jars according to the size of species. Small fishes were directly placed in the 10% formalin solution. The results of the present investigation indicate the presence of 8 species of fishes belonging to the 3 order Cypriniformes, Siluriformes and Perciformes. Cypriniformes was found to be predominant represented by 5 species, Siluriformes represented by 2 species and Perciformes 1 species. The fish species recorded were of commercial importance. The major threats faced by the freshwater fishes are mostly in the form of human interventions and aquatic pollution. The study of fish fauna of an aquatic body is useful for planning fisheries. Hence, proper management and utilization of the fish wealth is necessary to take up the sustainable steps to monitor and conserve fish health.

Keywords: Aquatic ecosystem, fishes, prime indicators, Cypriniforms

Floristic Diversity of Karjikoppa Reserve Forest, Central Western ghats of Karnataka

Nandana S. Tembe[1], N. Rajeshwari[1], H. N. Ramesh Babu[1] and Appaji Nanda[2]

[1*]*Department of Botany and Seed Technology, Sahyadri Science College, Shivamogga-577203, Karnataka, India*
[2]*Biodiversity Education and Research Lab, Environmental Study Centre, Kodachadri Integrated Development Society®, Rathnakaranagar, Abbalagere, Shivamogga-577204, Karnataka, India.*
[2]*Department of Post Graduate studies and Research in Applied Botany, Bioscience Complex, Jnana Sahyadri, Kuvempu University, Shankarghatta-577204, Karnataka, India.*
Email: nandanastembe@gmail.com

Abstract

The Western Ghats is an ecological oasis, providing a vital refuge for countless species of plants and animals. The study area, Karjikoppa Reserve Forest of Shivamogga District, is a part of the central Western Ghat region. Understanding an area's floristic variety can help to determine its overall resources, usage patterns and state of conservation, all of which are important factors in developing conservation plans and regulations. Analysing the vegetation assists in creating an entire picture of the regional tree species. A Standard (100m×5m) transect was laid in the area covering the study site. On the basis of floristic analysis, Rubiaceae and Moraceae families were found to be the highest genera, followed by the Lauraceae, Phyllanthaceae and Apocynaceae families. The Oleaceae family was found to have the highest number of individuals, followed by Anacardiaceae and Salicaceae. Since the study area is indicative of the entire Western Ghats, this kind of study is crucial for sustaining biodiversity.

Keywords: Floristic diversity, Central Western Ghats, Conservation, Karjikoppa

Preparation of Natural Dye Using Mahogany

Kashamma V. H., Likhita C. S. and Akash Patel

Department of Studies in Biotechnology, GM Institute of Technology, Davanagere 577007, Karnataka, India, Email: kashammavh@gmail.com

Abstract

The use of synthetic dyes in the textile industry is mostly non-degradable, which are carcinogenic and pollute the environment severely. Natural dyes have gained significant attention recently due to their potential to mitigate the environmental challenges associated with synthetic colorants. This investigation is centered around the extraction of natural dyes sourced from *Swietenia mahagoni* (mahogany trees) and the exploration of environmentally friendly techniques for coloring cotton fabric. The derived dyes were procured from distinct segments of the *S. mahagoni* (mahogany tree): namely, the fruits, and wood remnants. Employing an aqueous extraction methodology, inherent coloring agents were meticulously separated and subsequently applied to cotton fabric subsequent to appropriate mordanting employing a variety of mordant categories. An exhaustive assessment encompassing wash, light, rubbing, and perspiration resistance was conducted on cotton fabric that was subjected to dyeing using three distinct variants of *S. mahagoni* (mahogany tree)-derived dyes. Notably, cotton fabric treated with wood wastage-sourced dye exhibited commendable to exceptional resistance properties. The efficacy of this dyeing process was further substantiated through diverse characterization techniques, inclusive of scanning electron microscopy (SEM) and Fourier-transform infrared spectroscopy (FTIR), which unequivocally affirmed the successful bonding of *S. mahagoni* (mahogany tree)-derived dyes onto the surface of the cotton fabric. The textile industry, particularly dyeing operations that use large, designed colours and synthetic chemicals, is wreaking havoc on the sea-going environment by dumping emissions directly into bodies of water. Synthetic colours are commonly used to dye cotton fabric, which has major health and environmental consequences. Therefore, concerning the environmental challenges, the dyeing of cotton fabric using naturally extracted dyes from *S. mahagoni* (mahogany trees) can be a suitable alternative to synthetic dyes in the textile industry.

Keywords: *Swietenia mahagoni* (mahogany tree), Sustainability, Natural dye, Cotton fabric, Mordant

Reduction of BOD and COD from Distillery Effluent Using Sawdust as Adsorbent

Priyadarshini and Hina Kousar

Department of P.G Studies and Research in Environmental Science, Kuvempu University.
Email: pinkupriyavnaik4@gmail.com

Abstract

Ethanol distillation generates a large quantity of unwanted chemical liquid called distillery wastewater. It is acidic and dark brown in color. Also having high biological oxygen demand, Chemical oxygen demand, salt contents and heavy metals. So, there is an urgent need for its proper management. The present study focuses on the valorization of waste sawdust as an effective and environment- friendly bio-sorbent for sequestering BOD and COD from aqueous media. The sawdust was chemically modified with 0.1 N NaOH to obtain biosorbents with abundant availability of pores as active centers. SEM is used to confirm the surface properties of sawdust. Batch adsorption experiments were performed to investigate the percent reduction efficiency in terms of BOD and COD from distillery effluent. The maximum reduction efficiency of BOD (57.4%) and COD (55.0%) was achieved at 10g/100mL and an agitation speed of 180 rpm in 3 hrs duration. Thus, sawdust is an effective adsorbent to replace the costly commercial adsorbents for distillery waste water treatment.

Keywords: Distillery waste water, bio-sorbent, batch adsorption.

Assessment of Regeneration Status and Conservation Approach Through Habitat Distribution Modelling of *Diospyros crumenata* Thwaites - A Critically Endangered Tree Species in Central Western Ghats, India

H. S. Shashwathi and Y. L. Krishnamurthy

Department of Applied Botany, Kuvempu University, Jnanasahyadri, Shankaraghatta, Shivamogga, Email: shashwathisringeri@gmail.com

Abstract

Western Ghats of India is one of the globally recognised hotspots of Biodiversity which nurtures diverse flora. *Diospyros crumenata* Thwaites is a tree species that is endemic to the Western Ghats of India and is currently critically endangered. The local community recognizes this species for its edible fruits and timber; nevertheless, the population is dwindling due to various factors. The trees are commonly known as 'kaan thumri' in Kannada. Conservation efforts for these trees are urgently required. Hence the present research was aimed at studying population dynamics, specifically natural regenerating phases of the population through extensive field surveys in the research area. Additionally, the research aimed to predict suitable locations for future reintroduction of the species through habitat distribution modelling in the Central Western Ghats region. The regeneration studies on the population revealed that the potential regenerating trees were high in some peculiar type of forests called Kaan forests, which are the sacred forests protected by local communities situated in study areas. The habitat distribution model highlighted northern and western parts of the study area as suitable habitats for these trees. This model serves as a fundamental approach for conservation and facilitates the cultivation or reintroduction of these critically endangered plants in the foreseeable future.

Keywords: *Diospyros crumenata* Thwaites, Kaan forests, kaan thumri, regeneration status

Optimization of Aqua Vital for Enhanced Removal of Contaminants from Sewage Water

Charan Raj K. A.[1], Bharath M. L.[1], Thejaswini M. S.[1], Sindhu D.[1], Vaishnavi H. S.[1], Shyla A.[1], Tejas K. M. [1], Sindhushri C.[1], Aravind Kumar S.[2] and R. G. Sharathchandra[1]

[1] *Department of studies and research in Biotechnology and Microbiology, Tumkur university, Tumkur- 572 101*

[2] *Samsrusthi Health Technology and Solutions Private Limited, Atal Incubation Centre, JIC, Tataguni, Bangalore-560082*

Email: Sinducnaik@gmail.com

Abstract

The increasing demand for clean water necessitates the development of innovative waste water treatment strategies that purifies the water, integrates biological processes and breakdown contaminants in sewage and effluent streams. Aqua Vital is a promising solution for improving sewage water treatment processes by introducing beneficial microorganisms and active compounds that break down organic pollutants like BOD, COD, and TDS. The product reduces physical contaminants like colour, odour, and turbidity, improving the aesthetic and hygienic quality of treated water. Preliminary results show a significant reduction in harmful pollutants with minimal changes in physical parameters. The product is proven effective at various concentrations, suggesting its potential for stable use in industrial and municipal wastewater treatment facilities. Further research is underway to optimize the product formulation and its long-term impact on water quality, aiming to enhance biological problems in waste water treatment and provide a sustainable, cost-effective, and environmentally friendly solution for sewage water management.

Keywords: Aqua vital, sewage water, BOD, TDS, Microorganisms

Novel strategy for the sustainable soil enrichment for a Greener future employing Bio-char and Fertilizer

Vidya M., Rakshitha K., Yashaswini P., Shivakantkumar Adhikari and Sharathchandra R. G.

Department of Studies and Research in Biotechnology. Jnanasiri Campus Tumkur university, Bidarakatte- 572 118. Email: vidyamvidyam98@gmail.com

Abstract

The degradation of soil quality due to unsustainable agricultural practices is a major challenge in ensuring long-term food security and environmental sustainability. This research proposes a novel strategy for sustainable soil enrichment by integrating biochar and fertilizers, aimed at enhancing soil health, increasing crop productivity, and reducing environmental impact. Biochar, a carbon-rich byproduct of biomass pyrolysis, is known for its potential to improve soil structure, water retention, and microbial activity, while simultaneously sequestering carbon. When combined with fertilizers, biochar can act as a carrier, enhancing nutrient retention and minimizing leaching, thus optimizing fertilizer use efficiency. The proposed strategy explores the synergistic effects of biochar and fertilizers on soil nutrient cycling, microbial dynamics, and crop growth, while reducing greenhouse gas emissions. Experimental data from field trials and laboratory studies will be used to demonstrate the effectiveness of this approach in various agro-ecosystems. This innovative method provides a pathway toward a circular agricultural system that not only boosts soil fertility but also contributes to a greener, more sustainable future by promoting resource conservation, carbon sequestration, and climate resilience.

Keywords: Soil health, Bio-char, Bio fertilizer, cellulose, Nitrogen-fixers

Heavy metal accumulation in vegetables grown in a long-term wastewater-irrigated agricultural land

Kondhalkar Shridhar J.[1], Santosh Kumar H. S.[2] and Ravichandran B.[1]

[1]*ICMR-Regional Occupational health Centre(S), Bengaluru*
[2]*Department of Post-Graduate Studies and Research in Biotechnology, Kuvempu University, Jnanasahyadri Campus, Shankaraghatta-577 451*
Email: mi_shridhar@yahoo.com

Abstract

The extent of heavy metal contamination of vegetables in a long-term wastewater-irrigated agricultural area was assessed in the current study. River floodplains are most productive agricultural lands & making it ideal for growing crops. The river water get polluted when contaminants are released into rivers either directly or indirectly without sufficient treatment of hazardous substances and it affects humans, plants and organisms living in these rivers. The accumulation of heavy metals in agricultural products has become a major global concern due to the potential harm to human health. The cumulative nature of heavy metals makes them extremely hazardous, even at very low quantities. Long-term wastewater application can cause heavy metals to build up in crop fields to toxic levels. In present study the concentration of Al, Cd, Fe, Pb, and Mn metals found in water samples were exceeded the BIS permissible limits. Whereas, the metals Cr, Cu, Mn, Ni, and Pb found in soil samples were exceeded the WHO permissible limits. The study shows that irrigating with polluted water containing varying levels of heavy metals leads to an increase in their concentration in soil samples. Cd (4.96 mg/kg), Cr (9.71 mg/kg), Cu (10.35 mg/kg), Fe (73.75 mg/kg), Mn (157.02 mg/kg) & Zn (161.73 mg/kg) metals were found in vegetables collected from the same area. The presence of these metals in water and soil is a significant pathway for human exposure to metals through the food chain. Preliminary results reveals that, long-term irrigation with urban wastewater leads to elevated heavy metal levels in vegetables causing potentioal health risk to consumers. An awareness among the farmers is necessary to alleviate the risk if such vegetables are sold in market.

Keywords: Water pollution, Heavy metal, Contamination, Food chain, Human exposure, Potential health risk

Assessment of Fluoride in Ground water in Hosadurga taluk, Karnataka state

B. Anantha Nag and E. T. Puttaiah

Department of Environmental Science, Kuvempu University, Shankarghatta, Karnataka
EMail: ananth_acc@rediffmail.com

Abstract

Fluoride (F^-) concentration over and above the permissible limits (1.5 mg/l) in drinking water leads to human health hazards, such as dental and skeletal fluorosis affecting millions of people in many parts of India. Preliminary investigations indicate that severe health disorders have been identified in parts of the South Karnataka region. Fluoride concentrations beyond the standards cause dental and skeletal fluorosis. Fluoride toxicity can also cause non-skeletal diseases like aches and pain in the joints, non-ulcer dyspepsia, However, around 300 million people still live in absolute poverty in both urban and rural areas, and often lack access to clean drinking water and basic sanitation; nearly half the population is illiterate, not at all aware of the water borne diseases affecting their health. Seventy percent of infectious diseases in rural India are water borne and nearly fifty percent due to diarrhea. Major problems are being faced by the country due to the presence of excess fluoride, arsenic and nitrate in groundwater in certain parts of the country. Fluoride problems are widespread in nine States covering almost the entire country. Nearly 66 million people face the risk of which an estimated 6 million are children.

Keywords: Groundwater, Fluoride, Dental Fluorosis, Skeletal Fluorosis, Non-skeletal Diseases

Avifaunal Diversity of Kuvempu University Campus, Shankaraghatta, Shimoga, Karnataka

Sharadha, R and B.B. Hosetti

Department of Applied Zoology, Kuvempu University, Jnanasahyadri Campus, Shankaraghatta-577 451. Email: rsharadha01@gmail.com

Abstract

The area of ornithology is an essential ecological tool and acts as a habitat indicator. Birds are sensitive to environmental changes that helps in assessing the status of ecosystem health. So, the present paper is the documentation of avifaunal diversity of Kuvempu University Campus, Shankaraghatta. The distribution and diversity of avifauna of Kuvempu University campus was studied during October 2018 to April 2019. In order to know the avifaunal diversity, we have used the Road Transect Method (RTM), for this the entire University Campus was divided into 8 road transects except the thick forest area. We found 93 species of birds, belonging to 16 orders, 25 families and 70 genera. Among them, order Passeriformes was dominant and represented the most number of species. The Muscicapidae family represented a large number of species as it consisted of 6 sub families *viz*. Turdinae, Timalinae, Sylviinae, Muscicapinae, Monarchinae and Sturnidae. The study also highlights the feeding habitat of birds as most of them include the insectivorous, grainyvorous and frugivorous birds. So, this study attempts to highlight the avifaunal diversity and distribution of University Campus which would help in monitoring and management policies. This would also be a helping hand in reducing the impact of anthropogenic activities on bird diversity for the preservation of pristine nature of University Campus.

Keywords: Avifaunal Diversity, Kuvempu University Campus, Monitoring and management.

Plant Bioactive Compounds as Potential Alternative to Synthetic Anti-Parasitic Drugs: In View to Aquaculture

Suraj Ramesh[1], Karthick Varatharajan[1], Prasanth Bhatt[1], Parimala B.[2]

[1]*Department of Biotechnology, Faculty of Science and Humanities, SRM Institute of Science and Technology, Kattankulathur, Chengalpattu, Tamil Nadu, India- 603 203*
[2]*Department of Zoology, University College of Science, Tumkur University, Tumakuru-572 103*
Email: sr1055@srmist.edu.in

Abstract

The wide usage of synthetic anti-parasitic drugs in aquaculture has raised concerns due to their bioaccumulation in fish tissues and potential risks to human health. These drugs can cause severe physiological damage in fish, including oxidative stress, and hormonal imbalances and organ dysfunction. However, human consumption of these contaminated fish, leads to biomagnification of harmful drug residues, leading to long term health complications. Further substantiating, the persistence of these chemicals in aquatic environments affects off-target species and also contributes to developing drug-resistant parasites, making disease management more challenging. To avoid these risks, plant-based anti-parasitic drugs have emerged as a sustainable alternative to synthetic drug, various medicinal plants contain bioactive compounds such as alkaloids, flavonoids, and terpenoids, which are biocompatible and exhibit a direct toxic effect on parasites by interfering with their gene synthesis pathways, inhibiting the cellular metabolism and disrupting their cell membranes. Unlike synthetic drugs, plant-derived compounds regulation is simpler and can degrade naturally, and holds very less scope of bioaccumulation. On integrating plant bioactive compounds into aquaculture for the therapeutic applications such as antiparasitic drugs and vaccines, growth promoters, immunity boosters can lead to a safer and eco-friendly solution. Adopting these alternatives can increase sustainable fish farming while protecting aquatic ecosystems and human health.

Keywords: Aquaculture, Bioaccumulation, Biomagnification, Toxicity, Bioactive Compounds, Biocompatibility

Conservation Approaches and Importance of Medicinal Plants of Western Ghats

Abhishek Kori, Prashant Kapashi and Sachin Kadashetti

PG Department of Botany, GSS College, Rani Chennamma University, Belagavi-590006
Email: abhikori2002@gmail.com

Abstract

Global plant genetic diversity is under grave danger due to climate change and the usage of land for intensive cultivation and development. As a result, biodiversity protection is seen as critical, as it provides a livelihood for millions of people throughout the world. The majority of people in the underdeveloped world exclusively get their medicine from medicinal plants, which are essential in the treatment of many illnesses. One of the main sources of medicinal plants is the Western Ghats. About 4,000 kinds of higher plants may be found there, 450 of which are endangered. Presently, the region's important genetic resources are rapidly disappearing, and more species are being added to the red list category. It is crucial to supply high-quality planting material for sustainable usage in order to preserve the genetic variety of plants in the wild. To protect these significant species, *in situ* conservation would not be sufficient. Therefore, it is increasingly important to use the biotechnological technique to supplement the *ex situ* conservation effort. The preservation of these valuable genetic resources is just as crucial as their rapid growth. Maintaining live cells at extremely low temperatures is made possible by long-term conservation via cryopreservation. It is possible to cryopreserve a variety of tissues, including pollen, seeds, embryos, and meristems, with less hazards of contamination, less maintenance, etc. Significant efforts have been made to preserve the medicinal plants, such as establishing nature reserves, promoting the planting of fast-growing exotic and native trees for domestic use, and discouraging the cutting down of indigenous trees. Despite this increasing emphasis for conservation, it is still difficult to prevent residents from harming the surrounding vegetation. To preserve plants in their native environments, a lot more conservation initiatives and awareness campaigns must be carried out, followed by efforts to stop habitat loss and deforestation.

Keywords: Medicinal plants; Ex-situ conservation; Western Ghats; cryopreservation; in-situ conservation

Role of Fungal Enzymes in Plastic Biodegradation

Sakshi Darwandar, Sakshi Mahishale and Vidya Sannatti

PG Department of Botany, GSS College, Rani Chennamma University, Belagavi-590006
Email: sakshidarwandar99@gmail.com

Abstract

The world is now facing a serious challenge from plastic polymers, which are solid wastes that do not decompose and take decades to break down. The biodegradation process is the most efficient and best method for breaking down plastic when compared to other degradation processes because of its cost-effectiveness, eco-friendliness, and non-polluting mechanism. Synthetic plastic biodegradation is a very slow process that also incorporates environmental conditions and the activity of wild microbes. Fungi are essential to this plastic biodegradation process; they break down plastics by secreting enzymes such as lipase, cutinase, and proteases, as well as lignocellulolytic enzymes. The high molecular weight polymer is broken down into low molecular weight by the enzyme's oxidation or hydrolysis, which produces functional groups that increase the hydrophilicity of polymers. Plastics degrade as a result of this in a matter of days. Several *Aspergillus* species, *Penicillium griseofulvum*, *Bjerkandera adusta, Phanerochaete chrysosporium, Cladosporium cladosporioides*, and other well-known species demonstrate effective degradation on plastics. Additionally, some saprotrophic fungi, including *Pleurotus abalones, Pleurotus ostreatus, Agaricus bisporus,* and *Pleurotus eryngii*, grow on plastics and aid in their degradation. According to some research, the simultaneous use of photodegradation and thermooxidative processes in biodegradation can accelerate and facilitate the breakdown of plastics, making it more efficient. This study provides up-to-date information on the fungal species that break down plastics by various enzymatic processes.

Keywords: Fungal enzymes, plastics, biodegradation, synthetic plastics

Impact of Climate Change on Rare and Endangered Plants and Conservation Approaches

Sakshi Mahishale, Vidya Sannatti and Sakshi Darwandar

PG Department of Botany, GSS College, Rani Chennamma University, Belagavi-590006. Email: sakshimahishale92@gmail.com

Abstract

A major hazard to rare and endangered plant species is the increase in anthropogenic climate change leading to habitat loss and heightened susceptibility to extinction, particularly for species with limited ranges and specific habitat requirements. In ecology, predicting the response of endangered species to climate change is a significant concern. Certain plant species may relocate to higher altitudes in pursuit of better habitats as a result of climate change shifting their geographic range but not feasible for plants with already constrained ranges. Comprehensive and effective conservation management strategies have been impeded by the absence of reliable data on the geographical distribution of these species. Because of their small populations, restricted geographic range, and specific ecological needs, rare and endangered plants are especially vulnerable to causes like climate change. The ability of these plants to survive and procreate may be hampered by other variables such as rising temperatures, changed precipitation patterns, and an increase in the frequency of extreme weather events (such as floods, wildfires, and droughts), which can result in habitat loss and degradation. Temperature and precipitation variations can also have an impact on plant reproduction, including pollination, seed germination, and seedling survival, potentially resulting in smaller population levels. Comprehending the possible effects of climate change on rare and endangered plant species is essential for creating effective conservation plans. These plans may include creating protected areas, preserving and restoring habitat, implementing climate-resilient management techniques, cultivating rare tree species, seed banks, and ex-situ conservation, as well as addressing other threats like reducing greenhouse gas emissions to mitigate climate change.

Keywords: Climate change, endangered plants, conservation strategies, habitat

Raising Plastic Production and Their Impact on Climate Change

Vidya Sannatti, Sakshi Mahishale and Sakshi Darwandar

PG Department of Botany, GSS College, Rani Chennamma University, Belagavi-590006
Email: mallappasannatti@gmail.com

Abstract

Plastic is one of the most widely used and versatile materials that humans have created. Plastic is a long-chain polymer made up of carbon, hydrogen, silicon, oxygen, nitrogen, and chlorine. From the kitchen to the industrial level, its extended lifespan and excellent stability enable it to play an essential part in our daily lives. However, Because of their hydrophobicity and large molecular weight, plastics are not easily broken down by nature. In fact, it can take a thousand years for certain plastics to break down. Because of this reason, plastic is rapidly accumulating in natural ecosystems. The amount of plastic manufactured worldwide exceeds 300 million tons annually, with 359 and 368 million tons generated in 2018 and 2019 respectively. Both synthetic and bio-based plastics can be produced. Bio-based plastics, such as polylactic acid (PLA) and polyhydroxyalkanoates (PHA), are derived from natural substances such lignin, cellulose, hemicellulose, vegetable oils, and food waste. Conversely, synthetic plastics, particularly single-use plastics like PE, PP, PET, and polysterene (PS), which are typically referred to as non-biodegradable, are mostly made of crude oil. Every year, millions of tons of greenhouse gases are released during the plastics refining process. Developing an efficient method to accelerate the pace of plastic breakdown is essential to reducing this annual accumulation. Several solutions have been proposed by the scientific community, such as irradiation with gamma rays, chemical degradation, thermal degradation, photodegradation, and biodegradation. These techniques, however, have a number of negative environmental repercussions, such as the build-up of heavy metals in ecosystems and the disruption of the natural functioning of ecosystems. Stopping the use of plastic, supporting laws that limit its use, and supporting groups that combat plastic pollution are all simple changes that can have a big influence on climate change.

Keywords: Plastics: climate change; Bioplastics; synthetic plastics.

Climate Change-Related Weather Variations and Their Effects on Agriculture in Karnataka

Sachin Kadashetti, Prashant Kapashi and Abhishek Kori

PG Department of Botany, GSS College, Rani Chennamma University, Belagavi-590006
Email: sachinkadashetti007@gmail.com

Abstract

India is primarily a farming nation. India's most significant economic sector is agriculture, which provides a living for about 58% of the nation's people. The south-west monsoon is the primary source of food production in Karnataka state, which has the second-largest rain-fed agricultural area in the nation. Agriculture and climate are closely intertwined. Changes in average temperatures, rainfall, climate extremes, pests, and diseases, as well as variations in atmospheric carbon dioxide and ground-level ozone concentrations, the nutritional value of certain foods, and sea -level represent a few of the ways that climate change impacts agriculture. Taking all of these considerations into account, the goal of this review is to emphasize the influence of climate change on agriculture. According to the study, the amount of rainfall has changed, and in recent years, droughts, floods, hailstorms, thunderstorms, and lightning have all become more frequent and intense. Since the Indian economy is inextricably linked to the monsoon season, this kind of study aids in the formulation of climate change policies, raises public awareness regarding the effects of climate change, and provides a better understanding of the monsoon's probable behaviour in the future and variability, which is necessary for disaster mitigation and the development of adaptation plans to deal with climate variability and climate change.

Keywords: Climate change; Weather variations; Agriculture; Karnataka

Diversity of Amphibians in and Around Kuvempu University campus, Shankaraghatta, Shimoga District, Karnataka

Abhishek K., A. F. Pramod and G. R. Sowmya
Department of PG Studies and Research in Wildlife and Management, Kuvempu University, Jnanasahyadri, Shankaragghatta, Shimoga 577451
Email: abhiabhishek91390@gmail.com

Abstract

Amphibians are vertebrates with highly diverse group with Caecilians, Salamanders and Anuarans. They play a vital role in balancing the ecosystem as primary consumers. They are ecological indicators and vulnerable to environmental contamination. The current study on diversity of Amphibians in and around Kuvempu university campus was done by dividing the area into different grids and documentation of the species was done by opportunistic survey method from September 2023 to September 2024. A total of 14 species in which 2 toad species, 11 frog species and 1 Caecilians was documented. Highest documented was *Duttaphrynus melanostictus*. The study provides updated data on Amphibians diversity that can be used for evaluating the status and conservation measures to conserve the species and its habitat.

Keywords: Amphibians, Diversity, conservation, indicators

Distribution of Dendrelaphis Species in Selected Areas of Shivamogga

B.R. Pareekshith and Vijaya Kumara

Department of Wildlife and Management, Kuvempu university, Jnanasahyadri, Shankaraghatta – 577451, India
Email:brpareekshith411@gmail.com

Abstract

Bronzebacks (Genus: Dendrelaphis) are arboreal snakes belonging to the Colubridae family, known for their vibrant colors, agility, and ecological role in regulating populations of frogs, lizards, and young birds. This review focuses on the distribution of Dendrelaphis species in Shivamogga, Karnataka. These snakes prefer dense forests—both primary and secondary growth—and are often found near water bodies, climbing trees and bushes. An opportunistic survey combined with local herpetological records revealed the presence of five species in the region: *Dendrelaphis tristis*, *D. girii*, *D. ashoki*, *D. chairecacos*, and *D. grandoculis*. Among them, *D. tristis* is the most widespread, found in diverse habitats from forests to suburban areas. The remaining species are rare and largely restricted to undisturbed forest patches. Notably, *D. grandoculis* is distinguished by its large eyes, aiding its nocturnal behaviour and remarkable agility, including gliding between branches. Bronzebacks are typically solitary and retreat quickly when disturbed. However, during the breeding season, they may be observed in small groups. Sexual dimorphism is evident—males are slimmer and more brightly colored, while females are larger and duller. Despite, their ecological importance, Dendrelaphis snakes face threats from habitat loss and deforestation due to increasing human encroachment. Continuous monitoring and targeted conservation efforts are crucial to protect these species and their habitats in Shivamogga's rich biodiversity landscape.

Keywords: Dendrelaphis, Colubrids, Bronzeback, Snakes.

Comparative Assessment of Floral Diversity and Regeneration Status of Dry Mixed Deciduous and Scrub Forests of Challakere Taluk, Karnataka

Lohiyanarayan, N. S. Pooja, M. J. Harshith and Vijaya Kumara

Department of Wildlife and Management, Kuvempu university, Jnanasahyadri, Shankaraghatta – 577451, India
Email: Vijay15675@gmail.com

Abstract

Floristic inventory and diversity studies help us to understand the species composition and diversity status of forests, which also offer vital information for forest conservation. Challakere occupies a central position in Eastern plains of Karnataka and the forests vary from dry mixed deciduous to thorny scrub type. Challakere also known for its Amrit Mahal Kavals, which are grasslands that are biodiversity-rich and ecologically sensitive. The aim of the study was to compare floristic diversity in different reserved forests of Challakere. In each reserved forests 10 sample plots of 20*20m were laid, totally 30 sample plots assessed from 3 reserved forests. For enumeration, trees having >30cm gbh are taken in sample plot, for shrubs and herbs sub plots laid in the main plot i.e., 5*5m and 1*1m plots are laid respectively and plants botanically identified to the species level and the same was used for the computation of diversity indices. The richness and diversity were comparatively higher in Jajur RF compare to other 2 reserved forests and the regeneration of species was comparatively higher in Challakere RF.

Keywords: Diversity, Species richness, Dry mixed deciduous, Diversity indices

Evaluation of Biodiversity Through Acoustic Diversity Indices in Kuvempu University Campus, Shankaraghatta, Shivamogga, Karnataka, India

Manjunath S. N., Pramod A.F. and Vijaya Kumara

Department of PG studies and Research in Wildlife and Management, Kuvempu University, Shankaraghatta, Shivamogga 577451
Email: vijay15675@gmail.com

Abstract

The evolutionary success of a species is linked to its ability to communicate. Auditory, optic and olfactory systems are biological communication channels. Decoding the acoustic dynamics of a landscape can ingeniously be crafted as a rapid tool to assess biological diversity. Passive acoustic monitoring is a potentially valuable tool in biodiversity assessment and its health status. Acoustic surveys offer an important approach for biodiversity monitoring programs. With this intent the study was carried out to check the diversity of life forms through acoustic techniques by calculating the vocal parameters, by dividing the study are into 3 different zones i.e. undisturbed, semi disturbed and disturbed areas. The data was continuously collected by recording the vocalization using Song meters SM 4 at a frequency of 44.1 kHz, once in a week. The study site was divided into rids at each zone are device was deployed and vocalization was recorded. Study revealed the vocal diversity of life forms which was further analyzed using raven pro software and acoustic parameters such as acoustic diversity indices, evenness indices and Bio-acoustic index was calculated. The analysis present that the acoustic diversity i.e., biophony was more in undisturbed forest habitat compared to the other areas. Acoustic studies are valuable for monitoring the status of the ecosystem; health of ecosystem can also be analyzed through acoustic studied.

Keywords: Acoustics, diversity indices, call recordings, evenness index

Assessing the Intensity of Human-Elephant Conflict, and its Effect on Socio-Economic Dynamics in Southern Karnataka

Kumuda K.B. and Vijaya Kumara

Department of PG Studies & Research in Wildlife Management, Kuvempu University, Shimoga Karnataka.
Email:kumudakunkanadu@gmail.com

Abstract

Human-elephant conflict (HEC) is a persistent challenge in the vicinity of protected areas, leading to human casualties, livestock depredation, and significant crop damage. Southern Karnataka, home to the largest elephant conservation landscape in India, encompasses protected areas, reserved forests, deemed forests, and private lands. Despite mitigation efforts, including physical barriers, HEC remains as a conservation and socio-economic concern. However, there is limited quantitative understanding of its spatial distribution across large landscapes. Present study examines the spatial patterns of HEC and the associated socio-economic impacts on farmers in southern Karnataka. Forest department administrative divisions were used as the unit of analysis, as they provide ecologically relevant partitions for mapping conflict zones and developing targeted management strategies. Data on elephant presence and conflict incidents were collected from forest department records over a period of January, 2019 to December, 2024 areas with known HEC occurrences. Additionally, field surveys and structured questionnaires were conducted to assess farmers' socio-economic conditions and their responses to conflict from July 2023 to June 2024. Conflict-prone areas were identified and mapped using QGIS, employing a color-coded classification for effective visualization. Further, Classification and Regression Tree (CART) analysis was used to evaluate the social dynamics influenced by HEC, considering variables such as livelihood shifts, economic losses, and adaptation strategies. The findings highlight spatial variations in conflict intensity and the limitations of existing mitigation measures. The study provides critical insights into the effectiveness of conflict management strategies; policy implications to enhance coexistence in human-elephant landscapes.

Keywords: Human-elephant conflict, Southern Karnataka, Spatial distribution

Nesting Patterns and Hatching Success of Olive Ridley Sea Turtles

Tabassum. A

Department of PG Studies & Research in Wildlife Management Kuvempu University, Shimoga, Karnataka, India

Email: tabuanjum666@gmail.com

Abstract

This study analyzes secondary data from the Karnataka Forest Department to identify the nesting ecology of olive ridley sea turtle (*Lepidochelys olivacea*) on seven beaches in Honnavar Division, Karnataka: Gangavali, Dhareshwara, Haldipur, Kasarkod, Talmakki, Bailur (Bhatkal), and Bengre (Bhatkal). Nesting season generally lasts from November to April, with the best nesting months between December and February. Referring to the data from 2016 to 2021, the 2020-2021 season recorded the most nests, then the 2017-2018 season. Conversely, the 2019-2020 season recorded the least, with a mere 19 nests. In total, there were 237 nests over the five years. The nests were distributed over four ranges: Hireguti (86 nests), Honnavar (70 nests), Kumta (63 nests), and Manki (18 nests) of which Hireguti was the most active. The hatching success averaged at 53.29% for the year 2020-2021. Interestingly, there were no nests in the Bhatkal range from 2019 to 2021. Such results identify the significance of continued conservation activities, particularly where nesting is minimal or non-existent, to safeguard such critical habitats and enhance chances of successful hatchlings.

Keywords: Olive Ridley turtle, nesting sites, hatching success rate, conservation, Honnavar Division, Secondary data analysis

Study on Diversity of Entamofauna on Decomposing Samples at Kuvempu University, Shankaraghatta, Shimoga District, Karnataka

Nithin S., Harisha M. N. and Vijaya Kumara

Department of PG studies and Research in Wildlife and Management, Kuvempu University, Shankaraghatta, Shivamogga 577451
Email: vijay15675@gmail.com

Abstract

Forensic entomology aids criminal investigations by using insect activity to estimate the postmortem interval (PMI) and study decomposition. This study examined the diversity and succession of entomo-fauna associated with decomposing remains on the Kuvempu University campus, Karnataka, during the monsoon season in August 2024. Fish (*Colossoma brachypomum*) and farm-bred chicken (*Gallus domesticus*) were used as carrion models. Decomposition was monitored at multiple sites, recording insect activity, environmental conditions, and carcass degradation at regular intervals. Protective cages allowed insect access while preventing scavenger interference. Over 30 insect species were identified from four major orders: Diptera, Coleoptera, Hymenoptera, and Blattodea. Dipterans, particularly blowflies (Calliphoridae) and flesh flies (Sarcophagidae), were the earliest colonizers, arriving within minutes to hours of exposure—key indicators for PMI estimation. Necrophagous species like blue bottle flies and black soldier flies dominated early stages, while beetles and ants appeared in later phases. Five decomposition stages were recorded: fresh, bloated, active decay, advanced decay, and dry remains, with complete decomposition occurring in 20–40 days. A key focus was tracking blowfly development—egg laying occurred within 24 hours, with larval stages progressing over 7–10 days before pupation and adult emergence. Environmental factors such as temperature, humidity, and rainfall significantly influenced decomposition rates and insect activity. This study establishes baseline entomological data for forensic use in tropical climates. Future research could explore seasonal variations and integrate molecular tools for precise species identification, enhancing forensic applications in regional investigations.

Keywords: Forensics, Entamofauna, Carrion succession, blow flies, life cycle

Water Quality Index Assessment of Markonahalli Reservoir, Tumkur District, Karnataka

Chalapathi S. R. and Lalitha H. M.

Department of Zoology, University College of Science, Tumkur University, Tumkur, Karnataka - 572103
Email:lalithahm11@gmail.com

Abstract

Freshwater is one of the most essential natural resources on earth with socio-economic values for human beings and have a great role in the sustenance of ecosystem. The present study was conducted to assess the quality of water in Markonahalli Reservoir of Tumkur District, by using Water Quality Index (WQI) method. The Water Quality Index (WQI) method is one of the most useful mathematical methods to ascertain the quality of water for public consumption and other purposes. In spite of using many methods for the calculation of Water Quality Index by many researchers, Weighted Arithmetic Method (WAM) is used to assess the quality of water influenced by various environmental parameters. The main purpose of the research work is to ascertain the water of Markonahalli Reservoir as deemed to fit for drinking, irrigation and industrial use. Physicochemical parameters like pH, Electrical Conductivity, Total Dissolved Solids, Total alkalinity, Total hardness, calcium, Magnesium, chlorides, Nitrates, Sulphate, Dissolved Oxygen and Biological Oxygen Demand were used to calculate the WQI. The result indicated that WQI values ranged between 71 to 101 during 2024-25. It revealed very poor water quality, thus rendering it unfits for human consumption; however, it could be used for irrigation.

Keywords: Markonahalli Reservoir, Water Quality Index, Weighted Arithmetic Method, Physicochemical parameters.

Pollen and Seed Diversity of Genus *Osbeckia* L. (Melastomataceae) from Karnataka, India

Prashant Karadakatti and Siddappa B Kakkalameli

Department of Studies in Botany, Davangere University, Shivagangothri, Davangere – 577007.
Email: dubotsiddu@gmail.com

Abstract

The genus Osbeckia L. which is a widely distributed genus from the Melastomataceae family promotes its viability by producing numerous seeds that are unique and specific to each species through texture and testa cell variations discussed with the usage of Scanning Electron Microscope (SEM) images. The pollen diversity is also much varied notable key characters explained through Number, Position and Characteristics (NPC) discussed through SEM images and their respective keys may lead to differentiate each species of genus Osbeckia from Karnataka.

Keywords: Diversity, Osbeckia, Pollen, Seeds, SEM images.

Impact of Climatic Changes on Biodiversity

Mrutunjaya F. Soratur

K.L.E. Society's college of education, Vidyanagar, Hubballi-580031, Karnataka
Email: mrutunjayasoratur48@gmail.com

Abstract

Climate change threatens biodiversity with rising heat, odd weather, and extreme events. Down To Earth says India's forests are changing. Bael trees might grow, but mahua and amla weaken as rains shift. A Jharkhand woman cried for her mahua trees, vital for food and money, flowering less after odd rains. Forests, with 80% of land life, connect nature and people. The IPCC warns of a 1°C rise since pre-industrial times, risking species loss. Polar bears slip on melting ice. Coral reefs turn white from heat. An Indonesian fisherman saw his colorful reef die, matching the UN's 14% coral loss. Floods soak Indian rhino homes. Droughts dry African elephant water spots. The UN says forests and oceans, taking over half of carbon, weaken as life fades. Amazon fires make it a polluter, per the IPCC. The UN's 30x30 goal and India's tree-planting bring hope. Native indigenous cultures have always been familiar with sustainable development. In Bharatiya civilization there is no Dharma without Prakriti. Principles of environmentalism from Arthashastra by Chanakya specify not to destroy existing forest for commercial purposes, one must create a forest to use it for commercial purpose. Growth, development must go hand in hand with environmental sustainability. Respecting non-human beings to be included in the current growth model is the need of the hour, for maintaining ecological balance, especially as climate change accelerates biodiversity loss, disrupts habitats, and threatens countless species with extinction. Still, reducing deforestation, cutting emissions, planting trees, and sustainable steps can spark nature's hopeful recovery.

Keywords: Biodiversity, climate change, sustainable development, environment

The Survey of Moth and Butterfly (lepidoptera) Diversity in Kuvempu University Campus, Shankargatta, Shivamogga, Karnataka

Priya S. N. and Shwetha S. A.

Department of Applied Zoology, Bioscience Complex, Kuvempu university, JnanaSahyadri, Shankarghatta-577 451, Shivamogga district, Karnataka, India.

Abstract

Insects are the world's most diverse group of animals on Earth and play critical roles in ecosystem function they cycle nutrients, pollinate plants, disperse seeds, and maintain soil fertility. Butterflies and moths belong to order Lepidoptera and these species are highly sensitive to climatic factors such as temperature, humidity, rainfall, and wind speed. So, they are more vulnerable to minor disturbances in the environment and hence moths and butterflies can be considered as indicators of environmental quality. The present study deals with the preliminary survey on moth and butterflies (Lepidoptera) diversity in Kuvempu University, Shankarghatta, Shimoga Karnataka. Work has been carried out during July 2024 to October 2024. The survey was conducted throughout the day, from the morning to a convenient time at night. Total of 42 species of moths were recorded among them Erebidae and Geometridae comprises of 13 species respectively, followed by Eupterotidae 4 species and Noctuidae 4 species, followed by Sphingidae 3 species and Crambidae 3 species, followed by Saturnidae 1 species and Uranidae 1 species. In moth species Erebidae and Geometridae are most abundant family and Saturniidae and Uraniidae are the least. Total of 13 species of butterflies were recorded, among them Nymphalidae are most abundant family and Pieridae, Papilionidae, Lycaenidae are the least abundant family. The role of butterfly and moth as bioindicators, reflecting the overall health of the ecosystem and this project not only contributes to the understanding of local biodiversity but also emphasizes the importance of habitat preservation and ecological balance.

Keywords: Biodiversity, Lepidoptera, Butterflies, Moths, Bioindicators,

Preliminary study on ethology of Jungle Babblers (*Argya striata*) at Kuvempu University Campus, Shankaraghatta, Shivamogga, Karnataka

Roopa C. and Vijaya Kumara

Department of PG studies and Research in Wildlife and Management, Kuvempu University, Shankaraghatta, Shivamogga 577451
Email: roopac463@gmail.com

Abstract

Jungle Babbler (Argya striata) are cooperatively breeding passerines that breed throughout the year, belonging to the order Passeriformes and family Leiothrichidae. They are widely distributed throughout Indian subcontinent, mostly found foraging in the leaf litter of dry deciduous closed-canopy woodland and well-wooded gardens. Group members engage in many social behaviours such as cooperative brood care, collective foraging, anti-predator behaviour, all grooming etc. With an objective to access the behavioural ecology, study was carried out from August 2024 to February 2025, with focal, ad-libitum and scan sampling technique. Group members were observed when they were most active, with fixed time interval at a distance of around 100-150 meters using binoculars in their natural habitat. According to the study an ethogram of 12 kinds of behaviour patterns exhibited by jungle babblers were listed out. Time activity budget revealed that, babblers spend majority of the time foraging (39%) and roosting (37%) and least time spent was shower/drinking water (3%). Social behaviours such as play, allogrooming, inter and intra group communication, co-operative foraging, defence, resource sharing was also observed and recorded. Babblers play predominant role in the ecosystem as pest controllers and also as seed dispersals, slight variation in the ecosystem reflect on the behaviour of the species those houses there. Learning about the behaviour provides insights into evolution, ecology and conservation efforts, helping to protect species and their habitat.

Keywords: Ethogram, time activity budget, behavior, social organization.

Bioremediation as an Emergent Technique for Ocean Acidification: We Need Oceans Now More Than Ever

Priya G.Y., Rahul B.T., Sandeep M., Anusha A. B. and Navya M.V.

Department of Biotechnology and Bioinformatics, Kuvempu University, Jnanasahyadri, Shankaraghatta – 577451, Karnataka India
*Em*ail: chinnigy03@gmail.com

In the 200+ years since the Industrial Revolution, human activities like burning fossil fuels and deforestation have increased atmospheric carbon dioxide (CO_2) concentrations. The ocean absorbs about 25–30% of this CO_2, which reacts with seawater to form carbonic acid. This acid breaks down into bicarbonate and hydrogen ions, increasing acidity and lowering pH levels. Ocean acidification harms marine organisms, particularly those with calcium carbonate shells and skeletons, and impacts ecosystem services like waste bioremediation. Bioremediation, which employs microorganisms to degrade pollutants, is a vital ecosystem service. However, acidification reduces the efficiency of certain bioremediation strategies, such as those using bivalves like *Mytilus edulis* (blue mussels). These organisms play a significant role in cleaning eutrophic waters, but pH changes inhibit their growth, limiting their bioremediation capabilities. Techniques like bioaugmentation (adding microorganisms), biostimulation (introducing nutrients), and biosurfactants (to enhance pollutant degradation) may help counteract these challenges. Between 1985 and 2021, ocean pH fell from 8.11 to 8.05—a 15% rise in acidity since 1985 and 40% since preindustrial times. If CO_2 emissions persist at current rates, ocean surface pH could drop to 7.7 within 100 years. This would severely impact industries reliant on marine life, like shellfish farming and coral reef tourism, with losses potentially exceeding hundreds of millions of dollars by 2100. The most effective way to combat ocean acidification is addressing climate change through reduced fossil fuel use. Programs like NOAA's Ocean Acidification Program focus on developing strategies to mitigate and adapt to these changes.

Keywords: Ocean acidification, Bioaugmentation, Biostimulation, Biosurfactants

Comparative Study of *Nelumbo nucifera* and Nymphaea alba

Lokesh S

Department of Industrial Chemistry, Kuvempu University, Shankaraghatta-577451

Email:lokeshs461212@gmail.com

Abstract

Many aquatic plants are known as water-lilies or lotuses, conjuring up beautiful, multipetaled, scented flowers with large, roundish leaves. There are several genera of plants with these characteristics, but not all are closely related in evolutionary terms. It seems that this form has arisen more than once in the history of the angiosperms, the flowering plants. It might be easy at first to get these two aquatic flowers mixed up, but they have definite distinctions. In fact, though these are both flowers found in water, they actually belong to two separate families of flowers. It is also easy to tell them apart at a glance once you know what to look for. The water-lilies in my study belong to the genus Nymphaea, in the family Nymphyaceae, which has its origins, according to the fossil record, in the early Cretaceous around 130 million years ago. The Nymphyaceae are part of the basal group of angiosperms, meaning it may be among the earliest of the flowering plant families to have evolved from conifer-like gymnosperms. The Nymphyaceae has eight genera, the best-known of which are Nymphaea and Victoria. The "sacred" water-lily flowers, which are famous in Buddhist and Hindu art as the lotus motif, or padma, are not close relatives of Nymphaea. They are placed by taxonomists in the Nelumbonaceae, which has one genus, Nelumbo. These features have led to the identification, by botanists and art historians, of *Nelumbo nucifera* as the true lotus in Eastern iconography. They also show anatomical differences, which also help classify as different families. Even they both are hydrophytes, and float on water they possess different anatomical structures. In the following project, we will describe comparative Study of water-lilies and lotus. Since every plant has its own importance, in our project we will also put the light on the uses and applications of both the plants.

Keywords: Water lily, Lotus, Comparative botany

Preliminary study on Mammalian diversity in Kuvempu University Campus, Shankaraghatta, Shivamogga, Karnataka

Ajaykuumar Chittaragi, Nitin. S, Vijaya Kumara, Harisha, M.N

Department of PG studies and Research in Wildlife and Management, Kuvempu University, Shankaraghatta, Shivamogga 577451
Email:ajykumrchittaragi22@gmail.com

Abstract

India is home to approximately 91,000 animal species, including 140 mammal species that play an important role in maintaining environmental balance. Bhadra wildlife sanctuary, a part of western ghats, houses 41 species of mammals. Mammals are crucial for biodiversity in maintaining the ecosystem as many act as indicator species. This study focuses on assessing the mammalian diversity within Kuvempu University Campus, Shankaraghatta, Shivamogga, Karnataka, an area in close proximity to the Bhadra Tiger Reserve. The research aims to document species diversity, estimate population densities, and evaluate the conservation status of mammals in the study region. A combination of direct (visual encounters) and indirect (pugmarks, scat analysis, camera trapping) methods was employed to assess mammalian diversity from January to October 2024, covering both summer and monsoon seasons. Camera trapping, an advanced non-invasive survey method, was extensively used to capture the presence and behaviour of mammals. Data analysis included calculating the relative abundance index (RAI), species frequency, and density estimates to determine the distribution of different mammal species. The study recorded 19 mammalian species belonging to 10 families, including carnivores, herbivores, and omnivores. The analysis revealed seasonal variations in species abundance, with higher mammal sightings during the summer due to water scarcity drawing animals to concentrated water sources. Research highlighted the importance of the Kuvempu University campus as a critical habitat for mammalian biodiversity. However, threats such as habitat encroachment, invasive plant species, feral dogs, and human disturbances pose challenges to wildlife conservation. The study emphasizes the need for continued monitoring, habitat restoration, and awareness programs to mitigate anthropogenic pressures. The findings contribute to baseline data that can guide future research and conservation strategies.

Keywords: Mammals, diversity, distribution, relative abundance index.

Theme – 3

Novel Biotechnological innovations

UALCAN: Harnessing Public Gene Expression Data for Advancing Cancer Research

Dr. Darshan. S. Chandrashekar

Assistant Professor, Genomic Diagnostics and Bioinformatics Division, Department of Pathology, University of Alabama at Birmingham, Birmingham, AL

Advances in high-throughput technologies and the launch of multiple consortium-driven projects have generated vast amounts of molecular data from thousands of cancer patients. These datasets are invaluable for identifying novel biomarkers, discovering therapeutic targets in tumor subclasses, and supporting hypothesis-driven cancer research. However, the sheer volume and diverse formats of these data pose significant challenges for researchers without programming expertise to access and analyze them effectively. To address this, we developed **UALCAN** (University of ALabama CANcer portal, "Yes! You All Can"), a user-friendly platform for comprehensive cancer data analysis. UALCAN facilitates tumor subgroup-based analyses of gene expression, protein expression, and patient survival, enabling researchers and clinicians to extract meaningful insights with ease. The platform is widely used by cancer researchers globally, with over **one and half million site visits** and more than **6,500 citations** in scientific publications.

UALCAN integrates molecular data from **The Cancer Genome Atlas (TCGA)** and the **Clinical Proteomic Tumor Analysis Consortium (CPTAC),** along with gene expression datasets from the **Children's Brain Tumor Tissue Consortium (CBTTC).** Additionally, it provides tools for analyzing **non-coding RNA (miRNA and lncRNA) expression** from TCGA and offers **epigenetic insights** through **promoter DNA methylation analysis** using TCGA data.

Drosophila, a favourite invertebrate model to study cancer biology - An update in the era of genomics.

Dr. Rajaguru Aradhya

Professor, School of Biotechnology, Amrita Vishva Vidyapeetham, Amritapuri Campus,
Kollam-690525, Kerala, India

Around 100 years ago, T.H. Morgan and his team began utilizing Drosophila to explore fundamental genetic processes, and this marked the beginning of the fly's status as an invaluable model organism. Its popularity stems from how easily it can be managed and the wide range of genetic tools available for research. The quick reproductive cycle and well-understood developmental phases of Drosophila have made it a key organism for investigating developmental biology. These features have allowed scientists to decipher gene functions and unravel important signalling pathways. Discoveries of pathways such as hedgehog, Notch, and Wingless in Drosophila have counterparts in more complex organisms, including humans, and are essential for studying genetics across species. Additionally, advanced genetic techniques, like the UAS-GAL4 System and CRISPR-Cas9, have propelled research into functional genomics in Drosophila.

The MODEncode initiative is a large-scale project that seeks to identify and catalogue functional components of the genomes of several model organisms, including Drosophila. This project provides extensive genomic data that helps in the development of bioinformatics tools and databases. These resources allow researchers to visualize complex genomic datasets, facilitating the interpretation of how different genomic elements interact. FlyBase is an example of a database used to store and share Drosophila genetic and genomic data. Drosophila's genetic similarities with humans, along with its ability to be genetically modified, make it an ideal organism for studying diseases. By introducing specific mutations into fruit flies, researchers can simulate genetic disorders like neurodegenerative diseases and muscular dystrophy to study their molecular mechanisms. Drosophila is also used to create tumor models by altering genes linked to cancer, enabling research on oncogenes and tumor suppressor genes. Additionally, Drosophila plays a crucial role in drug discovery, being used to identify potential therapeutic targets, screen for new compounds, and assess the safety and efficacy of drugs. Its integration into drug development processes helps speed up the creation of new treatments for various diseases. Computational techniques are also employed to predict how compounds interact with drug targets, streamlining the selection of compounds for further testing.

Bridging Domain Co-Evolution to Structure-Based Inhibitor Design by Decoding Functional Linkages of putative proteins in *H. pylori* Proteome

Manish Kumar, Thejaswi Bhat and Pavan Gollapalli

Center for Bioinformatics, Nitte (Deemed to be University), Mangalore-575018, Karnataka, India. Email: gollapallipavan@nitte.edu.in

Abstract

Using the Rosetta Stone method to identify functionally linked proteins within the *Helicobacter pylori* J99 proteome enables the discovery of a critical hub protein for targeted inhibition. We prioritized high-impact domains (ABC_tran, Sel1, Radical_SAM, Fer4_8, Response_reg) based on evolutionary conservation, abundance, and versatility by analyzing co-evolved or fused protein domains across bacterial lineages. The Rosetta Stone approach revealed functional partnerships essential for bacterial survival, Protein-protein interaction (PPI) network analysis of the proteins of these domains pinpointed HP_1220, an ATP-binding protein, as a central hub protein for bacterial survival. Structural modeling of this hub protein using the I-TASSER web tool identified a binding pocket, which was screened against 19 novel ligands. Compound **3E** exhibited exceptional binding energy (-25.3 kcal/mol), outperforming other candidates through hydrophobic and hydrogen-bond interactions with catalytic residues (Asp98, Tyr162, Gly201). Molecular dynamics simulations confirmed stable interactions, minimal conformational changes, and persistent binding under physiological conditions. This work underscores the utility of evolutionary linkage analysis over traditional homology-based methods, particularly in organisms like *H. pylori* where functional annotations are limited. By anchoring drug discovery in domain co-evolution and PPI centrality, we propose a paradigm shift toward inhibiting hub proteins critical for pathogen resilience, offering a roadmap for combating gastric infections.

Keywords: Rosetta Stone, *H. pylori*, I-TASSER, ATP-Binding Domain

In silico Characterization and Molecular Cloning of *Trichogramma chilonis* Odorant Binding Protein – c25810 into pET-28a Vector

Meghashree M. C., Varsha G. S., Srusti E. K., Shruthi S. N., Shilpashree D. and Niranjana P.

Department of Biochemistry, Kuvempu University, Shankaraghatta, Shimoga, Karnataka – 577451 Email: bpniruvgst@gmail.com

Abstract

Trichogramma chilonis, an egg parasitoid, is widely used worldwide as a biocontrol agent to manage lepidopteran pests that infest key crops like cotton, maize, tomato, paddy, sugarcane, and brinjal. In India and China, *T. chilonis* is predominantly utilized to combat paddy and maize pests. Insect olfaction plays a vital role in detecting chemical cues for foraging, mating, food sourcing, predator avoidance, and locating oviposition habitats. The olfactory system comprises odorants, odorant-binding proteins (OBPs), and odorant receptors. Egg parasitoids typically use plant volatiles induced by oviposition or host egg chemical cues to locate eggs. Volatile odorants enter via sensilla, bind to OBPs in the lymph, and activate odorant receptors, transmitting signals to the central nervous system. The research focuses on cloning the *T. chilonis* OBP gene (c16951) into the pET28a vector and studying its bioinformatics characteristics. Additionally, the *T. chilonis* life cycle was examined using local paddy pest eggs and forest pest eggs from the Jnana Sahyadri campus. Mass rearing efforts involved Corcyra eggs, releasing T. chilonis in campus forests and nearby paddy fields. These parasitoids may parasitize eggs of pests like the paddy stemborer (*Scirpophaga incertulas*) or leaf folder (*Cnaphalocrosis medinalis*), establishing their lifecycle or locating alternative hosts in the forest. Understanding *T. chilonis* olfaction is pivotal for its effective use. Bioinformatics characterization and molecular cloning of the OBP gene were conducted using an *E. coli*-based expression system. The selected TC-OBPc16951 transcript was successfully cloned into the pET28a vector, screened, and preserved as glycerol stock at -20°C for future use.

Keywords: *Trichogramma chilonis,* biocontrol agent, Odorant binding protein, parasitisation

Exploring the Pharmacological Potential of *Asparagus racemosus* through GC-MS Profiling of Bioactive Compounds

Anup Hemant Eden, Vidya Holeyannavar, Adarsh Hanamanth Biradar, Hrishikesh Parab, Priya S. Shiraguppi, Soumya G. K. and Vootla Shyam Kumar

P. G. Department of Studies in Biotechnology and Microbiology, Karnatak University, Dharwad 580003, Karnataka, India.

Email: anupeden07@gmail.com

Abstract

Medicinal plants are well recognized for their pharmacological potential, which is often explored through various analytical methods. *Asparagus racemosus*, a widely known medicinal plant, was analyzed through a biological approach in this study. The objective was to evaluate the antioxidant, anti-inflammatory, and antibacterial activities, as well as identify the bioactive compounds in the chloroform, methanol, and aqueous extracts of *A. racemosus*. The entire plant was subjected to serial solvent extraction with chloroform, methanol, and aqueous solvents. Phytochemical screening, along with the determination of total phenolic and flavonoid content, was conducted using standard methods. Further analysis was performed using GC-MS and FTIR to identify the biological activity of the compounds present. The antioxidant activity was assessed using the DPPH and FRAP assays, while anti-inflammatory effects were evaluated through the protein denaturation method and the antibacterial activity was determined using the agar well diffusion method. Phytochemical analysis revealed the presence of various phytochemicals, such as alkaloids, flavonoids, glycosides, triterpenoids, and saponins. The GC-MS analysis of the chloroform, methanol, and aqueous extracts of the whole plant identified compounds with significant free radical scavenging activity, which contributed to the plant's strong antioxidant potential. Additionally, the phenolic and flavonoid content was associated with the antibacterial properties of the extracts. The plant also exhibited potential anti-inflammatory properties. This study highlights the potential of *Asparagus racemosus* as a source of novel bioactive compounds with pharmacological properties, which could be developed into safer therapeutic agents for treating various diseases.

Keywords: Phytoconstituents, *Asparagus racemosus*, antioxidant activity, antibacterial activity, anti-inflammatory activity.

Fruit to Pharma: Unravelling Phytochemicals and Anticancer Properties Against K562 Cells

Poojitha B. and Sridhara Setty

Department of Biotechnology, GM Institute of Technology, Davangere – 577 006, Karnataka, India.

Email: poojithabs@gmit.ac.in

Abstract

This study investigates the potential bioactive phytochemicals and evaluates the antimicrobial activities of Punica granatum L. (pomegranate) fruit peel, bark, and leaf methanolic extracts. We employed various extraction methods, including solvent extraction, distillation, pressing, and sublimation. The LLF methanol fraction underwent further analysis using LCMS, FTIR, and NMR for structural elucidation. Our flow cytometry analysis, utilizing PI Annexin V-FITC staining of K562 cells, revealed significant induction of apoptosis. The LLF-MF treated samples at concentrations of 40 g/ml and 80 g/ml induced 20.79% and 30.41% early apoptosis, along with 10.50% and 12.24% late apoptosis, respectively. Importantly, no adverse effects were observed during the study. Dose levels below 500 mg/kg can be safely used for repeated dosing, not exceeding 1000 mg/kg per week. This research also examined the anti-tumor efficacy of the test samples at 200 mg/kg and 400 mg/kg. Athymic nude mice, inoculated with five million K562 cells subcutaneously in a 1:1 Matrigel mixture with RPMI media, demonstrated tumor growth inhibition of 77.51 ± 3.74% with Bortezomib treatment, while the test samples showed inhibitions of 23.37 ± 25.44% and 40.64 ± 16.45% at 200 mg/kg and 400 mg/kg, respectively. Additionally, the in-silico activity of the purified compound was studied in comparison with known phytochemicals and standard drugs. This study also describes the extraction and isolation of ethyl henicosanoate (EHO) from *P. granatum* L. For the development of these compounds as broad-spectrum anticancer agents, further experimental in vitro testing and in vivo investigations are required.

Keywords: K562, *Punica granatum* L., Bortezomib, apoptosis, EHO

Extraction of natural dye from *Areca catechu*

Sindhu N., Archana H., Priyanka B. and Charvi S.

Department of Studies in Biotechnology,GM institute of technology, Davangere–577007, Karnataka, India,

Email: sindhun2141@gmail.com

Abstract

Natural dyes are gaining prominence due to their eco-friendly and biodegradable properties. This study focuses on the extraction of natural dye from freshly harvested *Areca catechu* (betel nut) chunks using *Areca catechu*-based aqueous solutions. The research examines the impact of suspended solid content on dye extraction efficiency and stability while incorporating alum (potassium aluminum sulfate) as a mordant to enhance color fixation. The extraction process involves macerating freshly harvested areca chunks in aqueous *Areca catechu* solutions under controlled conditions. Parameters such as extraction time, temperature, pH, and solid-to-liquid ratio are optimized to maximize dye yield. The suspended solid content in the solution is analyzed to understand its effect on dye solubility and concentration. Alum is then introduced as a mordant to improve dye adherence to textile fibers, enhancing color intensity and wash fastness.

Keywords: Natural dyes, biodegradable, *Areca catechu*, textile

A Systematic Review on Indian Herbal Formulation for the Management of Hemorrhoids

Shankar Murthy K.

Department of P.G Studies and Research in Biotechnology, Kuvempu University, Shankaraghatta-577451, Shivamogga district, Karnataka.

Abstract

Herbal medicine, also referred to as phytomedicine, pertains to the utilization of a plant's seeds, berries, roots, leaves, bark, or flowers for the treatment of diseases. Herbs possess numerous valuable phytochemicals or secondary metabolites effective in treating piles disease. They have a longstanding tradition of application beyond conventional medicine. The treatment of hemorrhoids or piles through herbs has proven efficient and offers a promising solution without adverse effects. Piles represent a prevalent condition of the gastrointestinal tract, commonly known as hemorrhoids or abnormal tissue clusters in the rectum. Hemorrhoids are characterized by the symptomatic enlargement and distal displacement of the normal anal cushions. Symptoms of piles may include a protruding mass, painful bleeding, discomfort during bowel movements, incontinence, or itching. Piles can lead to significant discomfort for patients, interfering with their daily activities and consequently diminishing their quality of life. A majority of individuals encounter this condition at least once in their lifetime. Many individuals maintain confidentiality regarding this ailment due to social stigma in its early stages, ultimately resorting to surgery in the chronic phase when hemorrhoids worsen. The recurrent nature of the disease necessitates the development of new treatment strategies. The objective of this review is to assess the significance of the herbal formulation for the management of hemorrhoids. This herbal formulation comprises a distinctive combination of plant-based components, including *Azadiracta indica, Terminalia chebula, Mimosa pudica, Symplocos racemosa, Curcuma longa, Aegle marmelos, Glycyrrhiza glabra,* and *Foeniculum vulgare*, all of which are advantageous in managing piles by alleviating symptoms and thereby aiding in the promise of hemorrhoidal edema.

Keywords: Piles/hemorrhoids, Anorectal disorders, Plant formulation,

Evaluation of In-Vitro Antibacterial and Antioxidant Potential of *Pimenta dioica* Leaf Essential Oil

Divakara R.[1] and B. K. Manjunatha[2]

[1] *Department of P.G Studies and Research in Biotechnology, Kuvempu University, Shankaraghatta-577451, Shivamogga district, Karnataka*

[2] *Department of Biotechnology, The Oxford College of Engineering, Bommanahalli, Bengaluru-560068,*

Email: divakarabdvt@gmail.com

Abstract

Pimenta dioica, also known as allspice and Jamaican pepper, belongs to the family Myrtaceae. It is native to Jamaica. It is now grown in various parts of the world and known for its unique flavour which is similar to a mixture of cinnamon, nutmeg and cloves. In the present research work antimicrobial and antioxidant activity of the essential oil extracted from the fresh leaves of the Allspice was carried out. The extraction of the essential oil was done by Hydro-distillation using Clevenger apparatus. The anti-bacterial activity was performed by well diffusion method against a range of Gram-positive and Gram-negative human pathogens such as *Escherichia coli, Klebsiella pneumonia, Bacillus subtilis, Staphylococcus aureus, Pseudomonas aeruginosa* and *Bacillus cereus*. The essential oil showed broad spectrum antibacterial activity by inhibiting both Gram-positive and Gram-negative organisms. The Minimum inhibitory concentration was found to be 0.5 µl/ml for *E. coli* and *S. aureus*. The antioxidant potency of the essential oil was evaluated by using DPPH assay and total antioxidant capacity was determined by ammonium molybdate assay. The essential oil showed promising antioxidant activity by scavenging DPPH free radical with an IC50 value of 7.6 µl/ml. The total antioxidant capacity was found to be 10 µg/ml ascorbic acid equivalents. Thus, the study reveals that essential oil of *P. dioica* leaves have antibacterial and antioxidant potential. The antimicrobial and antioxidant activities are due to the presence of bioactive compounds such as eugenol, limonene and myrcene.

Keywords: Essential oil, antioxidant, antibacterial, all spice, *Pimenta dioica*

Bio Computational and Experimental Insights into the Anticancer Potential of Trans-β-Ionone Against MDA-MB-231 Breast Cancer Cells

Mahanthesh Kumar G. T[1], Ramesh C. K.[1], Krishna V.[2] and Abdul Shafiulla[1]

[1]*Phytomedicine Laboratory, Department of Postgraduate Studies and Research in Biotechnology, Sahyadri Science College, Kuvempu University, Shivamogga Karnataka 577203*

[2]*Department of Postgraduate Studies and Research in Biotechnology and Bioinformatics, Jnana Sahyadri Shankaraghatta, Shivamogga Karnataka 577451*

Email: ckramck@gmail.com

Abstract

Trans-β-ionone, a naturally occurring cyclic terpenoid, shows potent anticancer activity against MDA-MB-231 breast cancer cells. In vitro studies reveal dose-dependent cytotoxic effects, with MTT assays demonstrating reduced cell viability. Flow cytometry confirms apoptosis, indicated by increased Annexin V-FITC and propidium iodide staining, along with elevated cleaved caspase-3 and caspase-9 levels. Comet assays show DNA damage, marked by increased tail moment and more DNA in the comet tail. In vivo, mouse models exhibit reduced tumor volumes, and immunohistochemistry reveals decreased Ki-67 expression, signaling reduced proliferation, and increased TUNEL-positive cells, confirming apoptosis. Computational studies, including DFT, molecular docking, and MD simulations, provide mechanistic insights. DFT calculations indicate high molecular stability, while docking studies show strong binding affinities of trans-β-ionone to key anticancer targets, surpassing standard drugs like 5-Fluorouracil. Notably, trans-β-ionone exhibits exceptional binding (-638014 kcal/mol), suggesting strong interactions with apoptotic and cell cycle regulatory proteins. MD simulations confirm the stability of trans-β-ionone-protein complexes. Flow cytometry analysis reveals G1/M phase arrest, disrupting cancer cell progression. Pharmacokinetic evaluations suggest favorable bioavailability and distribution, with toxicity studies showing no significant adverse effects at therapeutic doses. These findings position trans-β-ionone as a promising anticancer agent capable of inducing apoptosis, DNA damage, and inhibiting tumor growth, warranting further clinical investigation for breast cancer treatment.

Keywords: Trans-β-ionone, anticancer activity, Density Functional Theory, Methicillin

Protective Effect of *Musa paradisiaca* cv. Karibale Stem Extract on Cisplatin-Induced Nephrotoxicity in Wistar Rats

Shashikumar R. and V. Krishna

Department of P.G Studies and Research in Biotechnology, Kuvempu University, Shankaraghatta-577451, Shivamogga district, Karnataka.

Email: krishnabiotech2003@gmail.com

Abstract

Musa paradisiaca cv. Karibale is an endemic banana cultivar of Malnad region, Karnataka and the plant used to treat various ailments in particular renal disorders. This study investigated the protective effect of Karibale Stem Ethanol Extract (KBSE) on cisplatin-induced nephrotoxicity in rats. In the experimental model, Group I received Saline and served as untreated and Group II received Cisplatin (7.5mg/kg b.w) in each model of nephrotoxicity. While Group III to VI in each model served as treatment groups which were pretreated with 150 and 300 mg/kg b.w. of stem extract of KSEE per day 1hr before each dose of nephrotoxicant. The group VII was treated with Vitamin C 250mg/kg as standard nephroprotective agent. The nephroprotective activity of KBSE were examined by estimating urine volume, urinary protein, urinary creatinine level, creatinine clearance, serum creatinine, total protein, serum urea, catalase, superoxide dismutase and MDA levels along with histopathological investigation of kidney in different experimental groups. Cisplatin induced significant elevation in serum creatinine, total protein, serum urea, MDA, urinary protein and urinary creatinine along with significant decrement in urine volume, creatinine clearance, SOD, catalase and tubular necrosis compared with the control group. Co-administration of KBSE (150 and 300 mg/kg b.w) effectively mitigated cisplatin-induced nephrotoxicity in a dose-dependent manner. It preserved biochemical parameters, renal enzymatic antioxidants, and reduced kidney tissue damage. Histological analysis confirmed lower tubular and glomerular injuries. In conclusion these findings support KBSE's protective role against cisplatin-induced kidney damage and validate its traditional use for urinary disorders.

Keywords: *Musa paradisiaca* cv., Karibale, Ethanol extract, Wistar rats, Cisplatin, Nephrotoxicity

Phytochemical Content and Ethnomedical Practices Associated with *C. microcarpa*: A Candidate for Natural Pharmacological Resource

Bhoomika M. and Ravi Kumar S.

Department of PG studies and Research in Biotechnology, Jnanasahyadri, Kuvempu University, Shankaraghatta, Karnataka-577451

Abstract

Calamondin, or lime lemon mandarin, is a member of the family Rutaceae, Genus: Citrus and Species: *C. microcarpa*. The Other names of Calamansi are Calamondin, lemon, or Citrus lime. Citrus hybrid extensively grown in the Philippines. People use fresh calamondin in various ways, including recreational, therapeutic and industrial. This small, spherical fruit is similar to lime with a unique sour, and tangy taste. Antioxidant, antidiabetic, anti-inflammatory, and antimicrobial activity of calamansi is ascribed to its biologically active phytochemicals like flavonoids, phenolic compounds, essential oils, carotenoids, and ascorbic acid, As an abundant source of vitamin C, calamansi is often used in the treatment of colds and coughs, and for general immune system enhancement. It is mainly used as a flavoring agent in drinks, sauces and marinades, and the skin which is said to contain essential oils is used in the manufacture of cosmetics and cleansing agents. In addition, value-added products from value added products like dried peel and extracts are being made to support sustainable development goals. Due to its health benefits and usefulness, it is gaining popularity both locally and internationally.

Keywords: Calamansi, *Citrus microcarpa*, phytochemicals, health benefits, antioxidant, anti-inflammatory, antimicrobial

An *insilico* Approach to Demonstrate the Quorum Quenching Activity of Baicalein Against the Growth of *Acinetobacter baumannii*

Thejaswi Bhat, Manish Kumar and Pavan Gollapalli

Center for Bioinformatics, Nitte (Deemed to be University), Mangalore-575018, Karnataka, India. Email: gollapallipavan@nitte.edu.in

Abstract

Numerous nosocomial infections are caused by the significant Gram-negative opportunistic pathogen *Acinetobacter baumannii*. Bacterial communities, composed of diverse populations, signaling molecules, and specific gene sets which engage in a communication process known as quorum sensing (QS). This mechanism orchestrates collective behaviour and synchronizes group actions, thereby increasing survival probabilities. There are various systems that are responsible for quorum sensing and biofilm formation, one of which is the AbaI/Abar system. These systems have been studied to evaluate the quorum quenching activity of various bioactive compounds. In this study we have described the efficacy of Baicalein, a Trihydroxyflavone. This compound is known to have antioxidant, anti-virus, anti-bacteria, anti-inflammatory and anti-allergic properties. Here, we showed the activity of Baicalein against *A. baumannii* and thus, proposing it as a potential therapeutic agent. AbaI-Baicalein complex showed the binding energy of -7.63 kcal/mol and AbaR-Baicalein showed the binding energy of -6.12 kcal/mol. This suggests that these both could act as targets for Baicalein. But the structural stability analysis of ligand-protein complexes over a 500 ns molecular dynamics simulation revealed that AbaI forms a more stable complex with Baicalein compared to that of AbaR. The results indicated that the AbaI-Baicalein complex exhibited lower deviation, fluctuation and gyration values than the AbaR-Baicalein, suggesting enhanced stability upon ligand binding. Furthermore, principal component analysis revealed concentrated scatter patterns, indicating reduced conformational variability. These findings suggest that Baicalein could serve as promising therapeutic agents against *A. baumannii* infections by disrupting quorum sensing and biofilm formation, thus addressing the challenge of antibiotic resistance in this pathogen.

Keywords: Quorum quenching, *A. baumannii*, AbaR-Baicalein, Trihydroxyflavone

A Review on Pharmacological Property, Phytochemical Composition and Medicinal Uses of *S. pinnata*

Babu Naik C. K. and Divakara R.

Department of P.G Studies and Research in Biotechnology, Kuvempu University, Shankaraghatta-577451, Shivamogga district, Karnataka

Email: divakarabdvt@gmail.com

Abstract

S. pinnata is a moderate sized glabrous thin foliaged deciduous tree found in India and believed to be the origin of Malaysia. This tree is widely distributed in Western Ghats of Karnataka and Kerala. It is known by different names in different localities, in Karnataka it is called "Amate mara". It belongs to the Anacardiaceae family. The bark is thick surfaced with grey to grayish brown shallowly furrowed or cracked longitudinally and brittle in nature. The leaves are having a sour taste. The leaves have the aroma of mango when they are crushed and can be used as a flavoring agent. The flowers are not stemmed, white in color and bisexual in nature. The fruits are yellow, fleshy, with hard, rough, and fibrous seeds. In many countries it is cultivated commercially and marketed locally and internationally. *S. pinnata* possesses various pharmacological properties and is used in the traditional medicine system for the treatment of various diseases. Sap of the tree is analgesic in nature and used for the treatment of bronchitis, dysentery, diarrhea and skin diseases. Leaves are used as a health supplement, to treat anemia, diabetes mellitus, menstruation disorders, dysentery, gonorrhea, and skin infections. Bark possesses anti-emetic, antioxidant and anti-mucositis properties. Root is used for the menstrual regulation and treatment of gonorrhea. Fruits are aphrodisiac and anti-scorbutic properties. They are used for the treatment of constipation, rheumatism, sore throat, bronchitis and skin diseases. Flowers are used for the treatment of obesity, dyspepsia, hemorrhagic disorders and vomiting. Plant is rich in various phytochemicals. The phytochemicals found in the plant belong to alkaloids, phenolics, carbohydrates, flavonoids, triterpenoids, steroids, tannins, resins, saponins and gums. Various bioactive compounds have been isolated and characterized from various parts of the tree having potent pharmacological properties.

Key words: *S. Pinnata*, pharmacology, medicinal plant, phytochemicals

Anticancer Potential of Groundnut (*Arachis hypogaea* L.) Root methanol Extract: An *in vitro* Evaluation Study

Raagavalli K., Pradeepa K. and Prabhakara B. T.

Department of biotechnology, Sahyadri Science College, Shivamogga

Email: pradie.k@gmail.com

Abstract

Groundnut (Arachis hypogaea), a key oilseed crop, is rich in polyphenols, including resveratrol, known for its anticancer properties. This study investigates the anticancer potential of groundnut root extracts (LME, RME, and REE) using in vitro models. The H2O2-induced HEK-293 cell model was used to assess oxidative stress inhibition, while the MTT assay was employed to evaluate cytotoxicity against HepG2, NIH3T3, PC3, and PANC-1 cell lines. The results showed that root methanol extract (RME) exhibited the highest ROS inhibitory activity, indicating its potential to combat oxidative stress-related conditions. RME induced significant cytotoxicity against HepG2 liver cancer cells, with an IC50 value of approximately 22 µg, without affecting normal NIH3T3 cells. Nuclear staining (DAPI and Giemsa) revealed altered nuclear condensation and changes in cell morphology, confirming apoptosis induction in HepG2 cells.

The anticancer activity of RME is attributed to its bioactive compounds, including flavonoids, polyphenols, vitamin E, resveratrol, and essential fatty acids, which have chemopreventive effects. These findings suggest that groundnut-derived phytochemicals hold promise for cancer prevention and therapy. Additionally, the commercialization of groundnut root extracts could offer an alternative to wild plant depletion and provide farmers with an additional income source, underscoring the importance of proper extraction methods and antioxidant assessment for pharmaceutical and nutraceutical applications.

Keywords: *Arachis hypogaea,* anticancer, methanol extract, *in vitro* cytotoxicity

Podophyllotoxin: A Potential Anticancer Agent Inducing Apoptosis and Cell Cycle Arrest in Lung Cancer Cells

Ravi Kumar S., Jyothsna K., Sachin S. Nayaka and Krishna V.

Department of PG studies and research in Biotechnology, Kuvempu University, Shankaraghatta -577451.

Email: ravibioinfotech@gmail.com

Abstract

Lung cancer (LC) is one of the most aggressive malignancies, characterized by high morbidity and mortality rates, with limited treatment options available. This study investigates the anticancer potential of podophyllotoxin, a natural alkaloid derived from *Bridelia scandens*, against the A549 lung cancer cell line. The cytotoxic effects of podophyllotoxin were assessed using an MTT assay, revealing a dose-dependent reduction in cell viability. Flow cytometry analysis demonstrated that podophyllotoxin induces apoptosis, as evidenced by morphological changes such as cell shrinkage, membrane blebbing, nuclear condensation, and apoptotic body formation. Cell cycle analysis using propidium iodide (PI) staining indicated that podophyllotoxin treatment led to S-phase arrest, inhibiting cancer cell proliferation. Additionally, Annexin V/PI staining confirmed an increase in apoptotic cell populations in a concentration-dependent manner (0–50 μM). DNA fragmentation assays further supported that podophyllotoxin triggers apoptotic pathways in lung cancer cells. These findings suggest that podophyllotoxin exerts significant anticancer activity by inducing apoptosis, disrupting the cell cycle, and promoting DNA fragmentation in A549 cells. This study highlights the potential of podophyllotoxin as a promising candidate for lung cancer treatment and warrants further investigation into its molecular mechanisms and therapeutic applications.

Keywords: Lung cancer, podophyllotoxin, apoptosis, cell cycle arrest, DNA fragmentation

Mesua ferrea-Derived Phytochemicals as Natural Antimicrobials: A Synergistic Study of Bioactivity and Molecular Interactions

Jyothsna K.[1], Ravi Kumar S.[2], and Manjunatha H.[3]

[1]*Department of Studies and Research in Biotechnology, Jnansiri Campus, Tumkur University, Tumakuru, Karnataka-572118*

2Department of PG studies and Research in Biotechnology, Jnanasahyadri, Kuvempu University, Shankaraghatta, Karnataka-577451

[3]*Department of Biochemistry, Bangalore University, Bangalore, Karnataka-560056, India.*

Email: jyothsnasundar19@gmail.com

Abstract

Mesua ferrea, commonly known as the Indian rose chestnut, is valued for its medicinal properties, including antimicrobial activity. This study investigates the antimicrobial potential of *Mesua ferrea* stem bark extract and its phytoconstituents: (-)-epicatechin, betulinic acid, and 2,4-di-tert-butylphenol. The antimicrobial efficacy was tested against *Staphylococcus aureus*, *Bacillus subtilis*, *Escherichia coli, Pseudomonas aeruginosa, Candida albicans,* and *Aspergillus niger* using disc diffusion and minimum inhibitory concentration (MIC) assays. The inhibition zones ranged from 14.2 ± 0.5 mm to 20.4 ± 0.6 mm, with MIC values between 31.2 and 250 µg/mL. (-)-Epicatechin exhibited potent antibacterial activity (MIC: 62.5–125 µg/mL), while betulinic acid significantly inhibited *S. aureus* (MIC: 62.5 µg/mL). 2,4-di-tert-butylphenol demonstrated strong antifungal activity against *C. albicans* (MIC: 31.2 µg/mL). Molecular docking studies revealed strong interactions of (-)-epicatechin with *S. aureus* DNA gyrase (-8.2 kcal/mol), betulinic acid with *E. coli* β-lactamase (-7.8 kcal/mol), and 2,4-di-tert-butylphenol with *C. albicans* lanosterol 14α-demethylase (-9.1 kcal/mol). These findings confirm the antimicrobial potential of *Mesua ferrea*, supporting their use as a natural anti-microbial agent.

Keywords: *Mesua ferrea, Staphylococcus aureus, Escherichia coli,* (-)-epicatechin, anti-microbial activity

Pharmacological Networks: Unveiling the Interplay between Drugs, Targets, and Diseases

Sharanya H. S. and Ravi Kumar S.

Department of PG studies and Research in Biotechnology, Jnanasahyadri, Kuvempu University, Shankaraghatta, Karnataka-577451

Abstract

Pharmacological networks illustrate the intricate relationships between drugs, their molecular targets, and the diseases they aim to treat. Understanding these networks is crucial for optimizing therapeutic strategies and minimizing adverse effects. This study leverages a systems pharmacology approach, integrating diverse data sources such as bioinformatics databases, scientific literature, and clinical trials. Network analysis and modelling techniques are applied to reconstruct and explore the complex networks linking drugs, targets, and diseases. The study reveals distinct topological features and dynamic behaviours of these networks, which offer a deeper understanding of the pharmacological landscape. Key nodes, such as highly connected drugs and targets, are identified, along with disease-specific network modules that could provide insights into novel therapeutic avenues. Through this approach, the study highlights potential drug repurposing opportunities and discovers new targets for existing drugs, thereby broadening the scope for drug development. The research has significant implications for drug discovery, offering a more refined approach to understanding drug-target interactions. It also enhances the prospects of personalized medicine, where treatments can be tailored based on individual network behaviours. By unravelling the complex pharmacological networks, this study paves the way for developing more effective therapeutic strategies, optimizing drug efficacy, and reducing the risks of adverse effects, ultimately improving patient outcomes in various diseases.

Keywords: Pharmacological networks, Systems biology, network analysis, drug discovery, personalized medicine.

Identification and Nomenclature of Cactaceae plant using DNA barcoding

Ashwath Kesari and Ramesh Londonkar

Department of Biotechnology, Gulbarga University, Kalaburagi, (Karnataka), India.

Emai: londonkarramesh53@gmail.com

Abstract

DNA barcoding is a technique employed in short DNA sequences of the standard genome segment to identify species on a large scale. Compared to morphology-based taxonomy identification, which is challenging and prone to subjective biases, DNA barcoding is becoming more and more popular due to its ease of use and high accuracy rate. The standard chloroplast DNA barcode of a terrestrial plant, which was developed by the Consortium for the Barcode of Life (CBOL) plant working group, has to be evaluated for knowing variation of plant species. The amplicons were created by amplifying the isolated genomic DNA using the rbcL gene in a PCR. The recovered amplicons, which are ranged in length from 500 to 800 bp, were subjected to sequencing for the rbcL gene area. Therefore, in the present investigation the rbcL marker's potential for identifying plants in the cacti family is undertaken. To assess the rbcL gene's discriminating capacity, maximum neighborhood tree analysis was used. The result obtained from DNA barcoding matches up to the genus level including *Turbinicarpus* and species upto 99 % but these species though it is having 98% rbcL gene similarly with existing species it has 0.1 % of individual specific genomic component that supports to be identified a new variant species hence these cactecia plant family species is considered as new species and named as per IUPAC nomenclature it belongs to genus *Turbinicarpus* new species name is *ramesashwa.*

Keywords: DNA Barcoding, rbcL, Identification, Phylogenetics, Cactaceae

Metabolomics of *Cucumis sativus* Phytochemicals and *in-silico* Exploration of Their Cardiovasular Diseases Effects Through Network Pharmacology and Molecular Docking Simulation Studies

Vidyashree Suryavanshi and Joy Hoskeri H.

Department of Bioinformatics, Karnataka State Akkamahadevi Women University, Vijayapura.

Email: joybioinfo@gmail.com

Abstract

This study aimed to explore the phytochemical composition of *Cucumis sativus* through GC-MS-based metabolomics of methanol and chloroform extracts. The research also identified potential drug targets for these phytochemicals and hypothesized their mode of action via molecular docking simulations. The analysis revealed 10 phytochemicals in the chloroform extract and 7 in the methanol extract. Using the SEA database, 264 targets were identified for the methanol extract's phytochemicals and 581 targets for the chloroform extract. Notably, 253 targets were common across both extracts. A network of these targets was created using STRINGDB and analyzed with Cytoscape, identifying PTGS2 as a key "bottleneck" protein. Further investigation of PTGS2 pathways through the KEGG database highlighted its involvement in critical pathways related to cardiovascular diseases (CVDs), including arachidonic acid metabolism, oxytocin signaling, VEGF, TNF, NF-kB, MAPK, and Interleukin-17 signaling.

In-silico pharmacokinetic analysis using SwissADME showed that all identified compounds adhered to Lipinski's Rule of 5, indicating favorable drug-likeness. Molecular docking studies conducted with PyRx revealed that all compounds interacted with PTGS2, with dibutyl phthalate exhibiting the highest binding affinity (-6.5 kJ/mol), while methyl palmitate showed the lowest (-4.8 kJ/mol). The findings suggest PTGS2 as a promising target for CVD treatment, with dibutyl phthalate identified as a potential lead compound for further drug development against CVDs.

Keywords: *Cucumis sativus*; PTGS2; GCMS; Network pharmacology; Molecular docking; cardiovascular diseases.

Evaluation of Antioxidant and Anticancer Activities of *Ocimum tenuiflorum*

Charvi S., Archana H. and Akash Patel M. P.

Department of Biotechnology, GM Institution of Technology, Davanagere-577006, Karnataka, India. Email: charvi2003123@gmail.com

Abstract

Ocimum tenuiflorum, commonly known as Holy Basil, holds a significant place in traditional medicine due to its perceived medicinal properties. This study aims to systematically evaluate the antioxidant and anticancer activities of *O. tenuiflorum*, contributing to the growing body of knowledge on the health-promoting properties of natural compounds. However, almost all parts of the plant have medicinal value, so the study focused on the leaf part of the plant. Tulsi leaf extract was used in studies to know its druggable property against breast cancer cell lines (MCF-7). *O. tenuiflorum* leaves were collected, dried, and subjected to extraction using suitable solvents. The antioxidant activity could be assessed through established assays, including DPPH radical scavenging and total antioxidant capacity. Anticancer potential could be evaluated using various cancer cell lines through cytotoxicity assays, apoptosis detection, and cell cycle analysis. *O. tenuiflorum* could exhibit significant antioxidant activity, as demonstrated by its ability to scavenge DPPH radicals and its high total antioxidant capacity. This study was carried out to determine the antioxidant and anti-cancer effect of methanolic extracts from *O. tenuiflorum* on MCF-7cell lines. The specific objective of this research is to investigate the anticancer of *O. tenuiflorum* against human breast cancer cell lines (MCF-7).

Keywords: *Ocimum tenuiflorum*, antioxidant activity, anticancer activity, cytotoxicity.

In-vitro and *in-vivo* analysis of anticancer activity of triterpenes from bark of *Crataeva nurvala* Buch-Hum

Dinesh M., Darshan S., Nandan N. and Manoranjan M. B.

Department of Studies in Biotechnology, GM institute of technology, Davangere– 577007, Karnataka, India

Email: dineshm8299@gmail.com

Abstract

C. nurvala, a plant with a rich history in traditional medicine, has shown potential therapeutic properties. This study investigates the anticancer activity of triterpenes extracted from the bark of *C. nurvala* through comprehensive *in-vitro* and *in-vivo* analyses. The triterpenes were extracted and purified from *C. nurvala* bark using established procedures. *In-vitro* analyses to be involved and assessment of cytotoxicity on multiple cancer cell lines, including cell viability assays, apoptosis induction, and cell cycle analysis to be conducted. For *in-vivo* studies, a suitable animal model to be employed, and triterpenes to be administered following determined dosages. Our expected outcome of *In-vitro* experiments is to demonstrate a dose-dependent cytotoxic effect of *C. nurvala* triterpenes on cancer cells, with a notable selectivity for malignant cell lines. *In-vivo* studies we are expecting a significant reduction in tumor growth in animals after treatment with *C. nurvala* triterpenes. Finally, our expected outcome is a novel anticancer drug that can be explored to treat some cancer cell lines. We are expecting the anticancer activity of triterpenes isolated from *C. nurvala* stem bark by conducting *in-vitro* and *in-vivo* analyses.

Keywords: *Crataeva nurvala,* triterpenes, anticancer activity, *in-vitro* and *in-vivo* analysis

Characterization and Value-Added Textile Development from *Areca catechu folium* and *Aloe vera*

Archana H., Priyanka B. and Sindhu N.,

Department of Studies in Biotechnology, GM institute of technology, Davangere– 577007, Karnataka, India, Email: archanahrr19@gmail.com

Abstract

The increasing demand for sustainable and biodegradable materials has led to innovative approaches in the textile industry. This study focuses on the development and characterization of an eco-friendly textile bag utilizing *Areca catechu* folium (betel nut leaf sheath) and *aloe vera*. *Areca catechu* folium, a natural agricultural byproduct, was processed and evaluated for its fiber properties, including tensile strength, water absorption, and biodegradability. *Aloe vera,* known for its antimicrobial and moisture retentive properties, was incorporated to enhance the bag's functional attributes, providing protection against microbial degradation and improving shelf life. The developed textile bag presents an environmentally friendly alternative to synthetic and plastic-based materials, addressing sustainability challenges while offering practical applications in packaging, fashion, and everyday use. The study also examines the economic feasibility and potential scalability of the material for commercial production. Characterization tests confirm that the bag exhibits desirable properties such as durability, flexibility, and aesthetic appeal. The integration of natural fibers and bio-based additives showcases the potential of sustainable resources in producing value-added textile products that align with circular economy principles.

Keywords: Eco-friendly textile, *Areca catechu* folium, *Aloe vera*, Sustainability, Natural fibers, antimicrobial properties, Moisture resistance, Circular economy, Value-added products, green alternatives

Production of Fabric from Waste of Areca catechu folium and Aloe vera

Suchitra S. B., Mamtha H. G. and Tejashwini K. B.

Department of Studies in Biotechnology, GM institute of technology, Davangere–577007, Karnataka, India,

Email: suchitrasb2003@gmail.com

Abstract

Environmental sustainability has prompted research into utilizing agricultural waste materials for fabric production, thereby reducing dependence on synthetic fibers and minimizing environmental impact. Areca catechu folium, abundant in tropical regions, and Aloe Vera, known for its strong and flexible fibers, offer promising alternatives. The methodology involves the extraction and processing of fibers from Areca catechu folium and Aloe Vera plants, followed by blending them to create a composite material suitable for fabric production. Various parameters such as fiber strength, flexibility, and compatibility are assessed to determine the optimal blend ratio for fabric quality. The study aims to contribute to the growing field of sustainable textiles by exploring novel sources of natural fibers and developing eco-friendly fabric production methods. The results of this could have significant implications for the textile industry, providing alternatives to conventional fabrics derived from non-renewable resources and offering a sustainable solution to waste management in agriculture. The use of ethical bio-materials impact function ability, aesthetics. Due to high mechanical and silk-like appearance of the material it could be possible to use the material as the part of textile. Biomedical application (glows bandages) etc. The materials stability to endure high temperature make it a safe use in light and even in close contact with light.

Keywords: *Areca catechu folium, Aloe vera,* fabric sustainability, Biomedical application.

Phytochemical Analysis of *Diospyros buxifolia* (Blume) Hiern. Bark Extract *via* LC-MS/MS and Evaluation of its Antiproliferative Activity against Human Colon Carcinoma Cells

Bhargavi G[1]., Sapna M.[1], Suprada Rao M. [2] and Nataraju Angaswamy[1]

[1]*DOS&R in Biochemistry, Karnataka State Open University, Mukthagangotri, Mysuru, India*
[2]*DOS in Biotechnology, Mahajana College, Jayalakshmipuram, Mysuru-12.*

Abstract

Plants are rich sources of natural compounds with extraordinary therapeutic potential, essential for developing novel drugs. *Diospyros* species, medicinal plants traditionally utilized for managing several diseases, are a promising avenue for further exploration. Due to a lack of awareness of *Diospyros buxifolia* (DB) and its underutilized status, relatively few studies have been conducted on its nutraceutical potential. The present study aimed to identify the bioactive compounds from the DB bark extracts *via* LC-MS/MS and evaluate their antiproliferative activity against human colon carcinoma cells. The LC-MS/MS chromatogram showed the presence of various phytochemical compounds such as O-Phosphorylethanolamine, Dulcitol, 2-(2- Aminoethyl) pyridine, (+-) -alpha-Lipoicacid,14- (Hydroxymethyl) -5,9-dimethyltetracyclo- hexadecan-5-ol, Geranyl acetone, Retinol, Retinoids, Pimelic acid, (+-) -3-Methyl-2-oxovaleric acid sodium, and Prolinamide, etc. An extensive literature survey revealed various pharmaceutical properties. The extract demonstrated dose-dependent antiproliferative effects against HT-29 and HCT-116 cells with IC_{50} values of 16.0 and 14.57 µg/ml respectively by MTT assay. Moreover, the extract enhanced the reactive oxygen species (ROS) level, altered cellular morphology, and induced apoptosis as evaluated by fluorescence microscopy. Our current findings suggest DB produces significant levels of ROS (1.8-fold), which may cause apoptosis by disrupting the balance between the oxidant and antioxidant enzyme systems to alter the redox balance in the cell. Interestingly, DB at the highest concentrations significantly enhances the release of lactate dehydrogenase (2.7-fold) in HT-29 and HCT-116 cells. This result suggests the involvement of necrosis in the cytotoxic effect of DB. In conclusion, DB includes strong anticancer agents with notable antiproliferative activity, which makes it suitable for application in medicine and food industry.

Keywords: *Diospyros buxifolia*, MTT assay, antiproliferative effects

Phytochemical Analysis of *Diospyros malabarica* Bark Methanol Extract *via* LC-MS/MS and Evaluation of *in vitro* Antiproliferative Activity Against Human Colon Carcinoma Cells

Sapna M.[1], Bhargavi G.[1], Suprada Rao M.[2] and Nataraju Angaswamy[1]

[1]*Department of Studies and Research in Biochemistry, Karnataka State Open University, Mukthagangotri, Mysuru, India-06*

[2]*Department of Biotechnology, Mahajana College, Jayalakshmipuram, Mysuru-12.*

Abstract

Diospyros malabarica (Ebenaceae) is an ethnomedicinal plant used in Ayurvedic medicine. *D. malabarica* bark extracts have demonstrated hypoglycaemic and anti-bacterial properties. The present study aimed to identify the bioactive compounds of *D. malabarica* bark extract *via* LC-MS/MS and evaluate its antiproliferative activity. The LC-MS/MS chromatogram showed the presence of phytochemical compounds such as Dulcitol, Retinol, Geranyl acetone, 2-Hydroxyoctanoic acid, Betulinic Acid, Succinic acid, Linalool, alpha-hydroxyisovaleric acid, Pimelic acid and Benzoic acid, etc. An extensive literature survey revealed the reported anticancer properties of many of these compounds. The extract demonstrated dose-dependent antiproliferative effects against HT-29 and HCT-116 cells with IC_{50} values of 18 ± 3 µg/ml by MTT assay. Moreover, the extract enhanced the reactive oxygen species (ROS) level, altered cellular morphology, and induced apoptosis as observed by fluorescence microscopy. Our current findings suggest DM produces significant levels of ROS (2.6-fold), which may cause apoptosis by disrupting the balance between the oxidant and antioxidant enzyme systems to alter the redox balance in the cell. Interestingly, DM at the highest concentration significantly elevated the release of lactate dehydrogenase (3.2-fold) in HT-29 and HCT-116 cells suggesting the involvement of necrosis leading to cytotoxicity. Our findings suggest that DM contains potent anticancer agents that demonstrate significant antiproliferative and apoptotic activity against human colon carcinoma cells. As a result, using DM bark extracts has advantages for digestion and gut health.

Keywords: *Diospyros malabarica*, Lactate dehydrogenase, Colon Carcinoma Cells

Prediction of Drug target for Neurodegeneration Due to Neurotoxicity Through Meta-Analysis and Network Pharmacology Approach

Preeti Gadyal and Joy Hoskeri H.

Department of Bioinformatics, Karnataka State Akkamahadevi Women University, Vijayapura – 586108

Email: joybioinfo@gmail.com

Abstract

Neurodegenerative disorders (NDs) are chronic, progressive conditions that cause the degeneration of nerve cells in the brain and spinal cord, leading to impaired neuromuscular coordination and cognition. Neurotoxins damage the nervous system by either blocking neurotransmission or degenerating neurons. Network analysis and computational biology have advanced our understanding of the key genes and proteins involved in neurotoxin-induced neurodegeneration, helping to identify genetic variations that increase the risk of developing NDs. In this study, we analyzed 25 potential neurotoxins to explore the proteins they interact with and to identify common proteins associated with neurodegeneration. The 3D structures and canonical SMILES of the neurotoxins were obtained from the PubChem database. Using the SEA database, we identified 981 protein targets for these neurotoxins. Gene network analysis was conducted using Cytoscape, along with the CytoHub application, which pinpointed SRC as the key bottleneck protein, interacting with most neurotoxins.

Further investigation through the KEGG database revealed that SRC is involved in critical pathways related to neurodegenerative disorders, including the focal adhesion, prolactin signaling, ErbB signaling, axon guidance, GABAergic synapse, and oxytocin signaling pathways. These findings suggest that SRC could play a significant role in neurotoxin-induced neurodegeneration. This research establishes SRC as a potential drug target for managing neurodegenerative diseases triggered by neurotoxins, providing a foundation for future therapeutic strategies.

Keywords: Neurodegenerative disease; Neurotoxins; SRC protein; Network Pharmacology; Cytoscape; KEGG.

Effects of *Caesalpinia bonducella* Extracts and its Isolated Nutraceuticals on Repairing and Protecting Against Oxidative DNA Damage in CHO Cells

Devaraja B. J., Roopith H. Chavan and Santosh Kumar S.R.

Department of studies in Food technology, Davanagere University, Shivagangotri, Davanagere-577007, Karnataka, India.

Email: santoshkumarsr@davangereuniversity.ac.in

Abstract

Caesalpinia bonducella, commonly known as the fever nut tree, is an Indian plant renowned for its therapeutic properties. Traditionally used in Ayurvedic medicine, its leaves and extracts possess antioxidant and anti-inflammatory properties. Recent studies highlight its effectiveness in reducing oxidative stress and repairing DNA damage caused by reactive oxygen species from cellular metabolism, UV radiation, or chemicals. The plant's extracts are rich in flavonoids, phenolic compounds, and alkaloids, known for their antioxidant benefits. Flavonoids neutralize harmful free radicals, preventing oxidative DNA damage, while phenolic compounds enhance DNA repair enzyme activity. Research on CHO cells demonstrates the extracts' potential in repairing and preventing oxidative DNA damage, offering promising therapeutic insights for oxidative stress-related disorders. *C. bonducella* leaves contain bioactive compounds, including alkaloids, tannins, phenolic acids, flavonoids, and saponins, which exhibit antioxidant, anti-inflammatory, anti-cancer, and antibacterial properties. These compounds, such as quercetin, kaempferol, and rutin, are evaluated for their ability to protect CHO cells by reducing reactive oxygen species and boosting DNA repair enzymes. Quercetin, a key phenolic compound, stands out for its protective role against DNA damage. This study underscores the nutraceutical potential of *C. bonducella*, with its bioactive constituents demonstrating significant therapeutic applications in addressing oxidative stress-related cellular damage. The research emphasizes its relevance in developing innovative treatments for oxidative stress disorders.

Keywords: *Caesalpinia bonducella*, *oxidative DNA damage, CHO cells*, Leaf Extract, antioxidant

Phytochemical Profiling of *Parmotrema cristiferum* Lichen

Veena M. E., Arpitha H. P., Varunakumara J. B. and Sunil S. V.

Department of Biochemistry, Sahyadri Science College, Kuvempu University, Shivamogga-577203. Email: varuna24july@gmail.com

Abstract

Parmotrema cristiferum is a species of fungus. Commonly distributed in the transition and humid zone, infrequently in the dry zone. The majority of these lichens were found in bark, wood and rocks on various endemic trees and shrubs. The exploration into *P. cristiferum* has revealed that it is rich in a diverse array of bioactive compounds, including carbohydrates, saponins and flavonoids. These compounds are generally known for their pharmacological properties, suggesting that *P. cristifarum* could be a significant source of natural bioactive with potential health benefits. In our study *P. cristifarum* lichen ethanol extract shows a potent antioxidant free radical scavenging activity and further it also exhibits a potent antimicrobial activity against different pathogenic bacterial and fungal strains. These data supports us for the further research to investigate the other pharmacological activities to prove that the Ethanolic extract of the *P. cristiferum lichen* is a potent drug to overcome the commercially available pharmaceuticals.

Keywords: *Parmotrema cristiferum;* pharmacological properties; antioxidant activity; antimicrobial activity

Proximate Composition and GC-MS Analysis of *Musa paradiscia* L cv. Puttabale Inflorescence Extracts

Pratheeksha M. S. and Venkatesh

Department of Studies in Food Technology, Davangere University, Shivagangothri, Davanagere-577007, Karnataka, India.

Email: venka.biotech@gmail.com

Abstract

Banana (*Musa paradisiaca*) is a staple food grown in the tropical regions of the world. This study was aimed to determine the proximate analysis and phytochemicals of *Musa paradisiaca* cv. puttabale Inflorescence. The determinations were carried out by using standard methods. The result of the proximate composition showed moisture content (9.53%), ash (11%), crude protein (23.8g/100g), crude fat (1.9gm), crude fibre (8.14gm) and carbohydrate (6.8gm). The minerals are Ca (135 mg/100g), Mg (18 mg/100g), P (151.67 mg/100g), K (40 mg/100g), Fe (14 mg/100g), Na (280 mg/100g). It also contained vitamin A (0.97 mg/100g), vitamin B2 – Riboflavin (0.5 mg/100g), vitamin B1 – Thiamine (0.2 mg/100g), vitamin B3 – Niacin (1.13 mg/100g) and Vitamin C – Ascorbic acid (8.17 mg/100g). The phytochemical composition results revealed the presence of bioactive compounds such as Alkaloids, Tannins, Flavonoids, Phenols, Saponins, oxalates and GC-MS analysis of petroleum ether, chloroform and methanol extracts of inflorescence showed the presence of several bioactive compounds like aldehydes, ketones, alcohols, furans, sulphur compounds, esters and eugenol that may be responsible for medicinal actions of bananas.

Key words: Proximate composition, GCMS, *Musa paradisiaca* cv. Puttabale Inflorescence

Impact of Artificial Intelligence in Genetics and Genetic Analysis

Keerthanashree G. N., Venugopal T. M. and Manjunatha D.

Department of Microbiology, Sahyadri Science College, Shivamogga, INDIA.

Email: venushm09@gmail.com

Abstract

Artificial Intelligence (AI) refers to the development of machines designed to mimic human intelligence, allowing them to learn and adapt just like humans. This technology holds significant promise, especially in areas such as genetic engineering and gene therapy, similar to its role in drug discovery. In the fields of genetics and genomics, AI is revolutionizing how we analyse genetic data, detect diseases, and identify genetic disorders. Traditionally, analysing genetic data has been a lengthy and complex process, but AI can now interpret this data at a much faster rate, making it a powerful tool for researchers. AI systems excel in recognizing patterns within DNA, helping scientists pinpoint genetic markers linked to specific diseases. One of the key advantages of AI in genomics is its ability to uncover hidden patterns in vast datasets, something that traditional methods often struggle to do due to the sheer scale and complexity of genetic data. With AI, researchers can quickly extract meaningful insights from large datasets, enabling a deeper understanding of genetics. In clinical practice, AI is already making a notable impact by assisting in the diagnosis and treatment of diseases based on genetic information. By supporting precision medicine, AI helps predict genetic risks for conditions such as cancer, heart disease, and rare genetic disorders. Though still in the early stages, AI's integration into genomics is already paving the way for breakthroughs in both research and clinical applications. By analysing genetic data, identifying health risks, and suggesting new treatment methods, AI is reshaping the future of healthcare and changing the way we approach disease prevention and treatment.

Keywords: Artificial Intelligence, Genetic data, DNA

Phytochemical Profile and AntioxidantPotential of *Cedrela odorata* Fruit

Ramya Gajanan Shetty[1], Srushti A. M.[1], Varunakumara J. B.[1] and Raghavendra S.[2]

[1] *Department of Biochemistry, Sahyadri Science College, Constituent College of Kuvempu University, Shivamogga-577203, Karnataka, India.*

[2] *Department of Biochemistry, Division of Plant Science, College of Agriculture, Navuli, Shivamogga*

Email: varuna24july@gmail.com

Abstract

Cedrela odorata which belongs to the *Meliaceae* family, its stem bark is utilized as a herbal supplement and also treatment of diabetes. The fruit consists of a woody capsule, about 2 to 4 com long, which is borne near branch tips. The capsule splits when ripe, usually still attached to the parent tree. *Cedrela* is a genus consisting of several species which are commercially important and they have naturally antioxidants. They are evergreen or dry deciduous trees. *Cedrela odorata, also* known as Spanish cedar, belongs to the Meliaceae or mahogany family. The purpose of the present study we used fruit samples. The fruit sample was extracted by using solvents like water, methanol and chloroform, further we evaluate phytochemical analysis, secondary metabolite detection, and antioxidant activity. The analysis indicated the presence of secondary metabolites like Phenols, flavonoids and terpenes. The *Cedrela odorata* shows antioxidant activity by DPPH scavenging assay. This result will be useful for further investigation like antidiabetic and other diseases.

Keywords: *Meliaceae,* antioxidant activity, secondary metabolite detection, phytochemicals

Determination of Phytochemical Components from the Leaf Oil Extracts of *Platycladus orientalis* (L.) Franco by GCMS Technique

Ankitha S. and Manasa D. J.

Department of studies in Botany, Davangere University, Shivagangotri, Davangere 57700, Karnataka, India. Email: manasad310@gmail.com, ankithakhimavath@gmail.com

Abstract

Essential oils are widely found in plant species. They can be involved in a variety of ecological interactions. Many compounds used as food coloring, scents, therapeutic biochemicals, and flavors are traditionally derived from plants, particularly in India. The majority of herbal remedies and their byproducts were made from plants, which are made up of a complex blend of petrochemical components. The purpose of this study was to use GC-MS approach to analyze the primary metabolites and their conformation. *Platycladus orienntalis* (L) Franco is one of the medicinally important plants belonging to the family Cupressaceae, commonly known as Thuja. The present study deals with the GC-MS examination of the leaf oil extracts of the above-mentioned plant. 44 phytochemical constituents from leaf oil extracts have been identified, among these the most prevalent compounds are Cedrol (14.148), cis-Thujopsene (14.460), 1,3,7,11-Cyclotetradecatetraene, 2-methyl (15.250), €-Atlantone (15.425), Squamulosone (15.675), (4S,5S,8S,9R)-4-Isopropyl-6,8,9-trimethyl-3-oxabicyclo[3.3.1]non (16.941). Therefore, the leaf extract of *P. orienntalis* contain pharmacologically useful phytochemicals which have anti-inflammatory, anti-anesthetic, anti-oxidant, antiarthritic effect hence it can be recommended as a plant of phytopharmaceutical value.

Keywords: GC-MS, Cupressaceae, *Platycladus orientalis,* antiarthritic activity

Development of Mosquito Repellent Using C*ymbopogon citarus*

Ritu A. Palankar, Spoorthi G. M., Ganesh G. Tilve

Department of Biotechnology, GM Institute of Technology, Davangere, Karnataka, India

Email: ganeshgtilve@gmit.ac.in

Abstract

This study focuses on developing a natural, eco-friendly mosquito repellent using lemongrass (*Cymbopogon citratus*) oil, extracted via steam distillation using a Clevenger apparatus. Lemongrass oil, rich in citronella and known for its insect-repellent properties, was incorporated into a hydrogel-based formulation. Carbopol served as the gelling agent, while sodium hydroxide adjusted the pH for optimal consistency and stability. The formulation was evaluated for key physicochemical properties, including stability, pH, viscosity, irritancy, spreadability, and extrudability, ensuring user-friendly application. A repellency test demonstrated significant effectiveness in repelling mosquitoes, highlighting the potential of this hydrogel-based formulation as a safer alternative to chemical repellents. Free from harsh synthetic compounds, it is suitable for individuals with sensitive skin and offers a non-toxic, sustainable approach to mosquito control. The gel-based consistency allows for smooth and even application, enhancing user convenience. This study presents a promising step toward developing natural, environmentally responsible pest control solutions.

Keywords: *C. citratus*, Clevenger apparatus, hydrogel formulation, mosquito repellent, pharmaceutical formulations, spreadability, extrudability

New Role of Aryl Hydrocarbon Receptor Nuclear Translocator-1 (ARNT1) as a Regulator in the Development of Hepatocellular Carcinoma (HCC) in Patients with Type 2 Diabetes Condition

Nethravathi A. M.[1], C. K. Ramesh[1], Y. L. Ramachandra[2], Aditya Rao S. J.[3], Pallavi M.[1]

[1] *Department of PG Studies and Research in Biotechnology, Sahyadri Science College campus, Kuvempu University, Shivamogga.*

[2] *Department of PG Studies and Research in Biotechnology, Jnana Sahyadri, Shankaraghatta.*

[3] *GR Biosciences Pvt. ltd, Bangalore*

Email: ckramck@gmail.com

Abstract

Hepatocellular carcinoma (HCC) ranks as the sixth most commonly diagnosed cancer and the third leading cause of cancer-related deaths globally, with 866,136 deaths in 2022. HCC occurrence is two to three times higher in individuals with diabetes mellitus (DM), whose prevalence is rising sharply. While treatments like insulin and insulin secretagogues are linked to higher cancer incidence, medications such as metformin and thiazolidinediones (TZDs) have shown a reduction in cancer risk. Recent microRNA studies have highlighted variations in gene expression among diabetic cells leading to HCC, especially in the presence of metformin. To investigate the underlying mechanisms, a systems biology-based study was conducted, analyzing differentially expressed genes (DEGs) from the GSE131175 dataset. Using a protein-protein interaction (PPI) network, 538 DEGs were evaluated, and the hub protein Aryl hydrocarbon receptor nuclear translocator 1 (ARNT1) was identified as significant. Further analysis explored gene and pathway enrichment, suggesting ARNT1's role in transcription cis-regulatory mechanisms. To assess its potential as a drug target, the interaction of ARNT1 with metformin was studied using molecular docking and dynamic simulations for stability assessment. In vitro studies are ongoing to support the hypothesis of ARNT1 as a regulator in the development of HCC among Type 2 diabetes patients. These findings propose a novel role for ARNT1 in HCC mitigation, potentially influencing therapeutic strategies.

Keywords: DEGs, Hub protein, protein-protein interaction, biological network, HCC

Molecular Taxonomy and Phylogeny of Genus Nothopegia Blume nom.cons. (Anacardiaceae) Endemic to Central Western Ghats Karnataka

Venkatesh Jugal and Shrishail H. C.

Department of Applied Botany, Kuvempu University, Jnanasahyadri, Shankarghatta-577451, Karnataka, India email: venkateshjugal@gmail.com

Abstract

The genus *Nothopegia* Blume, a dioecious tree in the Sumac family, consists of four endemic species in the Central Western Ghats of Karnataka, which are difficult to identify due to their morphological similarities. This study employs Brief Taxonomic Description, Images and the molecular data used to resolve the genus phylogeny, using primers targeting the ITS region of nuclear DNA, chloroplast rbcL, and trnL-F genes. Genomic DNA was extracted using the CTAB method, and phylogenetic analysis was performed using Maximum Parsimony, Maximum Likelihood, and Bayesian methods. The results will help clarify the phylogenetic relationships within the genus and Taxonomical Description helps to identify the *Nothopegia* species in the field.

Keywords: Maximum Likelihood, parsimony, Posterior probability, Bootstrap, CTAB, NCBI,

Proximate, Phytochemical, GC-MS, *In-Vitro* Cytotoxic Assay and their Biological Activities of *Cynarospermum asperrimum* (Nees) Vollesen. (Acanthaceae)

Praveen T. and Siddappa B. Kakkalameli

Department of Studies in Botany, Davangere University, Shivagangotri, Davangere – 577007.
Email: dubotsiddu@gmail.com; praveenpravee542@gmail.com

Abstract

The present investigation deliberates the chemical profiling and biological activities of *Cynarospermum asperrimum* (Nees) Vollesen. Using three different polar and non-polar solvents. The proximate analysis reveals the presence of various components like Total protein, Total carbohydrates, Total lipids, etc. The qualitative and quantitative phytochemical analysis reveals that rich in Phyto-constituents shows the presence of various polyphenols, alkaloids, flavonoids, tannins, etc, the GC-MS analysis was used to identify its bioactive compound has several significant compounds linked to various health benefits, the antimicrobial activities against bacterial species *E.coli* and *S. aureus* shows good inhibition zones against these bacteria, antioxidant assay by DPPH revels that good IC_{50} values 57.24 ± 3.83 µg/ml in methanol extract due to various antioxidant phytochemical present in it this conclude the presence of free radicals, the *in vitro* cytotoxicity by MTT assay against MCF7 and HepG2 cell lines both are showing good IC_{50} values in 58.38 ± 3.13 µg/ml and 67.57 ± 4.10 µg/ml, methanol and 66.76 ± 3.37 µg/ml, 119.64 ± 5.05 µg/ml in chloroform extract these findings suggest *C. asperrimum* (Nees) Vollesen. Leaf has promising functional pharmaceutical applications; further research is to explore its mechanism of potential therapeutic uses.

Keywords: Antimicrobial, Antioxidant, Anticancer (MCF7, HepG2), GC-MS, Proximate, Qualitative & Quantitative Phytochemical Analysis.

A review on Phytochemicals of *Cryptocarya* Species and Their Pharmacological Applications

Monisha C. Patil and Govindappa M.

Natural Products Laboratory, Department of Studies in Botany, Davangere University, Shivagangotri, Davanagere-577007, Karnataka, India.

Email: monishapatil333@gmail.com

Abstract

The genus *Cryptocarya (Lauraceae)* has been extensively studied for its diverse phytochemical composition, leading to the identification of numerous bioactive compounds. Identified 23 known phytochemicals from *Cryptocarya impressinervia and they* are lignans, flavonoids, sterols, triterpenoids and *9,9'-O-Di-feruloyl-(-)-secoisolariciresinol* exhibited potent cytotoxicity against five human cancer cell lines. The *Rhusemialin A* also showed strong anticancer activity against HL-60 leukemia cells. From *Cryptocarya chinensis*, four novel flavanones (cryptoflavanones A–D) and known compounds such as pinocembrin and cryptocaryone demonstrated antituberculosis activity. *Cryptocarya myrtifolia* yielded cryptocaryalactone and its derivatives, while *C. obovata* provided cytotoxic flavonoids and α-pyrones, with obolactone and obochalcolactone exhibited significant anticancer activity against KB cancer cell line. Further, investigations on *Cryptocarya wightiana* led to the isolation of a new lactone with germination-inhibitory properties and a high-viscosity polysaccharide gum, composed mainly of arabinose and xylose, with potential industrial applications. *Cryptocarya rugulosa* produced rugulactone, which effectively inhibited NF-κB signaling, a crucial cancer target. Additionally, *Cryptocarya alba* was found to contain flavonoids and phenolic compounds with strong antioxidant activity. Antimicrobial studies on *Cryptocarya* extracts showed significant inhibition of *Candida albicans* biofilm formation but also cytotoxic effects on normal oral keratinocytes. The antioxidant potential of *C. stocksii* was assessed through DPPH, reducing power, and total antioxidant assays, where ethanol extracts demonstrated the highest activity, attributed to high polyphenol content. These findings highlight the potential of *Cryptocarya* species as sources of cytotoxic, antimicrobial, and antioxidant compounds, paving the way for their application in pharmaceutical and industrial fields.

Keywords: Cryptocarya, Phytochemicals, Cytotoxicity, Antimicrobial, Antioxidant

Anti- Inflammatory Role of *Chrozophora rottileri:* Phytochemical Profiling, *In-Silico* and In-Vitro Studies

G. Akanksha, Anjali Kayapure and Babu R. L.

Laboratory of Natural Compounds and Drug Discovery, Dept. Of Bioinformatics, Karnataka State Akkamahadevi Women's University, Vijayapura-586108

Abstract

Chrozophora rottleri, a common weed in the Euphorbiaceae family, has been traditionally used in medicine for its therapeutic properties. This study explores the plant's Anti-inflammatory, Antioxidant, and antimicrobial activities, supported by phytochemical screening. Plant material was extracted using Soxhlet apparatus with ethanol and methanol, and their effects were assessed *in vitro*. Methanol extract exhibited stronger activity compared to ethanol extract in inhibiting albumin denaturation. Antioxidant properties were evaluated via DPPH (1,1-diphenyl-2-picryhydrazyl) radical scavenging assay, showing superior capacity over ascorbic acid. Cytotoxicity was tested using the MTT assay, where the extract improved cell survival under inflammatory conditions caused by LPS. Nitric oxide scavenging activity was determined, revealing reduced NO production, which is crucial in managing inflammation. Antimicrobial potential was assessed using the agar-well diffusion method, with the extract demonstrating significant efficacy against Pseudomonas and *E. coli*. Six bioactive compounds with strong Anti-inflammatory activity were identified. These compounds were validated as non-toxic via *in silico* studies and *in vitro* experiments, indicating potential use in managing chronic inflammatory diseases.

Keywords: *Chrozophora rottleri*, *Insilico*, Anti-inflammation, plant extraction.

Ecological Distribution and Conservation of *Cyclea peltata*, a Medicinally Important Plant of the Central Western Ghats: A Plant Tissue Culture Approach

Rakshitha H. M. Jain and Y. L. Krishnamurthy

Department of Applied Botany, Kuvempu University, Jnanasahyadri, Shankaraghatta, Shivamogga,

Email: rakshithahm1@gmail.com; murthy_ylk@yahoo.co.in

Abstract

The Menispermaceae family plays a vital ecological role in tropical forest ecosystems, particularly in the Central Western Ghats of India. Among its members, *Cyclea peltata* stands out due to its high frequency and medicinal significance. Traditionally used to treat inflammatory conditions, infections, and neurological disorders, its population is declining due to habitat loss and overexploitation. This study assessed the distribution, ecological importance, and conservation strategies for *C. peltata*. Using a stratified random sampling approach across 20 study sites, 493 individuals from 9 genera and 10 species were recorded. *C. peltata* exhibited the highest frequency, while *Diploclisia glaucescens* and *Cissampelos pareira* had the highest density and abundance, respectively. The Species Importance Value (SIV) for *Coscinium fenestratum* was the highest (1.93, 18.7%), followed by *C. peltata* (1.12, 10.9%). The plant contains bioactive compounds such as alkaloids, flavonoids, saponins, and tannins, contributing to its reported pharmacological effects, including anti-inflammatory, antimicrobial, and neuroprotective properties. However, anthropogenic pressures threaten its populations, necessitating urgent conservation efforts. To address this, in vitro propagation was explored as a conservation strategy. Direct organogenesis was induced using stem explants on half-strength Murashige and Skoog (MS) medium supplemented with 2.0 mg/L BAP and 0.5 mg/L 2,4-D, achieving an average of 3.4 ± 0.2 shoots per explant. This demonstrates an efficient propagation protocol for large-scale multiplication and conservation. This study underscores the importance of *C. peltata* in both ecological and medicinal contexts, highlighting the need for integrated conservation strategies, including plant tissue culture, to ensure its sustainable use and long-term survival.

Keywords: *Cyclea peltate,* SIV. Direct organogenesis

Indigenous Medicinal Plants Used to Cure Jaundice: An Overview

Pallavi T. S. and Shankar Murthy K.

Department of P.G Studies and Research in Biotechnology, Kuvempu University, Shankaraghatta-577451, Shivamogga district, Karnataka.

Abstract

Healing with drugs from plant sources is as old as our civilization. In spite of the tremendous development in allopathic medicine, the people are more concerned towards ayurvedic medicine nowadays. Due to its less side effects, long lasting effect and cost effectiveness. Juandice is one of the most common medical conditions affecting infants, children and adults. That causes the skin, whites of eyes and mucous membranes to turn yellow. It is also known as icterus or hyperbilirbinemia (high secretion of bilirubin). The use of Ayurvedic medicine to treat jaundice has a long history from the far past generation, of which there is an effective from various sources: written documents, preserved monuments and even original plant medicines. This article attempts to review the literature and ethanobotanical uses of indigenous plants used in treatment of jaundice. For example, *Phyllanthus niruri, Euphorbia hirta L., Tenospora cardiofolia, Boerhavia diffusa, Agle marmelos, Andrographis paniculata* etc. These plants are locally available plants in most of the different parts of India. Continuing research is necessary to elucidate the pharmacological activities of the many medicinal plants available in different geographical locations.

Key words: Ayurveda, hyperbilirbinemia, ethanobotany, pharmacology

Integration of Docking, Simulation for Activity of Targets – TP53 & EP300 in Isothiocyanates Revived Network.

Vijayalakshmi V.[1] and Manjunatha H.[2]

[1]*Department of P.G. Studies and Research in Biotechnology. Kuvempu university, Shimoga.*

[2]*Department of P.G. Studies and Research in Biochemistry. Bangalore University, Bangalore, Karnataka.*

Email: vijayalakshmi.95v@gmail.com

Abstract

The framework of the study is based on the interpretation of the communication path/process aimed in Allyl isothiocynate (AITC) interactions to analyse molecular pharmacology. So, here we undertake to implement the alterations in the biological system by activation of AITC at molecular level, yielding a future direction for cancer therapy by the changes in malignant behavior at drug – related modules. We constructed the AITC's PPI network through STRING with Cytoscape work benches; the modulation was done using MCODE. The ClueGO modular enrichment interpreted the transformation in metabolic behavior implicating signaling pathways that linked closely to the metabolic processes. Different network properties and modules were analyzed based on Degree in sub-networks yielding top-ranked biomarker genes TP53 and EP300. DAVID yields 80 enriched pathways most of them correlated to disease groups in humans, particularly carcinogenesis. A molecular docking study reveals good binding scores with the best key regulatory biomolecular genes and obtained final hub proteins are validated through Survival analysis (Kaplan-Meier plotter). We were able to highlight important pathways involved in cancer and also validate the key regulatory proteins by analyzing their relation can provide insight into effective cancer medication management.

Keywords: Isothiocyanates, gene-target, protein interaction, drug-target prediction, TP53, EP300, Hub validation.

Elucidating the Biochemical Composition and Therapeutic Effects of Banana Stem Sap Water on Kidney Stones

Chamu G. B., Harshitha M. S., Suma S. L., Tejaswini G. V., Prashanth N. and Sharathchandra R. G.

Department of Studies and Research in Biotechnology. Jnanasiri Campus Tumkur university, Bidarakatte- 572118. Email: chamugb01@gmail.com

Abstract

Kidney stones are a prevalent and painful condition affecting millions worldwide. Traditional treatments often involve invasive procedures or pharmaceutical interventions. This study investigates the potential of banana stem sap water as a natural remedy for kidney stones. Our research focuses on the qualitative and biochemical analysis of banana stem sap water, examining its content, properties, and therapeutic effects. Preliminary results from qualitative analysis, protein estimation, and reducing sugar tests indicate that banana stem sap water possesses bioactive compounds with potential medicinal properties. This study aims to contribute to the existing body of knowledge on alternative treatments for kidney stones, providing a foundation for future research on the clinical applications of banana stem sap water.

Keywords: Banana stem sap water, kidney stones, qualitative analysis, biochemical analysis, natural remedy, traditional medicine.

Formulation, Characterization, and Optimization of Aadrakamritha: A Customizable Organic Liquid Fertilizer for Enhancing Soil Fertility and Rhizome Development in *Zingiber officinale* (Ginger)

Ramachandra Sharma Ainkai, Namratha S.R., Yashaswini V., Geetha K., Manogna S. K. Deepthi Gowda, Nagarakshitha V. K. and R. G. Sharathchandra

Department of Studies and Research in Biotechnology and Microbiology, Tumkur University, Tumkur-572103, India. Email id: dhruvaainkai@gmail.com

Abstract

Extensive chemical dependency in spice cultivation, especially like ginger, depleting yield quality and soil health. Organic formulations provide an ecofriendly alternative that enhances soil quality, through organic material incorporation. Aadrakamritha, a customizable organic liquid fertilizer, formulated to meet the specific nutritional requirement of ginger. These formulations are enriched with natural ingredients like black sesame, neem, and biochar from banana stem, which works in tandem to improve soil nutrient balance, enhance microbial diversity, and promote sustainable ginger cultivation. This study investigates the effects of Aadrakamritha on soil properties and ginger growth, assessing its potential as a sustainable organic liquid fertilizer. Formulations were analyzed for their physicochemical and biological properties, revealing significant impacts on soil pH, moisture retention, bulk density, microbial activity, nutrient availability, and rhizome development in ginger. Aadrakamritha was evaluated through randomized block design experiments using four different concentrations (GP1–GP4) to optimize and validate its effectiveness in ginger growth and fertilizer performance. Notably GP 3, Aadrakamritha exhibited superior results, with a significant increase in rhizome bulk density and overall plant vigor. Compared to the control and NPK treatment, it enhanced nutrient uptake, leading to improved tuber mass. GP3 demonstrated a 35.8% increase in rhizome mass compared to NPK and 22.1% higher than the water control, highlighting its effectiveness in enhancing ginger yield. The study confirms that the customizable organic liquid fertilizer significantly improves ginger rhizome mass and soil properties, highlighting its efficacy in sustainable agriculture.

Keywords: Aadrakamritha, GP - ginger plant growth, a name for concentration of Aadrakamritha, NPK fertilizer - Chemical fertilizer as control

Pathogenicity Related Biomarker Identification in *Colletotrichum orbiculare* Using *In silico* Approach

Vaishnavi S. L.[1], Sharathchandra R. G.[1], Rashmi Hosamani[1], Santosh Kumar H. S.[2] and Chandrashekar C. R.[3]

[1]*Department of Studies and Research in Biotechnology and Microbiology, Tumkur University, Tumkur-572103, India.*

[2]*Department of Biotechnology, Kuvempu University, Jnanasahyadri, Shankaraghatta-577451, India.*

[3]*Department of Biotechnology, Ramaiah Institute of Technology, Bengaluru-560054, India.*

Email: vaishnavisl1997@gmail.com

Abstract

Secretory proteins secreted from fungal phytopathogens impact the lifestyle of fungi. Identification of genes encoding secreted proteins and their expression patterns will provide significant insights into understanding the host's response to pathogens. In the current study, secreted proteins of *Colletotrichum orbiculare,* the hemibiotrophic fungal phytopathogen, have been investigated to identify biomarkers of elicitor and effector potential. Differential gene expression analysis of NCBI-GEO based dataset (GSE109337) has been used for designing novel gene analysis pipelines for the identification of key biomarkers via *in silico* computational approach. This unique pipeline allows integration of the relevant databases that help in the identification of a comprehensive set of secreted proteins and their functional relevance to their specific pathogenicity mechanisms.

Key words: GEO2R, differentially expressed genes, Gene ontology, *In silico* analysis

A Study on Biological Composition of Ipomoea Based Fermented Biostimulant and its Effectiveness in Mitigating Drought Stress in *Solanum lycopersicum*

Harisha R. S., Harshitha K. P., Namratha Y., Ullas T. N., Syed abrar M., Yeshaswini V., Harish R., Manasa Y. R. and Sharathchandra R. G.

Department of Studies and Research in Biotechnology and Microbiology, Tumkur University, Tumkur-572103, India,

Email: harishars259@gmail.com

Abstract

Drought stress is a major challenge to agricultural productivity, particularly in *Solanum lycopersicum* (tomato), a globally essential crop. This study investigates the potential of an Ipomoea-based fermented biostimulant (IFB), made from a blend of locally sourced, nutrient-rich plants, to mitigate drought stress in tomato plants. The IFB was produced through natural fermentation, harnessing beneficial microorganisms that enhance nutrient availability and plant resilience. Greenhouse experiments were conducted to evaluate the physiological and biochemical responses of tomato plants treated with IFB under controlled drought conditions. Key parameters assessed included plant growth, leaf water content, photosynthetic efficiency, and antioxidant enzyme activity. The results showed that IFB significantly improved drought tolerance, as evidenced by better growth, enhanced chlorophyll content, and improved photosynthetic rates in treated plants. These findings suggest that IFB not only supports plant health but also boosts productivity under water deficit conditions. The biological composition of the IFB includes essential vitamins, minerals, and beneficial microorganisms, all contributing to enhanced plant health. The synergistic effects of these components appear to play a key role in improving drought resilience. In conclusion, this research highlights the potential of fermented plant juices as a sustainable practice to enhance drought resilience in tomato cultivation. By combining traditional fermentation methods with modern agricultural needs, this innovative approach offers a promising strategy for building more resilient crop systems that can withstand the impacts of climate change, supporting food security and environmentally friendly farming practices.

Keywords: Drought stress, *Solanum lycopersicum* (tomato), Ipomoea based fermented biostimulant (IFB), chlorophyll, photosynthetic efficiency, antioxidant enzyme activity

Phytochemical Content and Ethnomedical Practices Associated with *Mesua ferrea*

Bhuvana V. N., Divakara R. and Shankar Murthy K.

Department of PG studies and Research in Biotechnology, Jnanasahyadri, KuvempuUniversity, Shankaraghatta, Karnataka-577451

Email ID:vnbhuvana13@gmail.com

Abstract

Mesua ferrea, the Ceylon ironwood, or cobra saffron, Nagakesar is a species in the family Calophyllaceae native to the Indomalayan realm. This slow-growing tree is named after the heaviness and hardness of its timber. It is widely cultivated as an ornamental for its graceful shape, grayish-green foliage with a striking pink to red flush of drooping young leaves, and its large, fragrant white flowers. It is the national tree of Sri Lanka, as well as the state tree of Mizoram and state flower of Tripura in India. *M. ferrea* is traditionally used for its antiseptic, anti-inflammatory, blood purifier, anthelmintic, cardiotonic, diuretic, expectorant, antipyretic, purgative, antiasthmatic, antiallergic and several other effects. The plant possesses various classes of phytochemicals like phenyl coumarins, xanthones, triterpenoids, fats and flavonoids. These phytochemicals are responsible for the medicinal and pharmacological properties of the plant. The plant has various other uses. It can be used as a substitute for petroleum gasoline, in cosmetics, as fire wood and the polymer obtained from seed oil is used in the preparation of resins.

Keywords: Nagakesar, cardiotonic, Petroleum gasoline

Exploring the Nutraceutical Properties and Bioactive Potential of *Aporosa lindleyana*: A Wild Edible Fruit from the Western Ghats of Karnataka

Megha G., Meghana P., Sachin G. C., Sandeep Kumar Jain R., Pooja S Rajaput, Prashanth N. and Kumaraswamy H. M.

Laboratory of Experimental medicine, Department of Biotechnology, Kuvempu University, Shankaraghatta, Karnataka, India

Email: drhmklab@gmail.com

Abstract

The study on *Aporosa lindleyana* fruit highlights its remarkable nutritional, bioactive and pharmacological potential, reinforcing its role as a functional food. Consumed raw or processed, this fruit serves as an essential dietary source for rural and tribal communities, offering significant amounts of vitamins, carbohydrates, proteins, fibres, and minerals. Phytochemical analysis reveals a rich composition of phenolics (ellagic acid, gallic acid etc.,) and flavonoids (epicatechin, rutin.,), contributing to its strong antioxidant and anticancer properties. Quantitative assessments confirm high protein (1.78 ± 0.134 mg/g) and fibres (0.78 ± 0.134 mg/g) content, along with notable levels of Vitamin C (0.513 ± 0.534 mg/g) and Vitamin A (0.022 ± 0.231 mg/g). Antinutrient factors such as phytic acid, oxalate, and tannins are present in moderate amounts. The fruit also exhibits potent free radical scavenging activity in ABTS, DPPH and FRAP assays with IC 50 values 119.944±0.559, 145.11±1.078 and 36.44±0.998 µg/ml respectively, supporting its role in oxidative stress reduction. Additionally, its cytotoxic effects against pancreatic cancer cells suggest potential therapeutic applications, with evidence of ROS enhancement, mitochondrial depolarization, and apoptosis induction. These findings validate its traditional medicinal use and encourage further research into its health benefits and its applications in nutraceuticals and modern medicine. *A. lindleyana* thus emerges as a promising candidate for future health- oriented product development.

Keywords: *Aporosa lindleyana*, Nutritional, Anti-Nutritional, Bioactive Compounds, Antioxidant, Anthocyanin and Apoptosis

Cardioprotective Potential of Telmisartan: A Study on H9c2 Cell Viability, ROS Reduction, and Antioxidant Enzyme Activity

Sachin S. Nayaka[1], V. Krishna[1], J. Narayana[2] and Ravi Kumar S.[1]

[1]*Department of Biotechnology, Kuvempu University, Shankaraghatta.*

[2]*Department of Environmental Science, Kuvempu University, Shankaraghatta.*

Email: sachinsnayaka@gmail.com

Abstract

Cardiovascular diseases (CVDs) are a major global health concern, often exacerbated by oxidative stress-induced myocardial damage. This study investigates the cardioprotective properties of telmisartan in H9c2 cardiomyocytes exposed to oxidative stress induced by hydrogen peroxide (H2O2). Cell viability assays revealed that telmisartan, at an optimal concentration of 25 µg/ml, significantly enhanced cell survival (79.40%) compared to H2O2-treated cells. Furthermore, reactive oxygen species (ROS) assays demonstrated that telmisartan pre-treatment reduced ROS generation (32.29%) in comparison to untreated controls. The study also evaluated the cellular antioxidant defense system, showing a marked increase in key enzymatic antioxidants, including superoxide dismutase (SOD), catalase (CAT), glutathione (GSH), and glutathione peroxidase (GPx), upon telmisartan treatment. Additionally, nuclear morphology assessment confirmed that telmisartan mitigated oxidative stress-induced apoptotic changes, preserving normal cell structure. These findings suggest that telmisartan exhibits significant cardioprotective effects by enhancing cell viability, reducing oxidative stress, and upregulating antioxidant enzyme activity, thereby providing potential therapeutic benefits for cardiovascular health.

Keywords: Cardioprotection, Telmisartan, Oxidative Stress, Antioxidant Enzymes, H9c2 Cells

Identification and Functional Analysis of Hub Genes in Hepatocellular Carcinoma through Bioinformatics Approaches

Ganapati Pakkirappa Yadav[1], Pradeepa K.[1] and Kumara Swamy H. M.[2]

[1]*Department of Biotechnology, Sahyadri Science College, Shivamogga,*

[2]*Department of Biotechnology, Jnana Sahyadri, Kuvempu University Shankarghatta*

Email: pradie.k@gmail.com

Abstract

Hepatocellular carcinoma (HCC) is a major cause of cancer-related deaths, characterized by significant heterogeneity and limited treatment options. This study aims to identify key oncogenic drivers of HCC by combining molecular profiling, pathway analysis, and survival studies. Data from GeneCards, cBioPortal, and DisGeNET were analyzed to identify overlapping genes, resulting in 27 common protein-coding genes after eliminating duplicates and non-coding sequences. These genes were used to generate a high-confidence protein-protein interaction (PPI) network in the STRING database. The PPI network was analyzed using Cytoscape, and hub genes were identified using the CytoHubba plugin with five metrics: Radiality, Degree, Betweenness, Bottleneck, and Closeness. Genes consistently ranked in the top five across these metrics were considered hub genes. KEGG pathways and gene ontology (GO) analysis were performed to examine the biological functions of these hub genes. Kaplan-Meier plots were created to assess survival outcomes.Six hub genes—TP53, CTNNB1, EGFR, PIK3CA, IL6, and IGF1R—were identified as key regulators in tumor growth and prognosis in HCC. GO analysis linked these genes to immune responses, cellular signaling, Akt signaling, phosphorylation, and cell proliferation. Pathway analysis revealed their involvement in various cancers, including HCC, glioma, and colorectal cancer, with enrichment in the proteoglycans in cancer pathway. CTNNB1 and PIK3CA expression increased with tumor grade, while EGFR and IGF1R expression decreased in advanced tumors. EGFR was associated with better outcomes, while IL6 and IGF1R indicated poor survival. Mutations in TP53, CTNNB1, and PIK3CA were critical for prognosis.This study provides valuable insights into the molecular drivers of HCC and suggests potential biomarkers for prognosis and therapeutic targeting.

Keywords: Hepatocellular carcinoma, PPI network, Survival analysis, Gene ontology, Therapeutic targets

Phytochemical Screening and *in vitro* Antibacterial, Antioxidant, Anti-inflammatory, Antidiabetic Attributes of *Senna auriculata* (L.) Roxb. Leaves

Renuka K. P.

Department of P.G. Studies and Research in Microbiology, Kuvempu University, Jnana Sahyadri, Shankaraghatta-577 451, Karnataka, India

Email: renu.kp27@gmail.com

Abstract

This study was aimed to determine total phytochemical components as well as in vitro antibacterial, antioxidant, anti-inflammatory and anti-diabetic, attributes of *Senna auriculata* (L.) Roxb. leaves extract. Among different solvent extracts tested, methanolic extract revealed maximum alkaloid, flavonoids, phenolic, and tannin contents of 90.41 ± 0.15 mg atropine equivalent/g, 156.64 ± 0.97 mg quercetin equivalent/g, 155.44 ± 1.65 mg gallic acid equivalent/g, and 121.31 ± 2.34 mg gallic acid equivalent/g of extract, respectively. Antibacterial activity of methanolic extract was determined against indicator pathogens using agar well diffusion assay which exhibited potential activity against *E. coli*, *K. pneumoniae*, *P. aeruginosa, S. aureus* and *S. typhi*. Antioxidants, anti-inflammatory, anti-diabetic attributes of methanolic extract were analysed using standard methodologies. The extract exhibited potential antioxidant traits by scavenging ABTS (IC50 value−224.2 µg/mL) and DPPH (IC50 value−76.24 µg/mL) in a concentration dependent manner. Further, the extract demonstrated significant anti-inflammatory activities at varied doses with an IC50 value of 55.7 µg/mL. The methanolic extract exhibited promising rates of α-amylase and α-glucosidase inhibition with IC50 values of 49.45 and 38.72 µg/mL, respectively. GC–MS analysis of methanolic extract revealed the presence of Mome inositol, 13-Docosenamide, (Z)-, Cycloheptasiloxane, tetradecamethyl-, and Octadecanoic acid, 2-hydroxy-1-(hydroxymethyl) ethyl ester as predominant compounds. In conclusion, the biological properties of *S. auriculata* leaves suggested its vast role as ideal antibacterial, antioxidant, anti-inflammatory, anti-diabetic gents in future.

Keywords: Phytochemical properties, *Senna auriculata* (L.) Roxb, Anti-inflammatory, Antidiabetic

Breaking Seed Dormancy of *Hibiscus lobatus* – A Vulnerable Medicinal Plant of the Central Western Ghats

Karthik T. D.[1], Krishna V.[1], Sourabh Giri B. U.[1], Raagavalli K.[2] and Syeda A. S.[1]

[1]*Department of Biotechnology, Kuvempu University, Shankaraghatta-577451, Karnataka, India*

[2]*Department of Biotechnology, Sahyadri Science College, Shivamogga-577203, Karnataka, India*

Email: karthiktdtke@gmail.com

Abstract

Hibiscus lobatus Kuntze is a medicinally important annual plant known for its ethnopharmacological applications, particularly in wound healing and anti-inflammatory treatments. Predominantly found in the Western Ghats, its natural population is declining due to habitat loss, overexploitation, and poor seed germination. Seed dormancy is a major factor limiting its regeneration, as field germination rates remain low despite viable seeds. This study assessed seed viability, dormancy-breaking treatments, and germination responses under field and in vitro conditions. Tetrazolium (TZ) testing confirmed seed viability, yet field trials showed poor germination (4–6%), indicating strong dormancy. Among dormancy-breaking treatments, sulfuric acid scarification (15%) significantly improved germination under field conditions, achieving 38.5±1.4%. In vitro, GA_3 (1 mg/L) effectively induced germination, reaching 58.8±3.6% for 1-month-old seeds, 56.6±3.2% for 5-month-old seeds, and 55.5±3.2% for 10-month-old seeds within 16–20 days. Combining 15% sulfuric acid pretreatment with GA_3 further enhanced germination to 76.3±4.2%, 72.5±5.3%, and 71.5±5.3% for 1-, 5-, and 10-month-old seeds, respectively. Additionally, hot water treatment (60°C) combined with GA_3 reduced germination time to 11–15 days while increasing germination rates. These findings establish an optimized protocol for overcoming dormancy in *H. lobatus*, ensuring improved seedling establishment. This approach provides a sustainable strategy for conserving and propagating this medicinal plant, addressing its declining population trend.

Keywords: *Hibiscus lobatus,* medicinal plant, Seed dormancy, *in vitro* germination

Evaluation of Phytochemical, HR-LCMS Analysis and Antibacterial Activity of Ethyl Acetate Extract of *Claviceps Purpurea*

Lokesh S. T. and B. Thippeswamy

Department of P.G. Studies and Research in Microbiology,

Bioscience Complex, Kuvempu University, JnanaSahyadri, Shankaraghatta–577 451, Shivamogga District, Karnataka, INDIA.

Email: thippeswamyb205@gmail.com

Abstract

Claviceps purpurea, a well-known species in pharmaceuticals, produces ergot alkaloids with diverse biological activities, Ergot alkaloids are well-known mycotoxins that can contaminate food and feed but also can serve as starting materials for important pharmaceuticals. Microbial secondary metabolites have provided numerous pharmaceutical agents ranging from antibiotics to immunosuppressive compounds. The present study deals with the secondary metabolites of ethyl acetate extract of *Claviceps purpurea* containing abundant active compounds, these compounds show good phytochemical values evaluated by alkaloids, tannins, terpenoids, glycosides and steroids. In secondary metabolites, a number of therapeutic compounds are existing assessed by HR-LCMS and for using this extract to test the antibacterial activity. Ethyl acetate extract of *C. purpurea* showed positive results of all the tests of phytochemical analysis. For Dragendorff's test indicating presence of alkaloids, ferric chloride test indicating presence of tannins, Salkowski's test indicating presence of phenols and steroids, Liebermann's test indicating presence of glycosides and in HR-LCMS analysis, Aldicarb, Arecoline, Glimepiride, Gedunin and Pentobarbital compounds were detected. These compounds show the antimicrobial property. Using this extract, to test antibacterial activity, *Staphylococcus aureus* showed more zone of inhibition (13.1±0.3mm) compared to other tested bacteria. Based on these results the secondary metabolites of *Claviceps purpurea* show significant results in pharmacological activities.

Keywords: *Claviceps purpurea*, Alkaloids, HR-LCMS, Terpenoids, *Staphylococcus aureus*

Phytochemical Profiling, Pharmacological Potential, and Ethnobotanical Significance of Hibiscus radiatus: A Promising Candidate for Modern Therapeutics

H. Raja Naika, C. P. Bhargavi and S. Chandan

Department of Environmental Science, School of Earth Science Systems (SESS), Central University of Kerala, Tejaswini Hills, Periya, Kasaragod, 671320, Kerala, India

Email: rajanaika@cukerala.ac.in

Abstract

Hibiscus radiatus, a nutritionally rich yet underexplored edible plant, holds immense potential for modern therapeutics due to its diverse phytochemical composition and pharmacological properties. This study investigates the methanolic extract of *H. radiatus* leaves, focusing on its phytochemical profile, antioxidant potential, and cytotoxicity against pancreatic cancer cell lines. Qualitative and quantitative analyses revealed a significant presence of bioactive compounds, including flavonoids (37.8 ± 1.5 mg QE/g), phenolics (49.2 ± 2.1 mg GAE/g), and alkaloids (12.6 ± 0.9 mg AE/g), which contribute to its medicinal properties. The antioxidant potential was evaluated using DPPH (IC_{50} = 68.4 ± 2.3 µg/mL), FRAP (450.2 ± 8.7 µmol Fe^{2+}/g), and ABTS (IC_{50} = 54.7 ± 1.9 µg/mL) assays, confirming its robust free radical scavenging activity. Furthermore, the cytotoxic potential of *H. radiatus* was assessed through MTT assays on pancreatic cancer cell lines PANC-1 and MIA PaCa-2. The extract exhibited dose-dependent cytotoxicity, with IC_{50} values of 72.6 ± 3.1 µg/mL and 58.3 ± 2.7 µg/mL, respectively, suggesting its potential as an anti-cancer agent. The promising bioactivity of *H. radiatus* can be attributed to its high polyphenolic content, which may modulate oxidative stress and apoptosis pathways in cancer cells. These findings underscore the ethnopharmacological relevance of *H. radiatus* and support its therapeutic applications in oxidative stress-related diseases and cancer. The study provides a strong foundation for further mechanistic exploration, in vivo studies, and formulation development to harness its full pharmacological potential. With its remarkable bioactive properties, *H. radiatus* emerges as an up-and-coming candidate for natural product-based drug discovery, warranting further scientific validation and clinical translation.

Keywords: *Hibiscus radiatus*, Phytochemical analysis, Antioxidant activity, Cytotoxicity, Pancreatic cancer

Phytochemical Profiling of Selected Ethnomedicinal Plants and Their Therapeutic Potential

S. P. Kavya and N. Mallikarjun

Department of Studies and Research in Microbiology, Sahyadri Science College, Kuvempu University, Shivamogga. Karnataka, India.

Email: kavyasp07@gmail.com

Abstract

Medicinal plants play a crucial role in traditional healthcare systems due to their diverse bioactive compounds. This study focuses on the phytochemical screening of seven medicinal plants *Tinospora cordifolia, Punica granatum, Moringa oleifera, Momordica charantia, Eugenia jambolana, Annona squamosa,* and *Carica papaya* collected from Bhadravathi Taluk, Shivamogga district, Karnataka. The objective was to identify the presence of secondary metabolites that contribute to their medicinal properties. Leaf samples were collected, thoroughly cleaned, shade-dried, and powdered for extraction using methanol, acetone, chloroform, and aqueous solvents. Standard qualitative tests were performed to detect alkaloids, flavonoids, steroids, terpenoids, tannins, glycosides, phenols, carbohydrates, amino acids, and proteins. The analysis revealed that these plants contain a wide range of phytochemicals, with variations based on the solvent used. *Tinospora cordifolia* and *Punica granatum* exhibited significant amounts of alkaloids, flavonoids, steroids, terpenoids, glycosides, and carbohydrates. *Moringa oleifera* and *Momordica charantia* were rich in flavonoids, tannins, glycosides, and phenols, whereas *Eugenia jambolana, Annona squamosa,* and *Carica papaya* displayed similar phytochemical compositions. The presence of these bioactive compounds suggests that these plants possess therapeutic potential, including anti-inflammatory, antimicrobial, antioxidant, and antidiabetic properties. This research emphasizes the importance of phytochemical analysis in identifying natural sources for drug development. Further studies on the pharmacological effects of these plants could lead to new advancements in herbal medicine and pharmaceutical applications.

Keywords: Medicinal plants, phytochemical screening, bioactive compounds, secondary metabolites, therapeutic potential

Phytochemical Screening and Antibacterial Study of *Barringtonia acutangula* (L.) Fruit Extract

Syeda Misba Fathima[1], Pradeepa K.[1] and Santosh Kumar H. S.[2]

[1]*Department of Biotechnology, Sahyadri Science College, Shivamogga,*

[2]*Department of Biotechnology, Jnana Sahyadri, Kuvempu University Shankarghatta*

Email: pradie.k@gmail.com

Abstract

Barringtonia acutangula (L.) Gaertn (Fam. Lecythidaceae), locally called Samudraphal, is a medicinal tree common in sub-Himalayan tracts, Madhya Pradesh, and peninsular India. In Ayurveda, its roots, leaves, and fruits are used to treat jaundice, liver, stomach, leprosy, and spleenic disorders. This study aimed to screen the phytochemicals and antibacterial properties of its fruit extract. The fruits were procured from the local market, shade-dried, powdered, and extracted using methanol via maceration for three days. The extract was desiccated and analyzed for phytochemicals using standard tests and HR-LCMS, identifying compounds through Metlin Library matching. Pathogenic Gram-positive (*Staphylococcus aureus*) and Gram-negative bacteria (*Escherichia coli, Salmonella typhi, Shigella flexneri, Pseudomonas aeruginosa, Klebsiella pneumoniae*) were tested for susceptibility using Agar well diffusion assay. The reddish-brown fruit extract was fully soluble in methanol and DMSO, partially in water. Phytochemical screening revealed saponins, alkaloids, carbohydrates, glycosides, proteins, flavonoids, phenolics, tannins, terpenoids, and phytosterols. The extract's total phenolic content was 5.49±0.56 µg GAE/mg, and flavonoid content was 33.36±4.26 µg QE/mg. HR-LCMS detected 52 known bioactive compounds. Antibacterial tests showed concentration-dependent inhibition, with *Staphylococcus aureus* being highly susceptible. Among Gram-negative bacteria, inhibitory activity was most pronounced against *Pseudomonas aeruginosa*, followed by *Salmonella typhimurium* and *Shigella flexneri*. This study confirms that *B. acutangula* fruit extract contains diverse bioactive phytochemicals and exhibits significant antibacterial activity, highlighting its medicinal potential.

Keywords: *Barringtonia acutangula,* HR-LCMS, Antibacterial activity, Ayurveda

In Vitro Propagation of *Buchanania lanzan* for Sustainable Conservation

Ajith S.[1], Krishna V.[2] and Ravi Kumar S.[2]

[1]*Department of PG Studies and Research in Food Technology, Kuvempu University Shankaraghatta, Karnataka, 577451, India*

[2]*Department of PG Studies and Research in Biotechnology, Kuvempu University Shankaraghatta, Karnataka, 577451, India*

Email: ajithbhat23@gmail.com

Abstract

Micropropagation protocol was developed for an endangered medicinal plant *Buchanania lanzan* (Family Anacardiaceae) via direct organogenesis from leaf explant. The chironji oil obtained from the seeds used in nutraceuticals and cosmetics and the leaf extract is used as an antioxidant and antidiarrheal drug. A method for rapid *In vitro* propagation of *B. lanzan* (L.) was developed *In vitro* seeds culturing. The seeds sterilized thoroughly and inoculated M.S media. Supplemented with GA3 and BAP leaf explant obtained from seedling used for *In vitro* shoots and roots development. *In vitro* seed germination showed a 79.33% response to concentration on MS+GA3 200mg/l. Direct organogenesis using the leaf explant treated with thidiazuron (TDZ), and Coconut water at 2 mg/l, 2 ml/l respectively were found to be optimum for direct shoot induction and growth with an average of 3.17 ± 0.37 shoots per explants. Successful i*n vitro* rooting was induced from the cut end of the micro shoots. The maximum number of roots was obtained on 3.39 ± 0.22 on MS + NAA 1.5 mg/l. The regenerated shoots along a well-developed root have been effectively acclimatized then established within poly cups containing base rite afterward transferred to earthen pots containing garden soil and manure (2:1), then grown under greenhouse conditions with a 78 percent survival rate.

Keywords: *Buchanania lanzan*, Micropropagation, Coconut water, Direct organogenesis

In silico Vaccine Design Against *Helicobacter pylori*

Reshma R. M., Shwetashri B. H. and Joy Hoskeri H.

Department of Bioinformatics, Karnataka State Akkamahadevi Women University, Vijayapura, Karnataka, India

Abstract

A bacterium known as *Helicobacter pylori* affects the stomach and is linked to a number of gastrointestinal conditions, including gastritis, peptic ulcers, and gastric cancer. Antibiotics are typically used as part of treatment for *H. pylori* infections, but the rise of antibiotic-resistant forms has raised serious concerns. As a result, several strategies including vaccine development are being investigated. In this study, we suggest an approach for developing an *in silico H. pylori* vaccine. Finding possible antigenic targets to activate an immune response against the bacterium is the goal. In order to identify antigenic areas in *H. pylori* proteins, we used a variety of computational techniques and methods. The immunogenicity and cross-reactivity of these anticipated antigens with human proteins was then assessed. Based on our investigation, we were able to pinpoint a number of prospective antigenic targets with favorable immunogenicity and low cross-reactivity. These targets include virulence components, and outer membrane proteins. In order to evaluate the binding affinity between these antigens and Major Histocompatibility Complex (MHC) molecules, we also ran molecular docking simulations. The result of the investigation revealed that structures of the predicted epitopes and the structure of HLA-A*01:01. The interactions of the epitopes and HLA-A*01:01 is visualized using discovery studio, the interaction of epitopes structure (FSYTKSLSY) showed the binding energy of (-1.16 kJ/mol). Our research offers useful information for the development of a prospective *H. pylori* vaccination. We may be able to trigger an immune response that completely eradicates the bacterium by selecting particular antigenic areas to target. This *in silico* strategy for designing vaccines is both affordable and quick, and it can be further supported by experimental research.

Keywords: *Helicobacter pylori*, Immunogenicity, Cross-reactivity, computational techniques, Molecular docking simulations, Antigenic targets, *In silico* vaccine design

Qualitative and Quantitative Analysis of *Embelia tsjeriam-cottam* Stem Extract and its Antioxidant Activity

Chaitra B. Vantamuri, Vinayak Lokapur and Varsha Jayakar

PG Department of Biochemistry, GSS College, Rani Chennamma University, Belagavi-

Email: vinayak.lokapur@gmail.com

Abstract

Oxidative stress triggered by a buildup of reactive oxygen species (ROS) is linked to the onset and progression of breast cancer, a condition marked by the unchecked growth of cancerous cells in breast tissue. As substitutes, bioactive substances derived from medicinal plants known for their therapeutic and antioxidant qualities are being investigated. The Myrsinaceae family includes the sprawling shrub *Embelia tsjeriam–cottam* (ETC), which is widely valued in Ayurvedic medicine as a potent anthelmintic and recognized for its anti-diabetic, antibacterial, hepatoprotective, and many other properties. Given its historical claims, the study's objectives were to investigate the phytochemicals in-vitro antioxidant activity and screen them using qualitative and quantitative assessments. Standard procedures were used for both qualitative and quantitative analysis. The DPPH radical scavenging, phosphomolybdenum, and FRAP tests were used to evaluate the antioxidant activity. Significant groups of secondary metabolites, including flavonoids, alkaloids, phenols, and saponins, were detected in ETC leaf extract. The amounts of total phenols were highest in methanol extract (0.129±0.0149), whereas flavonoids were highest in hexane extract (0.065±0.0107). The plant extract exhibited the greatest levels of total saponin and total alkaloids (0.234±0.01633 and 0.232±0.01633, respectively). Furthermore, it exhibited the strongest antioxidant capacity, as shown by the FRAP and PM assays as well as DPPH, where the IC50 values for ETC hexane, ETC methanol, and ETC water were 1.512 µg/mL, 17.09 µg/mL, and 456.7 µg/mL, respectively, and ascorbic acid, 0.362 µg/mL. The results showed that ETC stem extract has a significant number of bioactive components. The presence of these phytochemicals, particularly flavonoids and phenols, may be the reason why *Embelia tsjeriam-cottam* is used in ethnomedicine to treat a variety of illnesses.

Keywords: *Embelia tsjeriam–cottam*, antioxidant, cytotoxicity, Lung cancer, mouse fibroblast cell line

Phytochemical in vitro antioxidants and anticancer effect of *Nothopegia racemosa* and *Archidendron monadelphum*; medicinal plant from Western Ghats.

Gururaj S Bosle, Megha G, Meghana P, Sachin G C, Sandeep Kumar Jain R, Pooja S Rajaput, Prashanth N and Kumaraswamy H M

Department of Biotechnology, Kuvempu University, Shankaraghatta, Karnataka, India.
Email ID: drhmklab@gmail.com

Abstract

In recent days there has been an increasing interest among the scientific community on plant based drugs due to their protective effects against numerous diseases. *Nothopegia racemosa* (NR) and *Archidendron monadelphum* (AM) are the two plants of Western Ghats possessing rich bioactive compounds. The research aims to investigate the potential antioxidant property, protective effects on induced oxidative damage and cytotoxic property of bark and leaf ethanol extracts of plants. Phytochemical screening, estimation of total phenols and flavonoids were performed using standard methods. Antioxidant activity was performed by reducing power, radical scavenging activity and phosphomolybdenum assay. Anti-inflammatory activity was determined by protein denaturation and HRBC method and cytotoxic activity by MTT assay. The results of phytochemical studies showed that bark and leaf ethanol extracts were rich in phenols and flavonoids. The bark extracts of AM and NR exhibited significant antioxidant activity due to the presence of high (AB=0.39±0.01), (NB=0.56±0.02)mg/g EGA total phenol content and greater (AB=0.16±0.01), (NB=0.13±0.01)mg/g EQ total flavonoid content and all the extracts showed strong inhibition of DPPH radical as well possess potential effect on induced oxidative damage in erythrocytes and DNA. The potent free radical scavenging extracts of *Archidendron monadelphum* and *Nothopegia racemosa* could be used to treat the diseases related to oxidative stress. A bio product with such potential profile could be used as a good candidate for the development of new drugs.

Keywords: *Archidendron monadelphum*, *Nothopegia racemosa*, antioxidant, anti-inflammatory, cytotoxic.

Decoding Genetic Aberrations in Vitiligo Through In-Silico Methods

Nayanathara V. and Ganesh G. Tilve

Department of Biotechnology, GM Institute of Technology, Davangere, Karnataka, India
Email id: nayanatharav13@gmail.com

Abstract

Vitiligo is an autoimmune disorder that results in melanocyte loss, leading to skin depigmentation. Despite extensive research, the precise molecular mechanisms and potential therapeutic targets remain inadequately understood, necessitating computational approaches for further exploration. This study aims to identify and characterize key functional proteins involved in vitiligo pathogenesis and evaluate potential ligands through in-silico techniques. Bioinformatics tools were utilized to identify major proteins associated with melanocyte destruction and immune dysregulation. Potential ligands were selected and subjected to molecular docking to assess their interaction with target proteins. Energy calculations were performed to determine the stability of protein-ligand complexes. ADME (Absorption, Distribution, Metabolism, and Excretion) studies were conducted to evaluate the pharmacokinetic properties of the selected ligands. Our analysis identified promising lead compounds exhibiting high binding affinity, favourable energy profiles, and desirable pharmacokinetic properties. These ligands demonstrated significant potential for modulating vitiligo-associated proteins. This study highlights the utility of computational methods in drug discovery for vitiligo. The identified lead compounds provide a foundation for future in-vitro and in-vivo studies, potentially contributing to novel therapeutic interventions for vitiligo management.

Keywords: Vitiligo, computational, drug design, molecular docking methods, macromolecular targets

Role of Indian Spices on The Pathogens Involved in The Wound Infection

Ananya S., Nishchitha M., Shwetha S., Swanitha K and Venugopal T. M.

Department of Microbiology, Sahyadri Science College Shivamogga 577203
Email: venushm09@gmail.com

Abstract

Wounds involve the disruption of healthy tissues, cells, or anatomical integrity, and are often prone to infections due to the rapid growth of pathogens. A key challenge in wound care is promoting healing while preventing microbial proliferation. The growing resistance of microbes, especially multidrug-resistant *Staphylococci*, to standard antibiotics poses a significant global health concern. Resistance genes can be transferred within and between species via bacteriophages, complicating treatment efforts. However, natural products, including spices, have shown promise in reversing microbial resistance to antibiotics.This study aimed to evaluate the antimicrobial activity of ethanol extracts from Indian spices against pathogens associated with wound infections. Wound samples were collected from patients at the district McGANN hospital surgical ward using swab techniques under medical supervision. Samples were preserved in sterile saline and processed for pathogen isolation. Based on morphological, microscopic, and biochemical characteristics, clinical isolates were identified and tested for antibiotic susceptibility. The pathogens isolated included *E. coli*, *S. aureus*, *P. aeruginosa*, *Klebsiella* spp., and *Micrococci* spp. Susceptibility testing against standard antibiotics revealed varying degrees of resistance. Ethanol extracts of selected spices demonstrated notable antibacterial activity against all isolated drug-resistant pathogens. This study suggests that natural spice extracts possess significant antimicrobial potential and may serve as alternative treatments for infections caused by multidrug-resistant microbes.

Keyword: Wound infection, *E. coli, S. aureus,* Antibiotics, Indian spices

In-vitro Phytochemical Analysis, Antioxidant and Anticancer Potential of *Mallotus philippensis* Bark Extract

Chaitra B. Antyal, Vinayak Lokapur and Varsha Jayakar

PG Department of Biochemistry, GSS College, Rani Chennamma University, Belagavi-590006
Email: chaitraantyal@gmail.com

Abstract

The most common and deadly illness affecting women today is breast cancer, which is thought to be the fifth most common cause of death in affluent nations and the second in developing ones because of inadequate diagnosis. The aggressive triple-negative breast cancer (TNBC) subtype, which accounts for 10%–20% of all breast cancers and is distinguished by the lack of HER2 and hormone receptor expression, is one of the malignancy's heterogeneities. Alternative treatments are desperately needed, including less expensive anti-cancer medications based on natural products. In order to address this issue with herbal products, the current study aims to examine the initial phytochemicals, antioxidants, and selective cytotoxicity of *Mallotus philippensis* bark aqueous leaf extract on MDA-MB 231 triple negative breast cancer cell line and L929 mouse fibroblast cell line. To find out how phytochemical components that have cytotoxic and antioxidative properties relate to one another, the extracts phenolic, flavonoid, saponin, and alkaloids concentrations were quantified. Using the DPPH, phosphomolybdenum, and FRAP assays, the antioxidant capacity was assessed. The MTT test was used to determine the cytotoxic activity. High levels of total phenolic (2.808±1.10 mg GAE/g extract in hexane extract) and total flavonoid (4.038±0.067 mg QE/g extract in hexane extract) phenolic and total alkaloids (0.245±0.280 mg/g and 0.260±0.041 mg/g, respectively) phytochemicals are present in the chosen medicinal plant. In comparison to standard L-ascorbic acid, ETC bark extracts showed promising antioxidant potential at higher concentrations, according to the results of antioxidant assays. The IC50 values for ascorbic acid were 0.362 µg/mL, MP hexane was 24.54 µg/mL, MP methanol was 2.379 µg/mL, and MP water was 17.35 µg/mL. Cytotoxic activity shows that cell death increases as extract concentration rises. There can be a beneficial correlation between the outcomes of anti-cancer and antioxidant activities.

Keywords: *Mallotus philippensis*; antioxidant; cytotoxicity; MDA-MB-231; mouse fibroblast cell line

Exploration of Antioxidants and Cytotoxic Properties of *Mallotus philippensis* Leaf Extract Through Phytochemical Analysis

Kiran Belavi, Varsha Jayakar and Vinayak Lokapur

PG Department of Biochemistry, GSS College, Rani Chennamma University, Belagavi-590006
Email: kirandbelavi89@gmail.com

Abstract

One of the main causes of cancer-related deaths globally is breast cancer. In particular, 10– 15% of all breast tumors are triple negative breast cancers (TNBC). Compared to other subtypes of breast cancer, it is a diverse illness with aggressive behaviour, early recurrence, and a poor prognosis. Although *Mallotus philippensis* has been used to treat a variety of illnesses, there isn't much research that demonstrates how its cytotoxicity affects breast cancer cells. To present, however, nothing is known about how *M. philippensis* affects triple-negative breast cancer cells. In order to assess the antioxidant and cytotoxic capabilities of *M. philippensis* leaf extract against the L929 mouse fibroblast cell line and the MDA-MB 231 triple negative breast cancer cell line, the current study first screens the phytochemical contents. The extracts' phenolic, flavonoid, and saponin contents were measured in order to ascertain the connection between the phytochemical substances that have antioxidative and cytotoxic properties. The DPPH, phosphomolybdenum, and FRAP assays were used to test the antioxidant capacity, while the MTT assay was used to measure the cytotoxic activity. Along with having high levels of total phenolic (4.533±1.494 mg GAE/g extract in hexane extract) and total flavonoid (3.983±1.649 mg QE/g extract in hexane extract) phytochemicals, the chosen medicinal plant also has high levels of total alkaloids and total saponins (0.275±0.061 mg/g and 0.242±0.283 mg/g, respectively). Comparing ETC bark extracts to standard L-ascorbic acid, the results of antioxidant assays showed that they had promising antioxidant potential at higher concentrations. The IC50 values for ascorbic acid were 0.362 µg/mL, MP hexane was 50.02 µg/mL, MP methanol was 4.207 µg/mL, and MP water was 9.141 µg/mL. According to cytotoxic action, cell death increases as extract concentration rises. The outcomes of anti-cancer and antioxidant activities could be positively connected.

Keywords: *Mallotus philippensis*, Antioxidants, MTT assay, cytotoxicity, MDA-MB-231

Preliminary phytochemical screening, antioxidant and selective Cytotoxicity of *Embelia tsjeriam-cottam* leaf extract against human lung cancer cell line (A549) and mouse fibroblast cell line (L929)

Archana Shiragave, Varsha Jayakar and Vinayak Lokapur

PG Department of Biochemistry, GSS College, Rani Chennamma University, Belagavi-590006
Email: jayakarvarsha@gmail.com

Abstract

The ability of medicinal plants to cure a wide range of illnesses makes them a valuable source of information for human health. A rambling shrub that belongs to the Myrsinaceae family, *Embelia tsjeriam–cottam* (ETC) is highly valued in Ayurvedic medicine as a potent anthelmintic and is also renowned for its anti-diabetic, antibacterial, and hepatoprotective properties, among many other uses. In view of its traditional claims, and chemical constituents, antioxidant and anticancer activities were evaluated in Lung Cancer. Standard procedures were followed for doing qualitative analysis. The Folin–Ciocalteu technique was used to calculate the total phenolic content. The aluminum chloride colorimetric technique was used to measure the total flavonoid levels. Antioxidant activity was calculated using the DPPH, FRAP, and phosphomolybdenum assays. A human lung cancer cell line (A549) and a mouse fibroblast cell line (L929) were used to test the aqueous extract's cytotoxic capability. Significant groups of secondary metabolites, including flavonoids, alkaloids, phenols, and saponins, were detected in ETC leaf extract. Total phenols were most abundant in hexane extract (0.151 ± 0.057), whereas flavonoids were more abundant in aqueous extract (0.105 ± 0.011). The extracts' ability to scavenge free radicals also demonstrated improved antioxidant qualities; the IC_{50} values of ETC hexane, ETC methanol, and ETC water were 7.865 µg/mL, 10.37 µg/mL, and 49.48 µg/mL, respectively, while ascorbic acid had an IC_{50} value of 0.362 µg/mL. Additionally, ETC's aqueous leaf extract showed the most anticancer effect, with statistical significance at $p<0.001$. Interestingly, it showed the least amount of cytotoxicity against the mouse fibroblast cell line, even at the highest dosage tested (100 µg/ml). The water-based extract, on the other hand, showed significant anticancer potential ($p<0.001$). For human usage, ETC leaf extract shows promise as a possible source of secure and strong antioxidant and anticancer substances.

Keywords: *Embelia tsjeriam–cottam*, antioxidant, cytotoxicity, Lung cancer, mouse fibroblast cell line

Anthocyanin extracts from Black Grapes and its Phytochemical Analysis

Isha.R.V., Darshan.S., Charvi.S. and Archana.H.

Department of Studies in Biotechnology, G M institute of technology, Davangere– 577007, Karnataka, India, Email: isharv417@gmail.com

Abstract

Anthocyanins were extracted from black grapes (Vitis vinifera) to evaluate their antioxidant and health-promoting properties through phytochemical analysis. The extraction process involved maceration using a solvent mixture of 70% methanol with 1% hydrochloric acid at room temperature. Optimization of solvent concentration and extraction duration ensured maximum yield. The total anthocyanin content was quantified using the pH differential method, while standard qualitative tests identified bioactive compounds such as flavonoids, phenolics, tannins, and alkaloids. Antioxidant activity was assessed through the DPPH radical scavenging assay.

The extraction protocol yielded 0.88 mg/g of anthocyanins per fresh grape weight, under optimal conditions (70% methanol solution, 1% hydrochloric acid, and 24-hour maceration). Phytochemical analysis confirmed the presence of flavonoids, phenolic compounds, and tannins. The extract exhibited significant free radical scavenging activity, with an IC50 value of 18.9 µg/mL, demonstrating strong antioxidant potential. These findings highlight a viable method for isolating bioactive compounds from black grapes, which possess notable antioxidant and health-promoting properties.

The study underscores the importance of anthocyanin-rich extracts from black grapes as sources of valuable phytochemicals for potential applications in nutraceuticals and functional foods. Future research could further explore the bioactivity of the extract and its therapeutic implications in mitigating oxidative stress-related disorders.

Keywords: Vitis vinifera, Anthocyanin, Antioxidant activity

Phytochemical Profiling, Antioxidant, and Anti-Inflammatory Potential of *Sonchus arvensis* L.

Syeda A S[1], Krishna V[1]*, Karthik T D[1], Raagavalli K[2] and Sourabh Giri B U[1]

[1]*Department of Biotechnology, Kuvempu University, Shankaraghatta-577451, Karnataka, India*
[2]*Department of Biotechnology, Sahyadri Science College, Shivamogga-577203, Karnataka, India*

Abstract

Sonchus arvensis L., commonly known as field sow-thistle, is a medicinal plant from the Asteraceae family, widely distributed in the temperate and subtropical regions of the Western Ghats. Previous studies have reported its diverse pharmacological properties, including antibacterial, antihyperuricemic, anticancer, antioxidant, anti-inflammatory, antihypertensive, and antidiabetic activities. In this study, sequential Soxhlet extraction was performed, and among the tested extracts, the ethanolic extract exhibited the highest concentrations of bioactive compounds, including alkaloids, flavonoids, tannins, terpenoids, phenolics, and cardiac glycosides. The total flavonoid and phenolic contents of the ethanolic extract were recorded as 186.84 ± 1.27 µg/mg and 163.57 ± 0.36 µg/mg, respectively. Antioxidant activity was assessed using DPPH, metal chelating, and ABTS assays, where the ethanolic extract demonstrated the strongest antioxidant activity among all tested extracts. The IC50 values for the ethanolic extract were 248.86 µg/mL (DPPH assay), 244.21 µg/mL (metal chelating assay), and 241.92 µg/mL (ABTS assay). Furthermore, the ethanolic extract exhibited significant anti-inflammatory potential, as demonstrated in albumin denaturation, protein inhibition, membrane stabilization, and lipoxygenase assays. To further understand its therapeutic potential, the ethanolic extract was subjected to HR-LCMS analysis, which identified several bioactive compounds with significant pharmacological properties. Notable compounds included Momordicin II, known for its anti-inflammatory, anti-diabetic, and antioxidant properties, and Luteolin 4'-O-glucoside, a flavonoid with anti-inflammatory, antioxidant, anti-tumor, and neuroprotective effects. These findings confirm the strong antioxidant and anti-inflammatory properties of *Sonchus arvensis* L., supporting its traditional medicinal use. The identification of bioactive compounds through HR-LCMS further highlights its therapeutic potential, making it a promising candidate for the development of plant-based treatments for oxidative stress and inflammatory disorders.

Keywords: Secondary metabolites, Pharmacological properties, Anti-inflammatory, Antioxidant

Theme – 4

Microbial interactions & therapeutic applications

Biodiversity of Andaman and Nicobar Islands: Mycological Research Perspectives and Challenges

Mahadeva Kumar. S.

Botanical Survey of India, Andaman and Nicobar Regional Centre, Haddo – 744102, Sri Vijaya Puram (Port Blair), Andaman and Nicobar Islands, India
mahadevakumars@gmail.com

Abstract:

The Andaman and Nicobar Islands (ANI) constitute isolated group of islands located at the confluence of the Bay of Bengal and the Andaman Sea. They represents unique biodiversity hot spots regions viz., Andaman group of islands is a part of Indo-Burma biodiversity hotspot and Nicobar Group of Islands are part of Sundaland biodiversity hotspot and their floristic compositions differs significantly. Though major groups of floristic components elucidated the lower group of plants and cryptogams are the least explored from ANI. Researches are reporting new discoveries, species and records from ANI. However, from mycological perspective, except for few notable exceptions, it has not been explored extensively /systematically from ANI. A check list that contains 550 species, belonging to 225 genera and 100 families (44 orders, 10 classes and 7 phyla) of fungi from ANI based on literature are compiled. Some of the specialized researchers like Hosagoudar (2013) focussed some specific groups of fungi (on diversity surveys of Leaf inhabiting meliolalean members of fungal Kingdom) and as a result the most speciose genus is Meliola with 32 species recorded. Most of the ascomycetes fungi recorded from ANI are from terrestrial plant leaves and marine fungi (Chinnaraj 1993). When compared with the mainland ecosystem, the ANI potentially harbours great diversity of fungal diversity. Recently, 2025-18, Niranjan and Sarma explored fungi of Andaman group of Islands with an addition of 54 new species and 26 new records. However, the stumpy number of fungi reported from ANI could be due to lack of concerted efforts taken to study the fungal diversity from this region. Similarly, Chinnaraj contributed exclusively on the diversity of marine fungi and Sethy & Jagadish Ram, 2014 recorded more than 200 Lichenized fungi from ANI. Recently BSI, ANRC, started exploring macrofungal resources from ANI and made a good progress. Though the emphasis is on macrofungi, collections were also made for pathogenic fungi, slime molds, rusts and powdery mildews from ANI. Therefore, detailed information on past mycological explorations and current research activities going on with future opportunities will be appraised in this lead presentation.

Are our Biodiversity products microbiologically safe with sustainable Packing and Nutritional information?

Dr. Anu Appaiah K A

Director, Salutary Nutrifoods, Mysore
Senior Principal Scientist (Rtd), CSIR-CFTRI, Mysore
Independent Member, Scientific Committee, FSSAI, Govt of India
Ex-Chairman – FAD on Alcoholic Beverages, BIS, Govt of India.

Nutraceuticals from our biodiversity is the major product being marketed both for Indian foreign market. Instead of sending crude dried plant material for nutraceuticals extraction, Indian Industries have developed methodologies with active participation of universities and institutes to process and purify the active principles from these plant materials to the required quality standards and purity. Are our crude and purified products produced microbiologically safe and will it be as per the microbiologically safety standards of the land. The microbiological safety of the products is a vertical standard hence mandatory for all the products. How do these samples get contaminated and are their safe to the consumers. Further, the major products are labelled as either sustainable or environmentally friendly or biodiversity friendly and so on. However, when we think of marketing any product, the last thing that an entrepreneur think, is the packaging. Dose our packaging follow all the regulations and requirements of the claims or is it just the product. Yes, we think of all the art work for the label and the information that needs to be put in the label. Many times we do not understand why our samples have been rejected. Is it wrong on the part of the importing country or the consumers to reject our products with reasons that the packaging is not as per the claims. Have we, as a producer or manufacturer really complying with our claims. What are the requirements to be fulfilled for all the claims made on the labels? Let us give a though on these during this talk.

Unlocking the Multifaceted Potential of *Colletotrichum lini* KUMBASBT-16: A Comprehensive Study on Extrolite Pigment Production and Bioactive Properties Isolated from Litter Soil of the Western Ghats in Shivamogga District

Akarsh Subhakar and Thippeswamy Basaiah

Department of Post Graduate Studies and Research in Microbiology
Bioscience Complex, Kuvempu University, Jnana Sahyadri, Shankaraghatta–577451
Email: thippeswamyb205@gmail.com

Abstract

The Western Ghats of India, a biodiversity hotspot, provide a rich environment for microorganisms, including *Colletotrichum lini* isolate KUMBASBT-16, which was studied for its pigment production and potential antimicrobial, antioxidant, and anticancer properties. This isolate was deposited at GenBank (Accession No. MT994640). The optimal conditions for maximum biomass and pigment production were determined as 25°C, pH 7, 2% sucrose, 1% yeast extract, 0.05% potassium phosphate, and 0.5% asparagine. UV-Vis analysis identified a λmax at 390 nm, while FT-IR and UHPLC/MS analyses revealed yellow-colored metabolites, including L-pyroglutamic acid, methyl-1,4-benzoquinone, and 2,2,6,6-tetramethyl-1-piperidinol.

The pigment exhibited significant antimicrobial activity, especially against *Enterococcus faecalis* (inhibition zone: 20.96 ± 0.15 mm), with MIC values ranging from 0.75×10^3 to 1.25×10^3 µg/mL. Antioxidant testing showed strong efficacy, with IC50 values of 338.46 µg/mL for DPPH+ and 117.67 µg/mL for ABTS•+. Additionally, the pigment reduced the viability of HepG2 (IC50: 136.41 µg/mL) and A498 (IC50: 138.71 µg/mL) cancer cells, while being non-toxic to normal HEK-293 cells. These findings suggest that *C. lini* isolate KUMBASBT-16 could be a valuable resource for industrial applications, particularly in the pharmaceutical, food, and textile sectors.

Keywords: *Colletotrichum lini*, Natural colorants, Antimicrobial activity, Antioxidant potential, Anticancer properties, Extrolite pigment production

Probiotic *Lacticaseibacillus paracasei* MYSN17 for antifungal therapeutic benefits in poultry feed

Deepthi B. V., Rakesh S. and M. Y. Sreenivasa

Department of Studies in Microbiology, University of Mysore, Manasagangotri Mysuru- 570 006, Karnataka, India. E-mail: deepthi1806@gmail.com

Abstract

Fungal spoilage in poultry feed leads to significant economic losses and poses serious health risks to poultry and consumers due to mycotoxin contamination. Major mycotoxins include aflatoxins, fumonisins, trichothecenes, etc., which can be carcinogenic, neurotoxic, and immunotoxic, affecting poultry health, productivity, and food safety. The present study aimed to determine the antifungal activity of *Lacticaseibacillus paracasei* MYSN17 against deoxynivalenol (DON)-producing fungus, *Fusarium graminearum* (MTCC 1893). Further, a probiotic-based formulation was prepared and evaluated for its survival ability, nutritional parameters and shelf life. Initially, the probiotic isolate was subjected to an array of standard tests and criteria to determine probiotic attributes and antifungal properties. The isolate was able to utilize a wide range of carbon sources and survive gastrointestinal digestive conditions. MYSN17 survived acidic pH and bile, displayed strong adhesion properties, and inhibited a broad spectrum of bacterial and fungal pathogens. Whole- genome analysis confirmed the functional properties of the probiotic isolate, including its safety, validating its efficacy as a starter culture in fermented food products and in the biocontrol of mycotoxigenic fungus. The cell-free supernatant of MYSN17, analysed by LC-MS, showed the presence organic acids and amino acids as antifungal compounds. *L. paracasei* MYSN17 detoxified DON by 44%. Lyophilization of *L. paracasei* MYSN17 and its spray coating on feed samples resulted in extended shelf life and improved nutritive value of the feed. In feed samples, the lyophilized culture thrived at varying temperatures and inhibited the growth of *F. graminearum* while detoxifying DON. In summary, our findings illustrate the application of *L. paracasei* MYSN17 as an efficient probiotic additive and biocontrol agent in the feed and poultry industry.

Keywords: *Lacticaseibacillus paracasei* MYSN17, deoxynivalenol (DON)

Investigate the mechanoswitching feedback from region-specific mechanical properties of *M. Smegmatis* biofilms at varying ages using an OT microrheological approach

Naveena C. S.[1], Sharath Ananthamurthy[1, b], Sharmistha Banerjee[2], Krishnaveeni[2], Jyothi[1]

[1]*School of Physics, University of Hyderabad, Hyderabad-500046, India,*
[b]*Kuvempu University, Shivamogga, Karnataka-577451,*
[2]*School of Life sciences, University of Hyderabad, Hyderabad-500046, India.*
Email: aryanquanta@gmail.com.

Abstract

Biofilms consist of structured microbial communities embedded in a self-secreted extracellular matrix, allowing bacteria to form macroscopic structures. The role of localized stresses in bacterial colony growth remains largely unexplored. Our study examines how collective mechanical forces influence bacterial cluster dynamics. Biofilms exhibit rheological heterogeneity at the micron scale, making their mechanical properties crucial for understanding bacterial lifecycles. Using OT microrheology techniques, we can quantitatively measure biofilm strength and evaluate how molecular alterations affect rheology. Our experiment demonstrates that localized stress can stretch or compress the biofilm matrix, modifying its elasticity and altering local mechanical properties. Applied stress displaces bacterial cells within the cluster and at its periphery, potentially disrupting structural integrity. Shape changes in bacterial cells due to stress influence their packing and interactions, further modifying cluster mechanics. Stress can also affect local viscosity between bacterial clusters and the surrounding biofilm and it alters the connectivity of the entangled EPS network, affecting the overall mechanical stability, changes in viscosity and integrity of the biofilm. Our findings suggest bacterial cells respond to external perturbations by modifying macromolecular expression, leading to biochemical changes in extracellular polymeric substances (EPS). These alterations impact mechanical properties and biofilm organization. In response to stress, bacteria increase EPS production, creating a stiffer local environment. This change affects pore size and distribution within the biofilm, influencing its mechanical strength and permeability. Understanding biofilm rheology and mechanical responses provides insights into bacterial behavior under environmental stress. These findings could enhance strategies for biofilm management in medical, industrial, and ecological settings.

Keywords: Biofilm, exopolysaccharides, microrheology

Biomicrorheology in *S. cerevisiae* via Particle-tracking and Optical Tweezing

Sruthi N.[1], Krishnaveni Mishra[2] and Sharath Ananthamurthy[1a]

[1]*School of Physics, University of Hyderabad, Prof. CR Rao Road, Gachibowli, Hyderabad, Telangana, India-500046*
[a]*Kuvempu University, Shivamogga, Karnataka-577451,*
[2]*Department of Biochemistry, School of life Sciences, University of Hyderabad, Prof. CR Rao Road, Gachibowli, Hyderabad, Telangana, India-500046*
Email: sruthikd6@gmail.com

Abstract

The cytoplasm of eukaryotic cells contains multiple organelles including the Endoplasmic Reticulum (ER), Golgi bodies, Mitochondria, Vacuole/Lysosomes and Peroxisomes. The shapes and numbers of these organelles are regulated within a narrow range. In certain pathological conditions, the morphology is altered. Particle-tracking measurements via video-microscopy could yield information on the cellular environment in the cytosol and perhaps allow us to quantitatively estimate the levels of disruption in organelle morphology. We would use mutants that have disrupted ER or mitochondria organization and compare with the wild type cells. We attempt to track fluorescent polystyrene beads of diameter 100-300 nm inside a yeast cell, around these organelles & to characterize the cell environment as a preliminary method to quantify the rheology via parameters like viscosity & shear modulus. These nanobeads were inserted via two methods- Forced permeation via Electroporation & a chemical technique of transfection, both optimized for passive and surface functionalised 100nm, 300nm beads. There exist challenges regarding the size of the probes, their interactions within the cell and capturing a time lapse itself. The goal is to try various probes and microscopy techniques to fetch the best set of data corresponding to a reliable Intracellular Particle-tracking experiment and extend measurements via Active rheology using Optical tweezers integrated with Microfluidics.

Keywords: Biomicrorheology. Optical Tweezing, Microfluidics

Isolation of Bovine Mastitis-causing *Staphylococcus aureus* from milk sample and anti-bacterial *Piper longum*

Dhanya K.[1], Kavya M.[1], Sushmitha K. Y.[1], Shirisha Naik Bajpe[1], Abhijeeth S. Badiger[1] and Katenahalli Rudrappa Maruthi[2]

[1] *Department of Biotechnology, SDM College (Autonomous), Ujire - 574240, DK, Karnataka, India* [2] *Department of Botany, School of Sciences, Maulana Azad National Urdu University, Gachibowli, Hyderabad 500032, India*

Abstract

Staphylococcus aureus (SA) is one of the causative agents of Bovine mastitis. SA in recent times years has acquired multiple broad-spectrum- antibiotic Resistance. For the current study, SA was isolated from the infected cow Milk sample from the local region Belthangady, Dakshina Kannada district. Pure culture was isolated and subculture by serial dilution followed by streaking method. Culture of SA was validated by Gram staining and biochemical tests Antibiotic sensitivity using the disc diffusion method with six antibiotics- streptomycin, kanamycin, Tetracycline, Ampicillin, Amoxycillin, and Penicillin. Sequential solvent cold extraction was employed to obtain crude Piper longum extracts. Agar well diffusion using Piper longum crude extract against SA**.** Several colonies of microorganisms were obtained after performing a serial dilution of the compound. *Staphylococcus aureus* Colony Circular, convex, and smooth, Golden-yellow or creamy white were subcultured. After subculturing, the isolates were validated using Gram staining and biochemical tests, which yielded positive results. The absence of a clear zone upon the application of multiple antibiotics to the media containing SA indicates antibiotic resistance. 5 & 10 mg/ ml each concentration of n-Hexane, Chloroform, and Ethanol solvent was prepared. 100 ul of each concentration of different solution was added to the well and then incubated. After applying the well diffusion method with crude *Piper longum* -Hexane, Chloroform, and Ethanol solvent extract, the presence of a clear zone indicates its antibacterial activity against *Staphylococcus aureus.*

Keywords: Antimicrobial Bovine Mastitis, *Piper longum*, Multidrug-Resistant *Staphylococcus aureus*

Exploring the Microbial Landscape and Natural Remedies in the Treatment of Urinary Tract Infections

Kavya M.[1], Sushmitha K. Y. [1], Dhanya K. [1], Shirisha Naik Bajpe[1], Abhijeeth S. Badiger[1] and Katenahalli Rudrappa Maruthi[2]

[1] *Department of Biotechnology, SDM College (Autonomous), Ujire - 574240, DK, Karnataka, India*

[2] *Department of Botany, School of Sciences, Maulana Azad National Urdu University, Gachibowli, Hyderabad 500032, India*

Abstract

Urinary tract infections (UTIs) are prevalent infections that impact various parts of the urinary system, predominantly caused by bacteria, particularly uropathogenic *Escherichia coli* (UPEC), although viruses and fungi can also contribute. This paper provides a comprehensive review of the diverse microbial landscape of UTIs, focusing on the dominant role of the *Enterobacteriaceae* family and the growing concerns around antibiotic resistance driven by the overuse of antibiotics. Emphasizing the potential of natural remedies, we explore the antimicrobial properties of herbs and berries, such as cranberries and proanthocyanidins, which are believed to help prevent bacterial adhesion and support urinary health. The article also highlights the importance of using genotypic methods, such as 16S rRNA sequencing, for identifying uropathogens, and examines the virulence factors of UPEC, including P fimbriae, which play a critical role in infection. Additionally, we explore the function of Tamm-Horsfall Protein (THP), produced by renal tubular cells, in inhibiting bacterial adhesion and its potential to enhance the body's immune response. Through transfection of renal cells with THP plasmids and techniques like Native Polyacrylamide Gel Electrophoresis (NATIVE-PAGE) and Two-Dimensional (2-D) Electrophoresis, this study aims to clarify the protective mechanisms of THP against UTIs. In conclusion, this review stresses the need for alternative treatment strategies to address the challenges of UTIs, emphasizing the promising role of natural remedies when used alongside conventional therapies.

Keywords: Urinary tract infections (UTIs), Uropathogenic *Escherichia coli* (UPEC), *Enterobacteriaceae*

Antibacterial activity of ethanol extract of *Ruta graveolens* against the bacteria isolated from dog saliva

Mehek Nazz, Nida Anjum, Sharada M. S., Sanjana V. S., Mallikarjun N., Venugopal T. M. and Shilpa S.

Department of Microbiology, Sahyadri Science College, Shivamogga 577 203

Abstract

Dog saliva contains over 600 types of bacteria, making it not inherently cleaner than human saliva. Zoonotic infections, transmitted from dogs to humans, pose a significant public health concern. Understanding the risks associated with dog-related bacterial infections, the current study was designed to isolate the organisms from dog saliva. The dog saliva samples were collected from district government veterinary hospital under the supervision of veterinary doctors. The collected samples were processed in the laboratory for initial isolation and identification of organisms. Identification of organism was done based on morphological characters on different media and by performing various biochemical tests. In this current study, a total of 15 bacterial isolates were isolated from dog saliva samples. Based on morphological and biochemical characters, the organisms were identified as *Staphylococcus aureus, Pasteurella spp., E. coli*, and *Streptococcus spp*. All the isolated organism were subjected for antibiotic sensitivity tests against standard antibiotics. The result of this study revealed that all the isolates showed high resistance to Streptomycin antibiotic. *S. aureus* was found to be susceptible to Chloramphenicol antibiotics. E. coli and Pasteurella spp were found to be resistance to Chloramphenicol. Further antibacterial activity of ethanol extract of Ruta graveolens showed a very effective inhibitory activity against all the bacterial isolates. Thus, the present study concludes that, plant-based medicine plays a vital role in the management of infection caused by dog bites.

Keywords: Dog saliva, Antibiotics resistance, *Ruta graveolens*

Isolation of Viridans Group of Streptococci (VGS) and its susceptibility pattern against Standard antibiotics and ethanol extract of *C. guianensis*

Ananya S., Bhavana T., Priyanka D. B., Sanjana V. Salanke and Venugopal T. M.

Department of Microbiology, Sahyadri Science College, Shivamogga, India

Abstract

Viridans Group Streptococci (VGS) represent a group of *Streptococcus* species which exhibits alpha hemolysis on blood agar. The principal species comprises of VGS are *S. mutans, S. salivarius, S. mitis* and *S. sanguis*. These VGS are the part of commensals bacterial flora of the upper respiratory tracts of healthy humans. These causes an opportunistic infections like dental caries and bacterial endocarditis. Based on these facts, the present study was conducted for the isolation of VGS group of streptococci from the patients suffering from dental caries and also to know there antibiogram pattern against standard antibiotics and to know the efficacy of ethanol extract of *Courporita guianensis*. In this current study, infected teeth samples were collected from District Mc-GANN Hospital under the supervision of dental doctors. Further teeth samples were brought to laboratory and streaked on blood agar for the isolation of VGS. After inoculation, biochemical characterizations were done for the clinical isolates. Antibiotic sensitivity test was performed for all the clinical isolates by following Kirby Bauer disc diffusion assay. The antibacterial efficacy of ethanol extract *C. guianensis* was done by following the methodology of agar well diffusion method. The results of this current study revealed that, infected teeth sample yielded a VGS including *S. mutans, S. sanguis, S. mitis* and *S. salivarius*. Antibiogram pattern of these organisms against standard antibiotics showed a susceptibility and resistant pattern. Further, antibacterial activity of ethanol extract of *C. guianensis* exhibited a promising antibacterial activity against resistant bacteria. Thus, by the above findings, it is evident that the ethanol extract of *C. guianensis* can be utilized as an alternative source for the treatment of infection caused by multidrug resistant bacteria.

Keywords: VGS, Blood agar, Dental Caries, Endocarditis. *C.guianensis*

Polyherbal Remedies in the Management of Bovine Mastitis: An Alternative Approach

Dhanya K.[1], Kavya M.[1], Sushmitha K. Y.[1], Shirisha Naik Bajpe[1], Abhijeeth S. Badiger[1] and Katenahalli Rudrappa Maruthi[2]

[1] *Department of Biotechnology, SDM College (Autonomous), Ujire - 574240, DK, Karnataka, India*

[2] *Department of Botany, School of Sciences, Maulana Azad National Urdu University, Gachibowli, Hyderabad 500032, India*

Abstract

Bovine mastitis is widely acknowledged as the most prevalent and economically detrimental condition impacting dairy herds worldwide. This disease results in significant financial losses for the dairy industry, stemming from decreased milk production and quality, increased rates of culling and mortality among affected cows, and the expenses associated with treatment. Traditional treatment primarily relies on antibiotics; however, increasing concerns over antibiotic resistance, the presence of antibiotic residues in milk, and changing consumer preferences for natural products have highlighted the limitations of these conventional approaches. As a result, there is a growing interest in the use of herbal formulations as alternative or adjunct therapies in the management of bovine mastitis. Various medicinal plants, such as Echinacea, turmeric, garlic, neem, and ginger, possess anti-inflammatory, antimicrobial, and immunomodulatory properties that can enhance udder health and support recovery.

Keywords: Bovine Mastitis, Medicinal Plants, Polyherbal Remedies

Antifungal Activity of Probiotic Yeast *Meyerozyma guillermondii* MYSY23 against Mycotoxigenic Fungi *Aspergillus flavus*

B. Shruthi, G. Adithi and M.Y. Sreenivasa

Applied Mycology Lab, Department of Studies in Microbiology, University of Mysore, Mysuru-570006, Karnataka, India.

Abstract

The antifungal potential of the probiotic yeast isolate *Meyerozyma guillermondii* MYSY23 was evaluated against *Aspergillus flavus*, a notorious fungal pathogen. A series of *in vitro* assays demonstrated significant inhibitory effects of MYSY23 on fungal growth. The dual culture assay revealed a notable reduction in *A. flavus* mycelial growth and structural damage, as observed under scanning electron microscopy (SEM). The yeast isolates also showed potent inhibitory effects in the conidial germination assay, with a 79.17% inhibition of conidial germination. Additionally, the cell-free supernatant (CFS) of MYSY23 exhibited a 35.31% inhibition of fungal growth, while volatile organic compounds (VOCs) produced by MYSY23 inhibited fungal growth by 67.44%. The efficacy of MYSY23 was further supported by the reduction in ergosterol content in *A. flavus*, which decreased by 42.30%. The results suggest that MYSY23 exerts potent antifungal activity through direct interaction, VOC production, and metabolic byproducts, highlighting its potential as a biocontrol agent against *A. flavus*. Furthermore, its ability to reduce mycotoxin production offers additional promise for its application in food and feed safety.

Keywords: Probiotic yeast, *Meyerozyma guillermondii, Aspergillus flavus,* Antifungal activity, Mycotoxin

Effect of *Trichoderma viride* Against Alternaria Leaf Spot of Cabbage

Deepak P. R.[1], Megha Varshini Gowda B. R.[2] and K. N. Amruthesh[2]

[1] *Department of Biochemistry, School of Life Sciences, Mysuru, JSSAHER, Mysuru-570015*

[2] *Department of Studies in Botany, University of Mysore, Manasagangotri, Mysuru-570006*

Abstract

The study investigates the biocontrol potential of *Trichoderma viride* against Alternaria leaf spot, a destructive fungal disease affecting *Brassica oleracea* var. *capitata* (cabbage). *Alternaria* sp. is known to cause yield losses in cabbage crops, ranging from 20% to as much as 59%, with severe cases leading to up to 80% loss. This research evaluates the efficacy of *T. viride* as a biocontrol agent, focusing on its impact on plant growth and defense responses. The seed treatment method was employed as the primary approach for applying *T. viride* to cabbage plants. To assess the biocontrol activity, the enzyme phenylalanine ammonia-lyase (PAL), which catalyses the conversion of phenylalanine to trans-cinnamic acid and ammonia, was measured in treated and untreated plants. The results indicated that *T. viride* treatment significantly increased PAL activity in cabbage plants when compared to the control (treated with sterile distilled water), suggesting that *T. viride* effectively stimulates plant defense mechanisms and could serve as an effective biocontrol agent against Alternaria leaf spot.

Keywords: *Trichoderma viride,* Alternaria leaf spot, phenylalanine ammonia-lyase (PAL), *Brassica oleracea*

Probiotic and antifungal attributes of *Lactiplantibacillus plantarum MYSVCF3* isolated from Cluster fig.

Vasundaradevi R. and M.Y. Sreenivasa

Molecular Mycology Laboratory, Department of Studies in Microbiology, University of Mysore, Manasagangothri, Mysuru-570006.
*Email: sreenivasamy@gmail.com *vasudasrinivas@gmail.com*

Abstract

Probiotics are beneficial microorganisms that, when present in adequate amounts, promote health and growth. Plant-based probiotics are particularly valuable for their ability to enhance plant growth, improve vigor, and manage plant pathogens. In this study, a novel lactic acid bacterium was isolated from banyan tree fruit and tested for antifungal activity against *Alternaria alternata*, a well-known phytopathogen, using a dual-culture confrontation assay. The isolate showed tolerance to acidic pH (2 to 4), bile salts (0.3–0.5%), and phenol (0.6%), and exhibited antibiotic sensitivity. A negative haemolysis test confirmed its safety for use. Further tests revealed that the strain, or its 15% cell-free supernatant (CFS), inhibited fungal growth by 80% and completely blocked conidial germination. The plant growth-promoting potential was evaluated using a seed germination test with the paper towel method, calculating root length, shoot length, germination percentage, vigor index and infection incidence. Seeds exposed to *A. alternata* alone had the lowest germination rate (48%) and visible infection. In comparison, probiotic-treated seeds showed germination rates of over 83%, even in the presence of the pathogen. In conclusion, the probiotic strain showed potential as a natural biocontrol agent with both antifungal and plant growth-promoting properties, offering a sustainable alternative to chemical fungicides in agriculture.

Keywords- Cluster fig, *Alternaria alternata*, phytopathogen, antifungal activity, cell free supernatant

Unveiling the Antimucormycotic Potential of *Cinnamomum bejalghota* and its Endophytic Fungi: A Promising Avenue for Future Therapeutics

Chaitra K. N. and Thippeswamy B.

Department of post-graduate studies and research in Microbiology, Kuvempu University, Jnanasahyadri, Shankaraghatta-577451, Karnataka, INDIA. Email: chaitragowda.1812@gmail.com

Abstract

Mucormycosis is a severe, life-threatening fungal infection with high mortality rates, worsened during the COVID-19 pandemic. Antifungal resistance and limited treatment options, along with the adverse effects of Amphotericin B, highlight the need for safer alternatives. In this context, *Cinnamomum bejalghota*, a plant with known antimicrobial properties, was evaluated for its antimucormycotic potential. The antifungal activity of *C. bejalghota* leaf, bark, and essential oil was tested against mucormycosis pathogens (*Absidia blakesleeana*, *Apophysomyces elegans*, *Mucor circinelloides*, and *Rhizopus arrhizus*) using the agar-well diffusion assay. The oil exhibited the highest inhibition zones, outperforming Amphotericin B, with zones measuring 66.5 ± 0.5 mm, 75 ± 0.3 mm, 60 ± 0.6 mm, and 70 ± 0.5 mm, respectively. A spore germination assay confirmed the oil's efficacy, with inhibition percentages of 3.80%, 6.66%, 9.09%, and 8.69%, surpassing Amphotericin B. Additionally, eight endophytic fungi isolated from *C. bejalghota* leaves showed promising antimucormycotic activity. Phytochemical screening identified tannins, terpenoids, and glycosides, compounds known for antifungal effects. Silver nanoparticles (AgNPs) were synthesized using the plant extract, with a peak absorption at 420 nm, confirming successful nanoparticle formation. These findings suggest that *C. bejalghota* bioactive compounds and AgNPs hold potential as novel antimucormycotic agents, offering a promising alternative to conventional antifungal therapies.

Keywords: Mucormycosis, *Cinnamomum bejalghota*, Antimucormycotic, Endophytic fungi, Silver nanoparticles.

Endophytic Fungi from *Centella asiatica*: A Source of Bioactive Compounds and Extracellular Enzymes

Vidya Holeyannavar[1], Anup Hemant Eden[2], Adarsh Hanamanth Biradar[2], Hrishikesh Parab[2] Priya S. Shiraguppi[2], Soumya G. K.[2] and Vootla Shyam Kumar

PG Department of Biotechnology and Microbiology, Karnatak University, Dharwad 580003.
Email: vidya.ghali@gmail.com

Abstract

Endophytic fungi are microorganisms that reside within plant tissues symbiotically, often contributing to the host's defense and metabolism. In this study, endophytic fungi isolated from the medicinal plant *Centella asiatica* were evaluated for their ability to produce bioactive compounds and extracellular enzymes under in vitro conditions. The investigation focused on their biogenic potential, emphasizing their role in secondary metabolite synthesis and enzymatic secretion. A total of twelve fungal isolates were obtained from different plant parts, including leaves, shoots, and roots. Among these, four isolates demonstrated remarkable biogenic activity. These potent isolates were identified as *Penicillium chrysogenum* (isolate EF_S2), *Trichoderma harzianum* (isolate EF_R1), *Fusarium oxysporum* (isolate EF_L4), and *Phoma spp*. (isolate EF_L5). These fungi exhibited significant potential in synthesizing bioactive secondary metabolites and secreting extracellular enzymes, making them promising candidates for biotechnological applications. Molecular identification of the selected isolates was performed using phylogenetic analysis to confirm their taxonomy. Furthermore, the type of secondary metabolites produced by these fungi was analyzed through phytochemical screening, providing insights into their bioactive potential. These findings indicate that endophytic fungi associated with *Centella asiatica* possess significant enzymatic and bioactive capabilities, which could be harnessed for therapeutic applications in clinical microbiology and biotechnology. The ability of these fungi to secrete extracellular enzymes highlights their potential in industrial applications, including bioremediation, pharmaceutical production, and the development of enzyme-based bioactive formulations.

Keywords: Endophytic Fungi, *Centella asiatica,* bioactive formulations

Biogenesis of Polyhydroxybutyrate by utilizing low cost substrates and to analyze fungal depolymerase enzyme for degradation of biopolymer using novel *Bacillus paramycoides* KUMBNGBT- 33

Nandish G. and B. Thippeswamy

Department of P. G. Studies and Research in Microbiology, Bioscience Complex, Jnanasahyadri, Kuvempu University, Shankaraghatta – 577 451, Karnataka, INDIA
Email: thippeswamyb272@yahoo.in

Abstract

Polyhydroxybutyrate (PHB), a biodegradable biopolymer, was first discovered by Maurice Lemoigne in 1925. In this study, a PHB-producing strain was isolated from a soil sample collected from Kundadri, Shivamogga district, Karnataka, India. The bacterium was screened using various staining techniques, and PHB production was quantified via solvent extraction. Morphological and biochemical tests identified the bacterium, and genomic identification using 16S rRNA gene sequencing confirmed it as *Bacillus paramycoides* KUMBNGBT-33 (GenBank accession No. MW056185). Optimal conditions for PHB production were determined as follows: nutrient broth medium, 72 hours incubation at 37°C, pH 7.0, with glucose as the carbon source, ammonium chloride as the nitrogen source, and a carbon-to-nitrogen ratio of 4:1. Submerged fermentation with various agro-industrial residues, including rice bran, yielded the highest PHB production. The PHB content was quantified using a UV-visible spectrophotometer with a λmax at 235 nm.

The chemical nature of the PHB was analyzed using FT-IR, HR-LCMS, NMR, TGA, and DSC techniques. The biodegradability of PHB was assessed using depolymerase enzymes, with five soil fungi isolated and identified: *Arcopilus aureus*, *Talaromyces terricolous*, *Aspergillus insuetus*, *Penicillium chrysogenum*, and *Aspergillus versicolor*. *A. aureus* and *A. insuetus* demonstrated the highest PHB degradation rates, indicating their role in PHB biodegradation through depolymerase enzymes.

Keywords: Agro-industrial residues, ammonium precipitation, *Bacillus paramycoides*, GenBank and UV-visible spectrophotometer.

Antifungal Attributes of LAB MYSN3 Against *Sclerotium rolfsii*

Dhanuja J.[1], Pruthviraj[2] and M. Y. Sreenivasa[1]

[1]*Department of Studies in Microbiology, University of Mysore, Manasagangotri, Mysuru-57006*

[2]*Department of Plant Pathology College of Agricultural Science Applied Research (CASAR), Bharatiya Engineering Science and Technology Innovation University, Andhra Pradesh-515231*

Email: mys@microbiology.uni-mysore.ac.in, dhanujaj97@gmail.com

Abstract

Plant-pathogenic *Sclerotium rolfsii* is one of the most harmful fungi in almost 500 host plants. It causes wilting, head rot, root rot, and southern blight. The rate of infection varies from 3% to 28%, with tomatoes being one of the most significant plants among the many vegetable crops that are affected. The screening of ten lactic acid bacteria (LAB) isolates against *S. rolfsii* is assessed in this study. Among them, the LAB isolate MYSN3 significantly reduced growth in the dual culture in the primary screening method. The broth microdilution technique found the minimal inhibitory concentration that demonstrated crude CFS's effectiveness in reducing growth completely, where in >60% of the fungal biomass was inhibited when evaluated with crude CFS at different concentrations. Significant damage to the cell wall and cell membrane was revealed by the structural anomalies, and cell wall destruction was seen under a fluorescence microscope using propidium iodide dye. The noticeable red DNA has absorbed the dye. The current investigation shows that MYSN3, a possible LAB isolate, has a promising antagonistic biocontrol impact on *S. rolfsii*.

Keywords: *Sclerotium rolfsii,* Lactic acid bacteria, MYSN3

Molecular Basis of Host-Pathogen Interaction

Venkatesh[1] and V. Krishna[2]

*[1]*Department of Studies in Food Technology, Davangere University, Shivagangothri, Davanagere-577007, Karnataka, India*
[2]*Department of Studies and Research in Biotechnology, Kuvempu University, Shankaraghatta, Shimoga, Karnataka, India*

Abstract

Musa paradisiaca L. cv. Puttabale is indigenous banana and highly susceptible to *Fusarium* infection causes the yield loss approximately 30 – 40% at standing stage. The pathogenesis and symptoms of panama wilt is similar to other fungal diseases. It is very difficult to confirm panama wilt disease unless corroborated with morphological and molecular evidences. The disease control strategies such as, quarantine and exclusion practices, flood fallowing, crop rotation and the use of organic amendments are commonly employed in controlling the Foc wilt disease effectively. Chemical control measures do not exist, and partial control of the pathogen has largely relied on the use of methyl bromide. However, fumigated areas thoroughly reinvaded by the pathogen and the use of methyl bromide have now been restricted in many countries. In addition, accumulation of chemicals in the soil leads to detrimental effects on environment. Therefore, biological control and the use of chemical or biological products to induce systemic resistance in plants have to investigate for the control of panama wilt disease. Alternately, plant-breeding techniques acquire the central part for disease resistance lines. However, success rate is very limited in plant breeding due to its polyploidy nature, heterozygosity, sterility, low fertility and limited genetic variability. Banana proteomics research has made considerable progress in providing functional information of proteins expressed in various stresses including developmental stages, tissues, cells in osmotic stresses, cold tolerance, Foc infection on banana. Advanced MS techniques and *Musa* ssp. mRNAs database has identified the 1131 unique proteins belonging to various biochemical pathways in banana fruit. Sequence of *Musa acuminata* ssp. *malaccensis* chloroplast, sequence of *Musa acuminata* nuclear genome and a draft *Musa balbisiana* genome sequence has been available in public domain which will leads a new insight for genetic improvement of banana plant.

Keywords: Panama Wilt, *Musa paradisiaca* L. cv. Puttabale, Proteomics etc.

Native *Saccharomyces boulardii* from *Annona squamosa*: A Potential Probiotic Candidate

Ankita Balakrishna Nayak and Thippeswamy Basaiah

Department of Post-Graduate Studies and Research in Microbiology Jnanasahyadri, Kuvempu University, Shankaraghatta-577451, Shivamogga, Karnataka, INDIA.
Email: thippeswamyb205@gmail.com

Abstract

Probiotic yeasts, particularly *Saccharomyces boulardii*, have garnered a lot of interest for their beneficial effects on gut health and sickness prevention. This study aimed to discover, isolate, and evaluate the probiotic potential of *S. boulardii* from the sugar apple, *Annona squamosa*. The yeast strain was isolated using morphological, biochemical, and molecular techniques. Important probiotic traits were assessed, such as auto-aggregation ability, cell surface hydrophobicity, and tolerance to bile salts and acidic pH. According to the results, the isolated strain of *S. boulardii* possesses significant probiotic qualities, suggesting that it might be used in functional foods and pharmaceutical formulations. These findings suggest that *Annona squamosa* may be a special natural source of *S. boulardii*, which highlights the potential use of this plant in functional foods and medications. Further studies on its metabolic and health benefits might broaden its use in probiotic compositions.

Keywords: Functional food, Sugar apple, Positive benefits, Beneficial microbes, Gut health

Evaluation of *Amaranthus tricolor L.* Extract for Termite and Ant Control: A Natural Approach to Biopesticide Development

Roopith H. Chavan, Devaraja B. J. and Santosh Kumar S. R.

Department of Studies in Food Technology, Davangere University, Shivagangothri, Davangere - 577007

Abstract

The increasing resistance of termites and ants to synthetic insecticides, coupled with environmental and health concerns, has led to the exploration of plant-based alternatives for pest control. *Amaranthus tricolor* L., a widely cultivated leafy vegetable, contains a rich phytochemical profile with potential insecticidal properties. This study evaluates the efficacy of *A. tricolor* leaf extracts against *Odontotermes obesus* (termite) and *Paratrechina longicornis* (ant) under laboratory conditions. Following methodologies established in prior research on botanical insecticides, *A. tricolor* leaves were subjected to solvent extraction using methanol. The extracts were screened for phytochemical composition and tested for insecticidal activity by treating filter paper discs with varying concentrations (100–1000 mg/mL) of the extract. Mortality rates of termites and ants were recorded 6-hour, 12-hour, and 24-hour intervals. Preliminary results indicate that the methanolic extract of *A. tricolor* exhibited significant insecticidal properties, comparable to established botanical pesticides such as *Azadirachta indica* and *Eucalyptus citriodora*. The presence of bioactive compounds such as flavonoids, alkaloids, and terpenoids in *A. tricolor* suggests its potential as an eco-friendly alternative for pest control. Further investigation into its mode of action and field applicability is recommended to validate its commercial viability as a biopesticide.

Keywords: *Amaranthus tricolor*, Termite control, Ant repellence, Phytochemicals, Biopesticides, Natural insecticides

Ideonella sakaiensis: A promising bacterium for plastic degradation

Nagaraj. R. Hiremath, G. N., Venugopal T. M. and Manjunatha D.

Department of Microbiology, Sahyadri Science College, Shivamogga, INDIA.

Email: venushm09@gmail.com

Abstract

Ideonella sakaiensis is a tiny bacterium that can breakdown plastic materials especially PET (plastic bottles, plastic covers, etc.) it uses special enzymes to eat it and turn it into harmless chemicals and this is also safe for humans. *Ideonella sakaiensis* is a terrestrial bacterium which is known for decomposing PET (Polyethylene Terephthalate). It produces enzymes, PETase and MHETase that decompose PET into its basic components, suggesting many possible ways for plastic waste management. Basically *I. sakaiensis* is a bacterium which *helps* to decompose the plastic waste in places like land and ocean, to decompose the plastic it breaks down the plastic which turns into useful chemical so we can use that chemical and can produce new plastic materials. It acts as a super microbe which can help to solve the plastic pollution. Based on these key points, one can develop this into a new enzyme which helps to breaks down other varieties of plastics with the help of enzyme engineering. With further research, *I. sakaiensis* or its enzymes could be used in a wider variety of biotechnological application for waste treatment, biofuel production, and environmental management. By this we can combine with plastic making industries too, we can easily reuse the PTE without throwing it away, it will reduce the rate of costs on new raw materials and by *I. sakaiensis* we can easily get rid of the main problem of the world's plastic pollution faster and better. With help of this we can less depend on fossil fuels by not making new raw materials from fuels. In future it can help us and our environment in many ways.

Key words: *Ideonella sakaiensis,* PET, PETase, MHETase

Probiotic potential of Lactic acid bacteria isolated from *Elephas maximus indicus* milk

Dhanyakumari Y. and Thippeswamy Basaiah

Department of Post-Graduate Studies and Research in Microbiology Jnanasahyadri, Kuvempu University, Shankaraghatta-577451, Shivamogga, Karnataka, INDIA.
Email: thippeswamyb205@gmail.com

Abstract

Probiotics are living microorganisms that offer a host of health advantages to the user when taken in enough amounts. In addition to its well-known nutritional advantages, milk is a great source of probiotic microbes. Both humans and animals' typical mucosal microbiome includes the genus *Lactobacillus*. This bacterial group is crucial for preserving intestinal stability, avoiding intestinal infections, and promoting intestinal health in general. Elephant milk has not been utilized to isolate probiotic bacteria, while several probiotic bacteria have been isolated from the milk of different animals, such as cows, buffalo, goats, donkeys, horses, camels, and others. Hence the present study emphasizes the isolation, characterization and evaluation of probiotic properties. For the first time, the study details the probiotic qualities, safety, and effectiveness of two *Enterococcus* species that were isolated from elephant milk: *E. lactis* and *E. faecium.* Using all of the major *in-vitro* screening tests, both strains showed high survival in gastrointestinal conditions. Additionally, cultures showed strong auto-aggregation and cell surface hydrophobicity, which confirmed their capacity for efficient cell adhesion. The synthesis of extracellular enzymes, including lipase, amylase, and protease, was also investigated. Hemolysis was absent and antibiotic resistance was present, according to a thorough safety evaluation study. In conclusion, both elephant milk isolates, *Enterococcus faecium* (Accession number: KUMBDKBT116) and *Enterococcus lactis* (KUMBDKBT118) exhibited excellent probiotic properties.

Keywords: Probiotics, Elephant milk, *Enterococcus* spp., Extracellular enzyme

Role of Gut Microbiome in Maintaining Human Mental Health and Immune System

Nischitha M. Salgadi, Venugopal T. M. and Manjunatha D.

Department of Microbiology, Sahyadri Science College, Shivamogga, INDIA.
Email: venushm09@gmail.com

Abstract

The human gut contains a complex community of microorganisms, known as the gut microbiome, which communicates with the brain through the vagus nerve, hormones, and immune responses. These gut microbes play a vital role in health by supporting colonization resistance, strengthening the intestinal lining, breaking down nutrients, and regulating immune and brain functions through the gut-brain axis. An imbalance in gut microbes, called dysbiosis, is linked to mental health issues like anxiety, depression, and neurodegenerative diseases such as Parkinson's. Since about 90% of serotonin is produced in the gut, it significantly affects mood and cognitive functions. Probiotics, which are beneficial bacteria, help restore gut balance after disruptions caused by antibiotics or infections. They improve digestion, relieve diarrhea (e.g., from *Lactobacillus* and *Saccharomyces boulardii*), support lactose digestion, and help manage irritable bowel syndrome (IBS). Probiotic therapy and dietary changes are effective strategies for improving both gut health and mental well-being. Gut microbes also play a key role in immune system development. They train immune cells such as T cells, B cells, dendritic cells, and macrophages to distinguish between harmful and harmless substances, promoting immune tolerance and reducing autoimmune reactions. They also regulate inflammation through pattern recognition receptors (PRRs) on immune cells, which helps control conditions like rheumatoid arthritis and inflammatory bowel disease (IBD). Overall, gut microbiota is essential for digestion, immunity, and mental health. Overall, diet and influence of gut microbiome can help to maintain this balance, improving overall mental health condition and helps in reducing disease risks.

Ker words: Gut microbiome, Mental health and Probiotics

Studies on isolation of endophytic fungi from a medicinal plant for their antioxidant and anti-diabetic properties

Mallikarjun M. and Ananda Kulal

Biological Sciences Division, Poornaprajna Institute of Scientific Research, Bengaluru 562164, Email: ananda@ppisr.res.in

Abstract

Medicinal plants are well known for their efficacy in treating diabetes, but their cultivation often demands significant time before yielding usable compounds. Recently, there are multiple reports highlights that endophytic fungi from these plants as a promising alternative source of bioactive compounds. These fungi produce metabolites that are identical or similar to those in their host plants, exhibiting comparable therapeutic properties. In this study, *Curcuma longa* (L), a widely utilized plant in traditional medicine, was selected for endophytic fungal isolation. Multiple endophytic fungi were isolated and screened for antioxidant activities using ABTS and DPPH assays. Among them, three pure cultures with significant antioxidant activity were cultured in liquid media, and their secondary metabolites were extracted using ethyl acetate. These metabolites were further evaluated for antidiabetic potential by inhibiting α-amylase and α-glucosidase enzymes. The IC_{50} values of both antioxidants and antidiabetic assays demonstrated that these fungal isolates could serve as potent producers of bioactive metabolites. These findings suggest that endophytic fungi from *Curcuma longa* could provide a sustainable and efficient source of novel compounds for diabetes management, offering a promising avenue for future pharmaceutical development.

Keywords: Medicinal plant, Endophytic fungi, Secondary metabolites, enzyme inhibitors, treating diabetes

Mycochemical Screening and isolation of rhizospheric fungus Talaromyces purpureogenus and NBSM-F4

Shaila M. and Nafeesa Begum

Department of studies and research in Botany, Sahyadri Science College, Shivamogga. Email: shailamresearchscholar95@gmail.com

Abstract

The fungus *Talaromyces purpureogenus*, previously known as *Penicillium purpureogenus*, was investigated for its bioactive constituents. The ethyl acetate extract underwent mycochemical screening using HR-LCMS and HPLC analysis. Molecular characterization via PCR technique confirmed the fungi. Qualitative screening revealed the presence of steroids, alkaloids, flavonoids, glycosides, tannins, phenols, saponins, terpenoids, carbohydrates, and proteins. Quantitative analysis with HPLC showed various compounds, and high-resolution Q-TOF-LC-MS identified metabolites with antioxidant, antibacterial, and other biological properties. The extract exhibited significant antibacterial activity against *Staphylococcus aureus*, surpassing the standard drug Amoxicillin. DPPH and ABTS assays demonstrated strong antioxidant activity. These findings suggest that *T. purpureogenus* holds potential for medicinal use.

Key words: HPLC, HR-LCMS, Molecular Characterization, *Talaromyces purpureogenus*

Phosphate Solubilization and Influence of Plant growth and Yield of selected field crops by Phospho-fungi Isolated from Rhizosphere soil of Medicinal plants at Shivamogga District

Jyothi V. and Thippeswamy. B

Department of P. G. Studies and Research in Microbiology, Bioscience Complex, Jnana sahyadri, Kuvempu University, Shankaraghatta – 577 451, Karnataka, INDIA.
Email: jyothi.chaya17@gmail.com

Abstract

Phosphorus is the king pin in Indian agriculture, after the Nitrogen, Phosphorus is second most important essential element for growth and development of plant and microorganisms. In this study, the phosphate solubilizing fungi were isolated from different rhizosphere soil samples of medicinal plants from dry deciduous forest regions of Shivamogga district by serial dilution method. The isolates were coded as PSF 1 to PSF 66, among them 8 PSF were selected as maximum Phosphate solubilizers based on solubilization index and identified by microscopic observations using standard manuals. Then these cultures were further quantified for P solubilization includes pH and titrable acidity determination, remaining P concentration in culture broth showed good results and also showed positive results for Siderophore production. Among the selected 8 PSF isolates, PSF 44 (*Aspergillus awamori*) showed maximum enzyme activity include both alkaline and acid phosphatase activity. The efficiency of PSF on plant growth and yield was tested under field condition with different crops, among them, PSF 39 in methi, PSF 38 in palak, PSF 44 in radish and PSF 10 in sorghum crop showed maximum growth and yield, also in plant P uptake, available P in rhizosphere soil of crop compared to the control plants. Due to the efficiency of phosphate solubilization and plant growth and yield promotion ability of selected PSF inoculants can be recommended as P solubilizer in agricultural field for sustainable agriculture.

Keywords: Solubilization index, titrable acidity, Siderophore, plant growth and yield, phosphorus uptake

Green synthesis of functional polyhydroxyalkanoates with Antioxidant properties using Bacterial isolates from Coconut Rhizosphere

Akshatha H. C., Kumari Isha Verma A., Punyashree C. M., Suman Kumar Hiremath, Prashantha, Tejaswini Theerthapura V., Bhuvan P. and Sharathchandra R. G.

Department of studies and research in Biotechnology, Jnanasiri Campus, Tumkur University, Tumkur – 572101.
Email: tejaswinitheerthapura@gmail.com

Abstract

The objective of the study is to extract PHAs which is accumulated as intracellular inclusion in Rhizospheric bacteria. The soil was collected (from beneath coconut tree) and bacteria was isolated. Isolates were cultured, the presence of PHAs producing bacteria is determined by Sudan Black B and confirmed by Nile blue A. After confirmation, the PHAs producing bacteria was cultivated in the minimal salt media (MSM) and PHAs was successfully extracted by sodium hypochloride method. Further, the biofilm was generated through solvent-casting technique. The quantification was performed by crotonic acid assay. Furthermore, antioxidant activity was successfully analysed by ABTS assay. From which the study concluded that the PHAs based bio plastics have the antioxidant property.

Keywords: Polyhydroxyalkanoates bio plastics, Rhizospheric bacteria, crotonic acid assay, antioxidant activity and ABTS assay

Microbial-based Plant Immunity Inducing Biostimulants

Kusuma L., Apoorva C. N., Arshiya Khanum, Jeevitha N. G., Kiran Kumar, Maruthi H. S., Usha G., Jyothsna K., Vaishnavi S. L. and Sharathchandra R. G.

Department of Studies and Research in Biotechnology and Microbiology, Jnansiri Campus, Tumkur University, Tumakuru-572118, Karnataka, India.
Email: kusuma301201@gmail.com

Abstract

The increasing demand for sustainable agriculture requires innovative biostimulants that enhance plant immunity, improve crop productivity, and reduce synthetic agrochemical use. This study explores a novel biostimulant integrating fungal-derived elicitors. It begins by isolating fungal strains from infected chilli leaves and applying them to tomato plants to assess hypersensitivity reactions. The observed plant responses confirm fungal components' role in triggering defence mechanisms. Cell wall, extracellular, and apoplast proteins from fungal isolates are extracted, dialyzed, and purified. The crude protein is then tested for its elicitor potential in stimulating plant immunity. Investigating microbial-based biostimulants reinforces the effectiveness of natural inducers in enhancing crop resilience. The study evaluates plant growth promotion, nutrient uptake efficiency, and resistance to biotic stresses. A novel biostimulant delivery system, biosticks, is formulated and standardized for soil application. These biosticks, inserted directly into the soil, allow controlled, sustained release of active bio-compounds, enhancing plant immunity, growth, and resistance. This method ensures efficient nutrient absorption, promotes root development, and reduces repeated applications, making it cost-effective and eco-friendly. The findings of the study are expected to demonstrate significant enhancement in exhibition of plant defence responses, improve physiological and biochemical traits, and reduce dependence on chemical fertilizers and pesticides. This study not only introduces a novel biostimulant but also underscores its potential to revolutionize sustainable agriculture. The biostick-based formulation holds promise for large-scale adoption, increasing crop yields while ensuring environmental safety, contributing to food security, and maintaining ecological balance.

Keywords: Biostimulants, Elicitors, Biosticks

Mycelial growth and antibacterial activity of wild macrofungi, *Macrocybe gigantea* (Massee) Pegler and Lodge

Reena Roy D. and Krishnappa M.

Department of Post Graduate Studies and Research in Applied Botany, Kuvempu University Shankaraghatta, Shivamogga(dist), Pin: 577451, Karnataka,
Email: reenaroyprasad@gmail.com

Abstract

The mycelium known as "the neurological network of nature" representing the vegetative lifecycle of mushrooms has huge impact on human health and nutrition. The present study was focused on wild pantropical macrofungi, *Macrocybe gigantea* (Massee) Pegler & Lodge, collected from Agumbe rain forests of Karnataka, India. The macrofungal tissues was subjected to mycelial culturing in four different solid nutritive media viz., Potato Dextrose Agar, Malt Extract Agar, Sabouraud's Dextrose Agar and Czapek Dextrose Agar. The study also evaluated the *in vitro* antibacterial activity of ethyl acetate extract of mycelial filtrates obtained from Potato Dextrose Broth cultures of *M. gigantea*. The crude extracts were tested against five Gram-negative bacteria using agar well diffusion assay. Our data showed that among the solid media tested, the mycelium grown in Potato Dextrose Agar recorded the maximum growth followed by Malt Extract Agar. The crude extracts had inhibition against *Salmonella typhi*, *Escherichia coli*, *Klebsiella pneumoniae*, *Pseudomonas syringae* and *Xanthomonas campestris.* The maximum inhibition was against *S. typhi*. The results revealed that the extracts had the potent bioactive compounds with antibacterial property.

Keywords: Macrofungi, mycelial culture, ethyl acetate extract, antibacterial activity

Isolation and characterization of Bacteria in street Food

Anusha G.S. and Chandrakala E.

Department of Applied Zoology, Kuvempu University, Shankaragatta, Shivamogga
Email: genechandu@gmail.com

Abstract

Food, microbes and humans have a long and interesting association that developed long before recorded in the history. Microorganisms are associated in various ways with all the food we consume. Human beings having both positive and negative impact from food and microbial interaction. Food can serve as ideal culture medium for the growth of microorganisms which can cause decomposition, spoilage and serve as a vehicle for transmission of food borne illness. Hence, the present study was carried to analyse the microorganisms present in the street food. This study was conducted in Shankaraghatta, Shivamogga. Three frequently vended and highly consumed foods (Panipuri, egg rice and kebab) were selected for sampling. The microbes were isolated and sub cultured for microbial analysis. Microbes were screened and identified by morphological and biochemical tests. The study revealed many species of *Sterptococcus, Bacillus, Lactococcus, Staphylococcus, Corynebacterium, Micrococcus, Klebsiella, Branhamella, Enterobacter, Escherichia coli, Neisseria, Alcaligenes, Citrobacter* and *Salmonella*. Many of these microbes causes health problems.

Keywords: Street foods, microorganisms, biochemical analysis, isolation.

Role of Bio-fertilizers in Improving Soil Fertility and Crop Productivity

Prashant Kapashi, Abhishek Kori and Sachin Kadashetti

PG Department of Botany, GSS College, Rani Chennamma University, Belagavi-590006
Email: Prashantkapashi999@gmail.com

Abstract

The growth of agriculture and the provision of nutritious food for the growing worldwide population depend heavily on plant nutrients. Nowadays, the majority of soil management techniques use inorganic chemical fertilizers, which are extremely dangerous for both the environment and human health. In sustainable farming, bio-fertilizer is an alternative technique for increasing soil fertility and crop productivity. The employment of beneficial microbes as bio-fertilizers has drawn a lot of interest in the agricultural sector due to its potential to improve food safety, economic viability, and sustainable crop production. Biofertilizer could be a crucial component of integrated nutrition management. Nitrogen-fixing bacteria, phosphorus-solubilizing bacteria, plant growth-promoting rhizobacteria (PGPRs), arbuscular mycorrhizal fungus, and other beneficial microscopic organisms are frequently employed as components of biofertilizers. The application of bio-fertilizers improves nutrient availability and water absorption, increases crop yields, improves soil health through processes such as nitrogen fixation and nutrient solubilization, promotes plant development, and increases plant tolerance to biotic and abiotic influences. The productivity and sustainability of soil, as well as environmental preservation, would be greatly enhanced by these prospective biological fertilizers, which are also economical for farmers.

Keywords: Bio-fertilizers, soil fertility, crop productivity, beneficial microbes

Effectiveness of Bio fertilizer and Chemical Fertilizer on Growth and Yield of Soya Bean (*Glycin max* L.)

Arjumand Banu S. S.[1] and Puttaiah E. T.[1,2]

[1]*Department of Environmental Science, Kuvempu University, Jnanasahydri, Shankaraghatta – 577415, Karnataka, India*
[2]*Gulbarga University, Jnana Ganga, Kalaburagi - 585106, Karnataka, India*

Abstract

Bio fertilizers are renewable sources of plant nutrient which supplement chemical fertilizer. These are the selected strains of beneficial microorganisms cultured in the laboratory. The main and direct purposes of applying bio-fertilizers and chemical fertilizers to soil are: to provide nutrient sources and good soil conditions for the growths of crops. When produced annually, soybean (*Glycin max* L.) is commonly rotated with other crops such as wheat, maize, rice, sorghum and sugarcane. The experiment was conducted to find out the effectiveness of bio fertilizer and chemical fertilizer on growth and yield of Soya bean (*Glycin max* L.) The treatments were control and application of NPK 50 to 100 % and recommended dosage of Vermicompost, PSB (Phosphate Solubilizing bacteria) and FYM (farm yard manure). During the study it was noticed that the plant height, number of leaves, number of branches, and number of pods per plant and total yield the all parameters show the maximum results in the treatment 6 T6 (NPK, Vermicompost, PSB, FYM (Farm yard manure) and minimum in T1 control.

Keywords: Bio fertilizer, chemical fertilizer, Soya bean

Photocatalytic degradation of textile effluent by using synthesized MgO Nanoparticle by UV irradiation method at 374 nm

Madhusudhana N.[1], Pratibha T. B.[2] and Yogendra K.[1]

[1]*Department of P. G. Studies and Research in Environmental Science, Kuvempu University, Jnanasahyadri, Shankaraghatta, Shivamogga, Karnataka, INDIA*
[2]*Department of P. G. Studies and Research in Environmental Science, Kuvempu University, Email: yogendraku@gmail.com*

Abstract

The current research focuses on the development of effective nano photocatalysts for the degradation of textile effluent in polluted water. We have synthesized MgO nanoparticle via solution combustion method using urea as a fuel. The synthesized nanoparticles characterized by the different methods of analysis like SEM, XRD and UV-Vis spectroscopy. And are Examined under UV light for the photocatalytic activity. The outcome showed the maximum degradation of 89.58% in which colour removal was achieved in 6 hours.

Keywords: MgO, Textile Effluent, Decolourization, Nano-particles, Photocatalyst

Treatment of Municipal Organic Waste by Black Soldier Fly Larvae (BSFL) *Hermetia illucens*

Priyanka Shivaram[1], Prakash Kariyajjanavar[1] and Kalachar H. C. B.[2]

[1]*Dept. of P.G Studies and Research in Environmental Science, Gulbaga University, Kalabuagi-585106, India*

[2]*Dr. Arthos Solutions Pvt. Ltd., Harnahalli, Arasikere, Hasan, India*

Email: prakashsk2678@gmail.com

Abstract

The continuous increase in global organic waste generation is regarded as an escalating threat to human health, biodiversity, and the overall ecosystem. Environmental concerns associated with this substantial waste production include pollution affecting water, air, and soil. The purpose of this research is to examine the breakdown of organic waste by Black Soldier Fly Larvae (BSFL) and to assess the quality of the resulting organic fertilizer. BSFL *Hermetia illucens* was observed to convert remarkable capacity of organic waste into producing residual fertilizers for soil improvement and along with is used at pupe high-quality nutrition for pet food, fish, and poultry feed. The life cycle of BSF larvae progresses through six developmental stages, from the first instar to the prepupal phase, and lasts about 45 days, depending on environmental factors such as light, temperature, and humidity. The biodegradation of organic waste was evaluated by varying the amounts of feed treatment [100, 200, 300, 400, 500 grams], with each setup containing the same number of viable larvae (i.e., 1 gram) that were between 4 to 5 days old. It was observed that, BSFL can diminish the initial mass of organic waste by approximately 50% in a shorter duration compared to conventional composting methods.

Keywords: BSFL, Degradation, Frass, Organic waste, Temperature,

Detection of Microbial Pathogens Responsible for Causing Dental Plaques for the Development of Simple Detection Method for Early Onset of Dental Caries

Kushal Kumar Y. R.[1], C. K. Ramesh[1], Y. L. Ramachandra[2] and Pallavi M.[1]

[1]*Dept. of PG Studies and Research in Biotechnology, Sahyadri Science College Campus, Kuvempu University, Shivamogga*
[2]*Dept. of PG Studies and Research in Biotechnology, Jnana Sahyadri, Kuvempu University, Shankaraghtta, Shivamogga*
Email: ckramck@gmail.com

Abstract

Dental caries is a multifactorial disease characterized by the dissolution of dentine (hard tissues of mouth). This disease is caused by the interplay of three factors- host (teeth and saliva), microorganism (present in dental plaque) and substrate (in the form of diet). The development of dental plaque, the initial stage of dental caries is mainly influenced by the oral streptococci sp., other organisms like *Lactobacilli sp., Actinomyces sp., Bifidobacteria, Fusobacterium* and *Candida sp*. etc. are also known to involved in the pathogenesis by forming the biofilm. As the external substrates like food and regular oral practices play a vital role in plaque development, the current study was initiated to assess the oral microbial diversity and microbial load in the local population leading to the development of dental caries, followed with the development of simple diagnosing method to determine the plaque progression in forming dental caries. For the study, a diverse population consisting of 100 individuals belonging to different gender, age and food habits were considered. The pure culture of each isolate was identified based on biochemical tests. The streptococci sp., and Lactobacilli sp., were identified based on their capacity to ferment mannitol, sorbitol, melibiose, raffinose and inulin, arginine hydrolyses, hydrogen peroxide and catalase production. Culturing over selective media confirmed that the organisms are *Streptococci sp.,* and *Lactobacilli sp*., respectively. However, the further studies including 16S rRNA sequencing and Polymerase chain reaction (PCR) analysis will help us confirming the individual species.

Keywords: Dental caries, *Lactobacilli spp*., 16sS rRNA sequencing, *Bifidobacteria*

Theme – 5

Research advances in

Biochemistry & Food Technology

Studies on Metabolomics and Limonoid Biosynthetic Pathway in Neem, *Azadirachta indica*

Dr. Thulasiram H. V.

Principal Scientist: Organic Chemistry, NCL, Pune

Targeted metabolomics is all about identification and quantification of known metabolites, time and space resolved distribution in a specific biological system. Hyphenated mass spectrometry is a powerful tool in metabolomics due to its high sensitivity, accuracy, resolution, low sample requirement and the ability to monitor broad range of metabolites. Quantitative fingerprinting of secondary metabolites across different tissues of a species can be useful to predict the comparative expression levels of genes involved in the biosynthetic pathway of these metabolites. Neem tree (*Azadirachta indica*), gained honour as a wonder tree, and native to Indian sub-continent is one of the highest source of secondary metabolites called limonoids. Fifteen triterpenoids from neem tree have been isolated using chromatographic techniques such as HPLC and flash-chromatography. They were structurally characterized by various spectroscopic (NMR and HRMS) data. Limonoids were quantified in six different neem tissues, including kernel, pericarp, flower, leaf, stem and bark at different development stages using UPLC-ESI(+)-HRMS based targeted profiling. Tissue specific profiling of limonoids delineated the variation in the abundance of triterpenoids across various tissues. Pericarp, flower and leaf contained mainly ring-intact limonoids. Further, correlation of metabolic profiling with transcriptome helped in analysis and identification of genes involved in neem limonoid biosynthesis. Transcriptome functional annotation study predicted genes related to MVA and MEP pathways, and the ones involved in triterpenoid biosynthetic pathway such as prenyl pyrophosphate synthases, squalene epoxidases, CYP450 reductases and triterpene synthases. Expression profile data of genes related to secondary metabolism in neem shows that triterpene biosynthetic genes were highly expressed in fruit (kernel and pericarp), which was in agreement with metabolic fingerprint of limonoids. Differential gene expression study reveals that MVA pathway enzymes such as HMG CoA synthase, reductase, mevalonate kinase and a triterpene synthase were overexpressed in kernel when compared to flowers. Rate-limiting enzymes of MVA pathway, AiFDS, AiSQS, AiSQE and triterpene synthase showed co-expression in different tissues of neem. Further, five CYP450 genes were predicted to be involved in triterpenoid biosynthesis from functional annotation and expression analysis of transcriptome. The genes encoding for the enzymes involved in the sequential steps of limonoid biosynthesis such as homomeric AiGDS, AiFDS, AiSQS, AiSQE, triterpene synthase and CYP450 reductases were cloned in heterologous system and functionally characterized. Transformation of these genes into model plant system will further aid in studying the role of the individual genes towards the limonoid biosynthesis.

Genetics Today: An overview

Dr. Nallur B. Ramachandra, ***Ph.D., FASc., FKSTA, FIABS***

DAE- Raja Ramanna Chair, DoS in Genetics and Genomics,
University of Mysore, Mysore 570 006
nallurbr@gmail.com, ramachandra@genetics.uni-mysore.ac.in

Genetics is a fascinating branch of science that deals with genes, heredity and variations in all living organisms. The knowledge of genetics has become essential to unravelling the mysteries of life processes that are extensively pursued in today's science. In 1865, Gregor Mendel, the father of genetics, laid the mathematical foundation for the science of genetics, now known as Mendelism. Gregor Mendel's ideas provided the first comprehensive concept of heredity. Mendel's simple breeding experiments become an enormously intricate TREE OF KNOWLEDGE of genetics. Genetics involves understanding the inheritance process from parents to offspring, including the molecular structure and function of genes and gene behaviour in the context of cells or organisms, gene distribution, variation and change in populations. Genetics occupies the CENTRE-STAGE in science and is a common platform for researchers from diverse fields. The field of genetics demonstrates productive collaboration and fundamental and curiosity-driven interdisciplinary research. About 6% of humanity is suffering from genetic diseases. Therefore, knowing every individual's genetic makeup is essential to understand their life better. Further, genetics research revealed that genetic diseases are predictable, preventable, treatable and manageable. Genetics provides unimaginable wealth for human welfare and the Biosphere. Besides, the common man should also be educated about the basic principles of genetics to understand its applications in day-to-day life and lead a better and more meaningful life after the COVID-19 pandemic. Therefore, today, we are primarily responsible for engaging with the field and the public to build genetic literacy, address misconceptions about race, ethnicity, and ancestry, and ensure the responsible use of genetic and genomic information now and in the future. During my presentation, I will discuss these issues and challenges.

Assessment of Haematological and Biochemical Alterations Among E-Waste Handling Workers in Bangalore City, India

Mohan Rao[1], Rajeshwara A. N.[2], Dhananjayan V.[2], Panjakumar K.[2], Shridhar Kondalkar[2], Avinash Gaikwad[2], Rajeev Kumar[2], Tamrai Kannan[2], Mala Ambikapathy[2] and Ravichandran B.[2]

[1]ICMR-NARFBR, Genome valley, Shamirpet (M), Hyderabad, Telangana, PIN-500101, INDIA
[2]Department of Studies and Research in Biochemistry, Kuvempu University, Jnanasahyadri, Shankaraghatta – 577451. Email: mohanbiochem777@gmail.com

Abstract

The increasing influx of electronic waste (e-waste) in India has raised concerns about its impact on environmental and human health. This study assessed the potential health effects of e-waste exposure on workers in Bangalore City, India, by examining hematological indices and biochemical parameters. A total of 215 individuals participated, including 144 e-waste workers and 71 supporting staff members. Blood samples were analyzed to determine random blood sugar (RBS), alkaline phosphatase (ALP), alanine transaminase (ALT), and hematological parameters using standard laboratory techniques. The results revealed significant differences in several hematological and biochemical parameters between e-waste workers and supporting staff. Workers had lower RBC count ($p=0.02$), packed cell volume (PCV) ($p=0.03$), mean corpuscular hemoglobin (MCH) ($p=0.03$), and granulocyte percentage ($p=0.03$). Additionally, RBS levels were significantly higher in workers ($p=0.03$). However, no significant differences were observed in systolic or diastolic blood pressure, pulse rate, or other parameters ($p\geq0.05$). These findings highlight the potential health risks associated with prolonged exposure to hazardous chemicals in e-waste, emphasizing the need for further research on the long-term impact of e-waste exposure on workers' health. The study suggests that e-waste workers may be at increased risk of hematological and biochemical imbalances, particularly affecting blood sugar and cell composition.

Keywords: E-waste; Haemoglobin levels; Liver damage; Hypertension; Occupational exposure

Neuroprotective studies of Melatonin Functionalized Magnesium Oxide Nanoparticles

Joy Hoskeri H.[1] and Arun Shettar K.[2]

[1]*Department of Bioinformatics, Karnataka State Akkamahadevi Women University, Vijayapura, Karnataka, India*
[2]*Department of Multidisciplinary Research University, Karnataka Medical College and Research Institute, Hubballi, Karnataka, India*
Email: joybioinfo@gmail.com

Abstract

Melatonin and magnesium nanoparticles exhibit diverse pharmacological properties. Trimethyltin and triethyltin derived compounds both are toxic to neurons. The proposed research work is focus on synthesis on novel magnesium oxide nanoparticles conjugated with melatonin and evaluate its neuroprotective efficacy against trimethyltin induced neurotoxicity. Sol-gel method was used to fabricate Melatonin-MgO nanoparticles. Synthesized Melatonin-MgO particle were spectrally characterized. UV spectral analysis showed lambda max of Melatonin-MgO at 342nm. Particle size analysis indicated that M-MgO nanoparticles have Z-average of 160.6 nm. Zeta potential estimation revealed that M-MgO exhibited Zeta potential of -0.1 mV. XRD analysis of M-MgO nanoparticles indicated that it has amorphous nature. SEM images revealed the agglomerated state of the particles. The cytotoxicity studies revealed that the IC50 value of M-MgO against L929 mouse fibroblast cell line for 24 hr treatment was found to be 77.02 µg/ml. The results of this investigation indicate that the Neuroprotective studies revealed that melatonin conjugated magnesium oxide was exhibited maximum neuroprotection rendering cell viability of 88.59% at 30µg/ml against trimethyltin induced neurointoxication in SK-N-SH cells. This investigation provides the lead for the development of an efficient treatment for neurotoxicity induced neuronal damage.

Keywords: Melatonin conjugated Magnesium oxide; Nanoparticles; Cytotoxicity; L929; Neuroprotectivity; SK-N-SH; Trimethyltin

Selective Cytotoxicity and in-vitro antioxidant activity of *Mallotus philippensis* stem extract and its metal oxide nanoparticles

Gayatri Kulkarni[1], Vinayak Lokapur, Varsha Jayakar

PG Department of Biochemistry, GSS College, Rani Chennamma University, Belagavi-590006 Email: gayatrigk1302@gmail.com

Abstract

Metal oxide nanoparticles have gained attention in cancer detection due to their multifunctional properties, making them suitable for a variety of applications. This study uses the stem extract of *Mallotus philippensis* (MP) to synthesize zinc and copper oxide nanoparticles (ZnO and CuO NPs) through a green method, evaluating the phytochemical ingredients and optimizing the process. Several analytical techniques, including UV-vis spectroscopy, XRD, SEM, EDAX, TEM, SAED, DLS, and zeta potential, were employed to characterize the nanopowder, revealing its bonding, purity, surface morphology, crystallinity, size, and stability. The antioxidant and anticancer properties of the MP stem extract were also assessed. The MP species produced numerous secondary metabolites and radical scavengers, serving as capping and stabilizing agents in nanoparticle synthesis. In vitro antioxidant assays showed that ZnO NPs had 8.1 times greater antioxidant potential than the plant extract (IC50 456.6 µg/ml), while CuO NPs exhibited a 2.5-fold increase (IC50 55.98 µg/ml). The cytotoxicity of MP stem extract, ZnO NPs, and CuO NPs against triple-negative breast cancer cells (MDA-MB-231) showed dose-dependent effects in an MTT assay, with varying IC50 values (20.10 µg/ml, 25.63 µg/ml, and 4.916 µg/ml, respectively). No significant cytotoxicity was observed in normal mouse fibroblast cells at these concentrations. These findings highlight the promising anticancer activity of metal oxide nanoparticles, especially CuO NPs, which showed superior activity and potential for safe use against breast cancer.

Keywords: *Mallotus philippensis*; antioxidant; cytotoxicity; MDA-MB-231 breast cancer cell line; mouse fibroblast cell line; green synthesis

Investigation of photocatalytic and detoxification of Cr (VI) to (III) studies by using eco-friendly synthesized BiVO4 nanoparticles

Nachikethan A. C.[1], Veena H. R.[1], Poornima D[1], G Nagaraju[2] and Krishna[1]

[1]*Department of studies and Research in Environmental Science, Tumkur University, Tumakuru 572103, India*
[2]*Department of Chemistry, Siddaganga Institute of Technology, Tumkur University, Tumakuru 572103, India*
Email: arkbnmicrob11@hotmail.com

Abstract

Bismuth-based materials have gained significant attention for their potential in photocatalysis. In this study, Bismuth vanadate (BiVO4) nanoparticles (NPs) were synthesized via a facile hydrothermal method at 180 °C for 8 hrs using good medicinal valued plant *Centella asiatica* leaf powder as a fuel. Characterization techniques confirmed the orthorhombic phase structure of the synthesized photocatalyst, with an average particle size of ~53 nm as determined by X-ray diffraction (XRD) and spherical shaped NPS with a d-spacing value of 0.27 nm observed via high-resolution transmission electron microscopy (HR-TEM). UV-visible diffuse reflectance spectroscopy (UV-DRS) analysis determined the band gap of 2.5 eV. Photoluminescence (PL) analysis revealed characteristic excitation and emission peaks at 330 nm and 499 nm, respectively. Experimental results demonstrated the photocatalytic efficiency of the synthesized BiVO4 NPs, achieving approximately 98% decolorization of Rhodamine B (RhB) dye and 52% reduction of toxic Cr (VI) ions to Cr (III) within 3 hours of irradiation under visible light. This work underscores the potential of BiVO4 NPs as effective and environmentally friendly photocatalysts for pollutant degradation and remediation applications.

Keywords: BiVO4 NPs, *Centella asiatica*, Hydrothermal, Photocatalytic degradation, Detoxification Cr (VI)

Garcinia talbotii, a Functional Food Enhances ROS Mediated DNA Damage in Pancreatic Cancer Cells through Modulation of ATM Signalling

Meghana P., Sandeep Kumar Jain R., Prashanth N., Pooja S Rajaput, Megha G. and Kumaraswamy H. M.

Laboratory of Experimental Medicine, Department of PG Studies and Research in Biotechnology, Kuvempu University, Shankaraghatta-577451, Karnataka, India

Abstract

Garcinia talbotii, an evergreen tree endemic to the Western Ghats, produces wild edible fruits with culinary and medicinal uses. This study investigated the nutritional content, phenolic profile, and biological effects of *G. talbotii* fruit extract (GFE), focusing on its antioxidative and antiproliferative activities. The antioxidant potential of GFE was assessed using DPPH, ABTS, metal chelating, total antioxidant, and total reductive assays. In HEK-293 cells, GFE protected against H_2O_2-induced oxidative stress by reducing intracellular ROS accumulation, as determined through MTT and nitric oxide assays. The antiproliferative effects of GFE were evaluated against two human pancreatic cancer cell lines, PANC-1 and MIAPaCa-2. GFE reduced cell proliferation with IC_{50} values of 11.14 ± 0.30 µg/mL in PANC-1 and 4.65 ± 0.19 µg/mL in MIAPaCa-2. It also inhibited colony formation and increased ROS levels in a dose-dependent manner, leading to mitochondrial depolarization, DNA damage, and cell cycle arrest. DNA damage was confirmed by alkaline comet assay, while apoptosis was demonstrated via acridine orange/ethidium bromide dual staining and by assessing protein markers (ɣH2AX, BAX, Bcl2, pERK, p53, Chk2). GFE displayed a high selectivity index of 18.44 on PANC-1 and 43.91 on MIAPaCa-2 cells, indicating greater cytotoxicity on cancer cells compared to normal cells. This suggests that the bioactive compounds in *G. talbotii* fruit have significant potential as a nutraceutical agent with anticancer properties.

Keywords: *Garcinia talbotii,* wild fruit, fruit extract, antiproliferative, Pancreatic Cancer

Biocompatibility assessment and wound therapeutic prospective of poly lactic acid nanoparticles conjugated with *Brugmansia suaveolens*

Yashwanth S. Y., Tanuja C., Shreejith M. S. and Santhosh K. H.

Department of Biotechnology and Bioinformatics, Kuvempu University, Jnanasahyadri, Shankaraghatta-577451, Karnataka, India
Email: santhoshbio4@gmail.com

Abstract

Brugmansia suaveolens (Bercht. & Presl), is native to the Western Ghats and belongs to Solanaceae family. *B. suaveolens* leaves were sequentially extracted using an ethyl acetate solvent. Poly lactic acid (PLA) is used to synthesis nanoparticles using *B. suaveolens* leaf ethyl acetate extract (BSLEE). This biodegradable biopolymer is employed as a drug delivery carrier molecule. The conjugated efficacy was calculated and further characterisation was conducted for BSLEE conjugated PLA membrane. The BSLEE-PLA membrane conjugated efficiency was calculated and were characterized using by UV-visible, Fourier transform infrared (FTIR) spectroscopy, Scanning electron microscopy (SEM), X-ray diffraction (XRD) and Energy-dispersive X-ray spectroscopy (EDX). Later the synthesised nanoparticles evaluated for their pharmacological properties such as Biocompatibility, cytotoxicity and wound healing property. The BSLE-PLA conjugated efficacy was ranging from 26.33- 48.58% which directs the effective conjugation of BSLEE within the PLA membrane. The BSLEE conjugated PLA examined for hemocompatibility using human blood sample illustrate lower hemolytic activity compared with control PLA alone, Biocompatibility for MG-63 cell line was analysis for zero to 24h. which shows 64.68 ±0.01 with increase in percentage of cell viability up to 79.04 ± 0.01 was observer within 48 h. and finally wound healing studies was carried out to claim traditional knowledge using L929 cell lines. At concentration of 20µg for 24h incubation time. BSLEE conjugated PLA shows 69.64 %, where standard drug ascorbic acid shows 90.53% and untreated group shows 12.09% of wound healing activity. The current research scientifically proves traditional use of leaves extract to cure wounds.

Keywords: *Brugmansia suaveolens,* Polylactic acid, Nanoparticles, Biocompatibality, Cytotoxicity, Wound healing activity

Revolutionizing Cancer Research: New Insights into DNA Replication Mechanisms

Ranjitha D. Muddemmanavar, Ankitha T. and Venugopal T. M.

Department of Microbiology, Sahyadri Science College, Shimoga- 577203
Email: venushm09@gmail.com

Abstract

DNA Replication is a fundamental process in cellular biology, and its dysregulation is a hallmark of cancer. Despite significant advances, the molecular mechanisms underlying DNA replication which leads to cancer remain undiscovered. Cancer is characterized by uncontrolled cell growth and division often resulting in formation of tumors. Further, the potential of spread of abnormal cells to other part of the body, and finding the proper treatment is still ongoing. Nowadays, Cryo-Electron Microscopy has become one of the powerful tools in cancer research and its detection which allows scientists to study cancer related bio-molecules. Cryo Electron microscopy (Cryo-EM) is used to visualize the DNA replication machinery at near- atomic resolution which will provide unprecedented insights into dynamic interactions. The Cryo-EM helps in determining the structures of oncogenic proteins ie (mutated p53, Ras proteins). This approach allowed capturing the dynamic interactions between the replicative helicase, polymerase, and other accessory proteins (helicase, SSB, primases). The cryo-EM structures reveal a previously unknown mechanism of DNA replication, wherein the replicative helicase undergoes a conformational change to facilitate polymerase recruitment. It also identified a novel interaction between the helicase and the key regulatory protein, which is frequently mutated in cancer. This study provides unprecedented insights into the molecular mechanisms of DNA replication and sheds new light on the etiology of cancer. The identified protein – protein interactions represent a promising therapeutic target for cancer treatment, and the findings have significant implications for the development of novel anti-cancer strategies, this study demonstrates the power of Cryo –EM in revealing hidden mechanisms of biological processes and highlights its potential in identifying novel targets for cancer therapy.

Keywords: DNA replication, Cryo-EM, Cancer, Oncogenic proteins

Pure Fuel Morning Mix

Kishor Kumar B. C. and Nandeesh K. V.

Department of Food science and Technology, GM University, Davanagere -577006, Karnataka, India;
Email: nandeeshkv22@gmail.com

Abstract

A Nutritional powder which is rich in proteins, carbohydrates and fibres. It is a Nutritional booster in our day-to-day life. It is useful for the busy people like students, working women's, etc. Addressing the concern, we present you a solution a 100% natural sugar free instant protein breakfast mix. The innovative product, crafted from a blend of dry fruits and sweetened with natural agents like jaggery powder and dates. With each serve providing approximately 30 g of protein and 262 g of carbohydrates. This product aligns with needs of individuals seeking a quick nutritious start towards day. Finally, our expected outcome is to elevate your breakfast routine with a blend that harmonious health and convince.

Keywords: Fibers, Nutritional booster, Jaggery

Synthesis of Nanocellulose from Biomass by Green Pathway

Pragnya C. K., Deepa I. and Neha B.

Department of Studies in Biotechnology, GM Institute of Technology, Davangere– 577007, Karnataka Email: isharv417@gmail.com

Abstract

The synthesis of nanocellulose from biomass via green pathways has gained significant attention as a sustainable alternative to conventional methods, which often involve harsh chemicals and energy-intensive processes. Nanocellulose, a biopolymer with exceptional mechanical, thermal, and barrier properties, has numerous applications in fields such as pharmaceuticals, food packaging, and electronics. The production process typically involves steps such as pretreatment, mechanical shearing, and enzymatic hydrolysis, which are optimized for sustainability and efficiency. The resulting nanocellulose demonstrates enhanced properties, such as increased surface area, crystallinity, and biodegradability. This eco-friendly method not only minimizes harmful environmental impacts but also contributes to the circular economy by utilizing waste biomass, reducing dependence on non-renewable resources, and lowering carbon footprints. Nanocellulose is an organically generated biopolymer derived from Teak wood leaves a biodegradable plant source. It is utilized in numerous industries, such as packaging, biomedical, and bio composite formulations. In this study, the acid hydrolysis process comprised pretreatment with alkali and bleaching to extract nanocellulose from agricultural biomasses. FTIR, XRD, SEM, and TGA/DTA analyses were used to evaluate the synthesized NC's functional group, crystallinity, surface architecture, and thermal properties. The present study employed acid-catalyzed hydrolysis to extract nanocellulose from Teakwood leaves. The influence of synthetic methods on the properties and morphology of nanocellulose is investigated thoroughly by various analytical techniques.

Keywords: Nanocellulose, green pathway, waste biomass

Enhancing the Shelf Life and Quality of Paneer Through a Synergistic Preservation Approach at Room Temperature

K Shanthi, Tilak Revanasiddappa and Prarthana G. D.

Department of Food Science and Technology, G M University, P B Road, Davanagere-577006, Karnataka, India EMail: reddyshanthireddy31@gmail.com

Abstract

Paneer, a heat-acid coagulated dairy product, is widely valued for its rich protein content and nutritional benefits. However, its limited shelf life due to microbial spoilage poses a major challenge for commercial viability. This study explores a synergistic preservation approach integrating multiple techniques to enhance the physicochemical stability, microbial safety, and sensory attributes of paneer. A combination of bio-preservative (nisin), chemical preservative (sorbic acid), vacuum packaging, and in-pack pasteurization was employed to extend its shelf life. The treated paneer samples underwent in-pack pasteurization at 90 °C for 1 minute and were stored under room temperature (27±2°C). The results indicated that the synergistic preservation approach effectively minimized microbial spoilage while maintaining the proximate composition of paneer. Although slight variations were observed in water activity (aw), titratable acidity, free fatty acids (FFA), and pH, all values remained within permissible safety limits. Sensory evaluation demonstrated that the preserved samples retained high consumer acceptability in terms of texture, aroma, and taste, even after 30 days of storage at room temperature. This study highlights the effectiveness of multi-modal preservation techniques in extending the shelf life of paneer while ensuring its safety, quality, and market potential. The findings contribute to advancements in food preservation strategies, value-added dairy products, and sustainable food technology innovations.

Keywords: Synergistic Preservation, Shelf-life Extension, Paneer quality, Microbial stability, Food preservation techniques

Synthesis and Characterization of Ampicillin Conjugated Silver Nanoparticles Using *Annona squamosa* Leaf extract: Antioxidant, Larvicidal and Antibacterial Activity Against Gram Positive and Gram Negative Bacteria

Malini B. P., Raghu H. S. and Rajeshwara A. N.

Department of Biochemistry, Kuvempu University, Shankaraghatta-577451. Karnataka, India

Abstract

The silver nanoparticles (As-AgNPs) and the Ampicillin conjugated silver nanoparticles (Amp-As-AgNPs) were synthesized by biological method using aqueous leaf extract of *Annona squamosa* (Custard Apple). The synthesized As-AgNPs and Amp-As-AgNPs were characterized by different analytical techniques namely UV-Visible spectroscopy, scanning electron microscopy, X-ray diffraction analysis and Fourier transform infrared spectroscopy. The AgNPs exhibit characteristic absorption maxima between 350-500 nm. The UV-Visible absorption maxima of synthesized As-AgNPs and Amp-As-AgNPs were found to be 452 nm and 484 nm, respectively. The SEM images of As-AgNPs and Amp-As-AgNPs suggests that the nanoparticles are spherical in shape with most of the nanoparticles were aggregated and few were individually found. The particle size of As-AgNPs and Amp-As-AgNPs was found to be 87.89 nm and 93.80 nm, respectively. The XRD results indicate that the As-AgNPs and Amp-As-AgNPs were crystalline in nature. The FT-IR results show absorption bands for different functional groups. The Amp-As-AgNPs has absorption bands corresponding to As-AgNPs as well as antibiotic Ampicillin. The antimicrobial activity against Gram positive *Bacillus subtilis* and Gram negative *Salmonella typhi* was assessed by agar well plate method. The Amp-As-AgNPs has exhibited enhanced antimicrobial activity compared to As-AgNPs and Ampicillin. The antioxidant activity of synthesized As-AgNPs and Amp-As-AgNPs were assessed by DPPH radical scavenging activity, ABTS radical scavenging activity and Ferric reducing activity. The results have shown that both the AgNPs have exhibited potent antioxidant activity. The As-AgNPs and Amp-As-AgNPs both have exhibited 10% and 30% mortality against II and IV instars larvae of *Aedes* species. These results suggest that the Amp-As-AgNPs can potentially be used as an eco-friendly and economical antimicrobial, antioxidant and larvicidal agents.

Keywords: *Annona squamosa,* DPPH radical scavenging activity, XRD, FTIR

Enhanced Peroxidase-Like Activity and Antibacterial Potential of Molybdenum-Doped Cerium Oxide Nanoparticles

Santhosh K. H., Shashank M. E. and Sanjana

Department of studies and research in Biotechnology, Kuvempu University, Jnanasahyadri, Shankaraghatta-577451, Karnataka, India
Email: santhoshbio4@gmail.com

Abstract

Nanozymes development is essential to replace high cost, less stable natural enzymes and these nanozymes have excellent catalytic activity. The Molybdenum-doped cerium oxide (Mo-CeO_2) nanoparticles were synthesized by solution combustion method with varying molybdenum concentrations (0% to 6%). The structural and morphological analysis of these nanoparticles was performed using powder X-ray diffraction (PXRD), Fourier transform infrared (FTIR) spectroscopy, UV-Visible spectroscopy, and scanning electron microscopy (SEM). XRD results confirmed the fluorite cubic structure of CeO_2. As Mo content increased, peak broadening in XRD patterns suggested reduced crystallite size. FTIR analysis showed characteristic Cerium-oxygen vibrations. The UV-Vis spectra confirmed formation of nanoparticles. And SEM revealed the spherical morphology of nanoparticle with size below 100 nm. The catalytic peroxidase-like activity of the nanoparticles was assessed using the oxidation of chromogenic substrate 3,3',5,5'-tetramethylbenzidine (TMB) in the presence of H_2O_2. Kinetic studies demonstrated that 6% Mo-doped CeO_2 exhibited the highest catalytic efficiency, with significantly improved Km and Vmax values compared to undoped CeO_2. The apparent Michaelis constant (Km) for TMB was lower (0.381mM) in 6% Mo- CeO_2NP's indicating a higher affinity for the substrate. The antimicrobial activity of the nanoparticles was evaluated using the broth microdilution method against *Staphylococcus aureus* and *Pseudomonas aeruginosa*. The minimum inhibitory concentration (MIC) of 6% Mo- CeO_2 was determined to be 15.56 µg/mL for both strains, which significantly outperformed pure CeO_2 (MIC of 250 µg/mL). This enhanced antimicrobial and catalytic performance highlights the potential of Mo-doped CeO_2 nanoparticles for applications in biomedicine and catalysis.

Keywords: Peroxidase, Tetramethylbenzidine, Molybdenum-doped cerium oxide, Nanoparticles, Antibacterial activity, Solution combustion method

Millets and Rhizomicrobiome Metagenomics: A Revolution in the Bioeconomy

Katenahalli Rudrappa Maruthi

Department of Botany, School of Sciences, Maulana Azad National Urdu University, Gachibowli, Hyderabad – 500032 Email: krmaruthi@manuu.edu.in

Abstract

Millets, often termed "Nutri-cereals" or "superfoods," are gaining global recognition for their nutritional value, climate resilience, and low environmental footprint. Millets, ancient and versatile crops, offer a sustainable solution to global food security challenges amid climate change and population growth. Recent research has explored the rhizosphere microbiome of various millet species, revealing diverse microbial communities that contribute to plant growth and resilience. Studies on Kodo millet, finger millet, and foxtail millet have identified beneficial microorganisms associated with nutrient cycling, stress response, and disease resistance. The rhizomicrobiome—the diverse microbial community in the root zone of plants—plays a pivotal role in enhancing millet growth, nutrient uptake, and stress tolerance. Metagenomics, the study of genetic material recovered directly from environmental samples, offers unprecedented insights into these microbial communities. Applying bioinoculants has been shown to enrich beneficial microbes in the rhizosphere, while synthetic fertilizers may reduce microbial diversity. Advanced genomic and omics technologies, including metagenomics, are being employed to understand and harness the potential of millet rhizomicrobiomes for improved crop productivity and sustainability. These findings highlight the importance of millets and their associated microbiomes in developing resilient agricultural systems.

Keywords: Metagenomics, Millets, Rhizobiome, bioinoculants, Omics, Crop Productivity

Eco-friendly Synthesis of CeO2-NiO Nanocomposites via Tridax procumbens: Photocatalytic Degradation of Rose Bengal Dye and Chromium (VI) Reduction

Pallavi Sulakiyaa[1], Ananthu P.[1], Pooja K. R.[2], G. Nagaraju[2] and H. Raja Naika[1]

[1]*Department of Environmental Science, School of Earth Science Systems (SESS), Central University of Kerala, Tejaswini Hills, Periya, Kasaragod, Kerala, 671320.*
[2]*Energy Materials Research Laboratory, Department of Chemistry, Siddaganga Institute of Technology, Tumakuru, Karnataka 572 103*
Email: pallavi.2301207008@cukerala.ac.in

Abstract

This study successfully synthesized cerium oxide-nickel oxide (CeO_2-NiO) nanocomposites (NCs) using a sustainable and cost-effective green combustion method. Unlike conventional synthesis approaches that rely on toxic chemicals, this study utilized *Tridax procumbens* leaf extract as a natural fuel and reducing agent, making the process more environmentally friendly. The synthesized nanocomposites were subjected to extensive physicochemical characterization using advanced techniques, including XRD to determine crystal structure, FTIR to identify functional groups, UV-vis spectroscopy to analyze optical properties, and SEM to examine surface morphology. The optical properties of the CeO_2-NiO NCs were studied using the Tauc relation, which revealed a band gap energy of 2.63 eV. The photocatalytic efficiency of the nanocomposites was evaluated through the degradation of Rose Bengal (RB) dye under visible light irradiation. The results demonstrated exceptional photocatalytic activity, with the NCs achieving 98% degradation efficiency within 180 min. The study further investigated the influence of various operational parameters, such as catalyst dosage, dye concentration, and pH variation, to optimize the degradation process. Additionally, the scavenger study was conducted to determine the reactive species responsible for the degradation mechanism. Beyond dye removal, the nanocomposites also exhibited promising potential for heavy metal remediation, effectively reducing the hazardous hexavalent chromium (Cr^{6+}) by 64%, converting it into the less toxic trivalent form (Cr^{3+}). These findings highlight the dual functionality of CeO_2-NiO NCs in environmental remediation, making them a promising material for both organic pollutant degradation and heavy metal detoxification.

Keywords: Nanocomposites, Green combustion synthesis, Photocatalytic degradation, Chromium (VI) reduction, Visible light irradiation

Synthesis and Characterization of Sericin- Beetroot Extract Conjugated Edible Biopolymer Film for Chlorpyrifos Detection in Food Samples.

Adarsh Hanamanth Biradar, Hrishikesh Parab, Anup Hemant Eden, Vidya Holeyannavar,
Priya S Shiraguppi, Soumya G. K. and Shyam Kumar Vootla

PG Department of Studies and Research in Microbiology and Biotechnology, Karnatak University Dharwad, India
Email: biradaradarsh888@gmail.com

Abstract

The development of biodegradable and functional biopolymer films is crucial for sustainable food packaging and environmental applications. In this study, a novel biopolymer film was synthesized using beetroot extract, sericin, polyvinyl alcohol (PVA), glycerol, to enhance flexibility and stability. The structural, physicochemical, and functional properties of the films were extensively characterized using FTIR, XRD, antimicrobial assays, antioxidant activity tests, moisture retention capacity (MRC), water contact angle measurements, Scanning electron microscopy (SEM), Mechanical properties like thickness Young's modulus tensile strength elongation at break, Solubility, degradability etc. FTIR analysis confirmed that higher sericin content resulted in intensified amide peaks (~1650 cm^{-1}), reflecting protein incorporation, whereas films with increased beetroot extract exhibited pronounced phenolic peaks, signifying antioxidant potential. XRD analysis revealed that beetroot extract disrupted the semi-crystalline nature of PVA, increasing amorphous content and improving film flexibility. However, sericin-enhanced films exhibited improved molecular packing, contributing to superior mechanical strength. The films also demonstrated promising moisture-barrier properties. In the application part UV-Visible spectroscopy, FTIR, and GC-MS analysis were conducted to assess the film's ability to detect pesticide residues and its mechanism, a pesticide Chlorpyrifos was selected for detection. The peak shift and increasing in the Optical density show that the quantification and qualitative assessment of Minimal Residual concentration can be achieved by using novel synthesised edible films.

Keywords: Sericin, Edible Biopolymer Film, Chlorpyrifos Detection, FTIR

Storage Stability of Field Bean Flakes: A Comparison of Packaging Materials

Krishnamma, P. N.[1], Venkatesh, Ravikumar Patil H. S.[1], Sree Devi M. S.[2] and Namitha M. Y[1]

[1]*Department of Food Technology, Davangere University, Shivagangothri Campus, Davangere-577002*

[2]*ZARS, V.C, Farm Mandya*

Email: venkatesh_r@davangereuniversity.ac.in

Abstract

This study examined the effects of low-density polyethylene (LDPE) and metalized polyester (MPE) packaging on the moisture content, sensory attributes, and microbial safety of field bean flakes over a 6 months storage period. Moisture content, a key determinant of product stability and shelf life, increased significantly in LDPE-packaged flakes (6.21 % to 12.69 %), whereas MPE effectively limited the rise to 8.34 %. MPE's superior barrier properties minimized moisture migration, maintaining moisture levels below the critical 10 % threshold and ensuring microbial safety throughout the storage period. Sensory evaluations demonstrated that flakes stored in MPE packaging retained higher scores for appearance, texture, flavour and overall acceptability compared to LDPE. Microbial analysis further confirmed MPE's effectiveness, with Total Plate Count (TPC) increasing only to 4.26×10^4 cfu/g after 180 days, significantly lower than LDPE's 7.25×10^4 cfu/g. Yeasts and molds appeared later and at lower levels in MPE-packaged flakes, and no coliforms were detected during the entire storage period. In contrast, LDPE allowed greater microbial growth, compromising product safety and quality after 120 days. The findings highlight LDPE's limitations for long-term storage, while establishing MPE as the ideal packaging material for preserving sensory quality, microbial stability, and product integrity. Although MPE is more costly, its superior performance ensures extended shelf life and enhanced food safety, making it the preferred choice for storing hygroscopic food products like field bean flakes.

Keywords: Field Bean Flakes, Low-density polyethylene, Metalized polyester

Isolation and structural elucidation of secondary metabolite from root extract of *Maesa indica* (roxb.) Sweet and its anticancer efficacy against MCF-7 and Hep G2 cancer cell line.

Pooja K. P. and Shrishail H. C.

Department of Applied Botany, Kuvempu University, Shankaraghatta, 577451-Karnataka, India
Email: poojakp969@gmail.com

Abstract

Maesa indica (Roxb.) Sweet, an evergreen plant from the Primulaceae family, has been traditionally used to treat cancer, infections, and blood disorders. However, little is known about the phytochemicals and anticancer properties of its roots. This study analyzed the ethanol root extract, identified bioactive compounds via LC-MS/MS, and isolated Rutin, a key flavonoid. Rutin was characterized using FT-IR, ^{1}H-NMR, ^{13}C-NMR, and LC-MS/MS. The MTT assay revealed dose-dependent cytotoxicity against Hep G2 liver cancer cells (IC50: 168.44 µg/ml), while its effect on MCF-7 breast cancer cells was lower. Rutin exhibited stronger cytotoxicity than the crude extract, highlighting its potential as an anticancer agent. The presence of flavonoids, phenols, alkaloids, glycosides, and saponins further supports the therapeutic value of *Maesa indica* roots. These findings suggest that Rutin and other bioactive compounds warrant further investigation for their potential in cancer treatment.

Keywords: *Maesa indica*, LC-MS/MS, cytotoxicity, Hep G2 cells, Rutin, breast cancer

Conservation and Commercialization of Wild Edible Fruits in Karnataka: A Sustainable Market Development for Biodiversity-Rich Resources

Tilak Revanasiddappa[1,2], Sharath R.[1] and Kumaraswamy H. M.[3]

[1]*Department of Studies in Food Technology, Davangere University, Shivagangotri, Davangere, 57700, Karnataka, India*
[2]*Department of Food Science and Technology, GM University, PB Road Davangere-577006, Karnataka, India*
[3]*Laboratory of Experimental Medicine, Department of Biotechnology, Kuvempu University, Shankaraghatta, 577451, Karnataka, India.*
Email: tilak.r3900@gmail.com

Abstract

Several wild edible fruits, such as *Aporosa lindleyana* (Vetty fruit), *Artocarpus hirsutus* (Wildjackfruit), *Flacourtia montana* (Mountain sweet thorn), *Garcinia indica* (Kokum), *Limonia acidissima* (Wood apple), *Clausena indica* (Indian wampi), and *Garcinia xanthochymus* (False mangosteen), are rich in bioactive compounds, including antioxidants, polyphenols, and essential nutrients. Their bioactive properties provide anti-inflammatory, anti-diabetic, and immune-boosting benefits, making them ideal for developing value-added products. However, several challenges hinder large-scale commercialization, including difficult harvesting due to the rugged terrain and seasonal availability of these fruits. Additionally, limited consumer awareness, high post-harvest losses, poor market linkages, deforestation and inadequate processing infrastructure further restrict their market potential. To address these challenges, value addition through fruit powders, juices, jams, and herbal extracts can improve marketability. Strengthening farmer-industry ties, integrating these fruits into public health programs, and implementing supportive policies will drive growth. Research on post-harvest technologies, sustainable processing, and market expansion is key to unlocking their potential. Conservation efforts and sustainable market development will ensure long-term availability and economic viability while preserving biodiversity. Future studies should focus on clinical validation, better storage solutions, and increased consumer awareness.

Keywords: Wild edible fruits, commercialization, biodiversity, Karnataka, nutraceuticals

One pot facile green synthesis of ZrO_2 nanoparticles using *B. monosperma* for efficient dye degradation studies

Sathisha H. C. [1] and Sunil S. V.[2]

[1]*Department of Studies and Research in Industrial Chemistry Sahyadri Science College, Kuvempu University, Shivamogga-577203, Karnataka, India*
[2]*Department of Biochemistry, Sahyadri Science College, Kuvempu University, Shivamogga-577203, Karnataka, India*
Email: sathi.harnhalli@gmail.com

Abstract

Plant-based nanoparticles (NPs) production is gaining attraction in the field of nanoscience and has several advantages over physicochemical methods. By using powdered leaves of *Butea monosperma* (BM) with ZrO_2 novel NPs was synthesised using the green combustion technique. The studies resulted that, the X-ray diffraction (XRD) techniques validated nature of NPs and showed that ZrO_2 had a cubic phase. The morphology of NPs observed by transmission electron microscopy (TEM) and scanning electron microscopy (SEM) which shows, a non-uniform spherical shape and a reasonable distribution. EDAX pattern (Energy Dispersive X-Ray Analysis) indicated the presence of oxygen and zirconium components, Fourier Transform Infrared Spectroscopy (FT-IR) spectrum determined the metal-oxygen bonding in nanoparticles. Tauc relation determined optical energy 3.34 eV of band gap value. Further, the study of photocatalytic degradation of methylene blue (MB) dye is carried out using UV light. Up to 99.5% of the dye can be degraded by the NPs in 150 minutes, which interprets its exceptional efficiency. According to the gathered data, ZrO_2 NPs are the predominantly effective photocatalyst for the degradation of MB.

Keywords: Combustion: ZrO_2NPs: XRD: Methylene blue: Photocatalytic activity

Green Synthesis of Silver Nanoparticles Using *Bauhinia forticate* and Evolution of its Characterization, Antioxidant and Anti-biofilm Activity

Varunakumara J. B. and Nehakumari C.

Department of Biochemistry, Sahyadri Science College, Constituent College of Kuvempu University, Shivamogga-577203, Karnataka, India
Email: varuna24july@gmail.com

Abstract

The biosynthesis of nanoparticles is vital area due to their benefits over chemical and physical methods of synthesis. The Green synthesis of silver nanoparticles makes use of plant constituents like carbohydrates, fats, enzymes, flavonoids, terpenoids, polyphenols and alkaloids as reducing agents to synthesize silver nanoparticles. This method is proved to be very simple, cost-effective and convenient. Silver nanoparticles were confirmed by visual detection in which the colourless solution gets changed to a brown coloured solution. The aim of the present study is the Green synthesis of silver nanoparticles using Brazilian Orchid (*Bauhinia forticate*) leaf extract for the reduction of silver nitrite solution to silver nanoparticles (AgNPs). During the synthesis silver oxides nanoparticles were synthesized as a reducing and capping agent. Physicochemical characterization completed by SEM, XRD and FTIR spectroscopy. The XRD result shows the nanoparticles possessed a crystalline nature. The morphological analysis using SEM was offered the shape was spherical. FTIR result also shows various changes in functional and other group peaks in synthesized AgNPs as compare to plant extract. The characterization confirmed that the synthesized material consisted of AgNPs. Furthermore, The AgNPs at bared their antioxidant capacity in vitro by scavenging DPPH free radicles, the largest inhibition titer found in the mixture of DPPH with biosynthesis AgNPs. The Biofilm inhibition (95%) of AgNPs treated *Pseudomonas aeruginosa* was observed using crystal violet assay. Based on our results, we propose that the AgNPs biosynthesized using *Bauhinia forticate* are an eco-friendly and effective bio-medical material unlike those produced *via* chemical methods.

Keywords: Green synthesis, AgNPs, silver oxides nanoparticles, anti-biofilm, antioxidant Activity

Photocatalytic Efficiency of $NiCaO_2$ Nanoparticles in Industrial Dye Removal Using Solar Light

Shiva Naik H., Madhusudhana N. and Yogendra K.

Department of P. G. Studies and Research in Environmental Science, Kuvempu University, Jnana Sahyadri, Shankaraghatta-577451, Shivamogga, Karnataka, India.
Email: yogendraku@gmail.com,

Abstract

$NiCaO_2$ nanoparticles were synthesized using the solution combustion method with acetamide as a fuel. The nanoparticles were characterized using X-ray diffraction (XRD), Scanning Electron Microscopy with Energy-Dispersive X-ray Spectroscopy (SEM-EDX), Photoluminescence (PL) analysis, Cyclic Voltammetry (CV), and UV-Vis Diffuse Reflectance Spectroscopy (UV-DRS). The band gap of the nanoparticles was determined to be 3.22eV, with an average particle size of 20 nm and an Orthorhombic crystal structure. Antibacterial and Antifungal activities of the synthesized nanoparticles were also evaluated. The photocatalytic activity of $NiCaO_2$ nanoparticles was investigated for the degradation of Coralene Blue BGFS dye under solar irradiation by varying catalyst concentration, solution pH, and initial dye concentration. The nanoparticles exhibited excellent photocatalytic degradation efficiency. The highest degradation rate was achieved at a catalyst loading of 0.6 g/100 ml, a dye concentration of 30 ppm, in 300 min at pH 2. This approach is well-suited for the degradation of azo dyes, offering a practical solution for wastewater remediation.

Keywords: Coralene Blue BGFS, $NiCaO_2$, acetamide, antibacterial and antifungal activities, photocatalytic degradation

Biological Potentials of Silver Nanoparticles Synthesized from *Cassia auriculate*

Aruna S. H., Nayana V., Manoj G. T., Madhu Gowda K., Manjunatha D. and Venu Gopal T. M.

Department of Microbiology, Sahyadri Science College, Shivamogga, Karnataka, INDIA
Email: manjunathad07@gmail.com

Abstract

Cassia auriculata belongs to the Fabaceae family (subfamily: Caesalpinioideae) and is widely recognized for its medicinal properties. Traditionally used in Ayurveda and Siddha medicine, it has been employed to treat various ailments, including diabetes, liver disorders, urinary infections, and skin diseases. Different parts of the plant, such as its flowers, leaves, seeds, and bark, contain bioactive compounds that contribute to its pharmacological benefits. This research focuses on the biological synthesis of silver nanoparticles from *C. auriculata* ethanol extract (CA-AgNPs**)** to explore their potential therapeutic applications. The ethanol extract of *C. auriculata*, analyzed through UV-visible spectrophotometry, exhibited an absorption peak at 430 nm, indicating the presence of bioactive compounds. Further characterization through FTIR analysis identified peaks corresponding to various functional groups, confirming their involvement in nanoparticle synthesis. GC-MS analysis revealed multiple bioactive compounds when compared with the NIST05 database. The synthesized CA-AgNPs were further characterized using different analytical techniques to confirm their properties. UV-visible spectrophotometry confirmed the formation of CA-AgNPs, displaying an absorption peak at 441 nm. FTIR analysis indicated functional groups responsible for the reduction and stabilization of AgNPs. SEM-EDAX analysis revealed a spherical morphology, with EDAX spectra confirming the presence of silver atoms at 3 keV. The XRD study confirmed the crystalline structure, and DLS analysis determined the nanoparticle size. The CA-AgNPs demonstrated significant antibacterial activity against *Staphylococcus aureus, Salmonella typhi, and Klebsiella pneumoniae* and exhibited antifungal activity against *Candida albicans*. Ongoing research aims to investigate the anticoagulant properties of CA-AgNPs, along with detailed *in-vitro* and *in-vivo* anti-inflammatory studies, to explore their potential biomedical applications.

Keywords: *Cassia auriculata*, CA-AgNPs*,* Antimicrobial, anticoagulant, antiinflammatory

Photocatalytic Performance of Metal Oxide Nanoparticles for the Removal of Coralene Dark Red Bel Dye

Pratibha T. B.[1], Madhusudhana N.[2] and Yogendra K.

Department of P. G. Studies and Research in Environmental Science Kuvempu University, Jnana Sahyadri, Shankaraghatta-577451, Shivamogga, Karnataka, India
Email: yogendraku@gmail.com

Abstract

The photocatalytic degradation of Coralene Dark Red BEL was investigated using SrO nanoparticles synthesized via solution combustion method using urea as fuel. Structural and morphological properties were analysed using XRD, SEM, TEM, analysis, while UV-Vis provided insights into the optical properties. The band gap energy was determined to be 4.30 eV, optimizing light absorption for enhanced photocatalytic activity. The Photocatalytic degradation was determined against Coralene Dark Red BEL, involving the parameters such as Catalyst concentration, pH of the solution, Dye concentration and Effect of light. Under UV light, the catalyst achieved 81.27% dye degradation within 300 minutes. Thus, this study shows that structural properties influence photocatalytic efficiency, helping to improve wastewater treatment and reduce pollution.

Keywords*:* Coralene Dark Red BEL*, SrO, Nanoparticle, UV light, Photocatalytic Activity*

Synthesis, Characterization and Photocatalytic Performance of $SrMgO_2$ for Coralene Dark Red 2B Dye Degradation Under UV Light at 528 nm

Rakshit G. Hosamani[1], Madhusudhana N.[2] and Yogendra K.[1]

[1]*Department of P. G. Studies and Research in Environmental Science, Kuvempu University, Jnana sahyadri, Shankaraghatta, Shivamogga, Karnataka, INDIA*
[2]*Department of P. G. Studies and Research in Environmental Science, Kuvempu University, Jnana sahyadri, Shankaraghatta, Shivamogga, Karnataka, INDIA*
Email: yogendraku@gmail.com

Abstract

Nanoparticles unique properties have created attention because of their importance in both science and industry. Among various metal oxide nanoparticles have been utilized to remove organic pollutants. $SrMgO_2$ is an environmentally friendly material that is cost-effective, and exhibits high thermal and chemical stability. $SrMgO_2$ nanoparticles were fabricated and characterized using XRD, SEM and UV-visible spectroscopic techniques. $SrMgO_2$ was synthesized by solution combustion method using urea as a fuel. The particle size distribution of $SrMgO_2$ was determined to be under 70 nm, as confirmed by XRD analyses. And the Bandgap found to be 3.42eV. The effectiveness of $SrMgO_2$ nanoparticles in the photodegradation of Dark red 2B under UV light was examined. The findings indicated that the degradation efficiency reached 70.96%. Effectively, the Dark red 2B dye showed degradation. Therefore, these nanoparticles have been recognised as promising for the remediation of textile wastewater.

Keywords: $SrMgO_2$, Coralene Dark red 2B, nanoparticles, UV light

Therapeutic properties of biogenically proficient synthesized silver nanoparticles from endophytic fungus *Hyaloscypha vraolstadiae*: KUMBMDBT-24

Manjunatha Dadayya[1], Megha Gowri Thippeswamy[2], Sowmya Hirakannavar Veeranna[3] and Thippeswamy Basaiah[1]

[1]*Department of Microbiology, Sahyadri Science College, Shivamogga, Karnataka, India.*
[2]*Department of Studies and Research in Biochemistry, Tumkur University, Tumakuru – 572103,*
[3]*Department of P.G. Studies and Research in Microbiology, Bioscience complex, Kuvempu University, Jnanasahyadri, Shankaraghatta-577451, Shivamogga dist., Karnataka, India*
Email: thippeswamyb272@yahoo.in

Abstract

Silver nanoparticles (AgNPs) have gained attention for their diverse biological applications, with biogenic synthesis offering a more sustainable alternative to conventional chemical methods. This study explores the green synthesis of AgNPs using the endophytic fungus *Hyaloscypha vraolstadiae*, isolated from *Canthium parviflorum*. The nanoparticles (Hyl-AgNPs) were synthesized via submerged fermentation, and their formation was confirmed by UV-Vis spectrophotometry, which showed a peak at 430 nm. FTIR spectroscopy identified functional groups involved in nanoparticle reduction and stabilization, while SEM and TEM imaging revealed spherical nanoparticles. EDAX analysis confirmed the presence of silver, with a peak at 3 keV, and XRD analysis indicated crystalline nanoparticles. DLS analysis revealed an average particle size of 19.59 nm. Biologically, Hyl-AgNPs demonstrated potent antibacterial activity against *Salmonella typhi* (inhibition zone: 14.16 ± 0.28 mm) and antifungal activity against *Aspergillus brasiliensis* (inhibition zone: 12.16 ± 0.28 mm). Cytotoxicity assays revealed 20.48% and 47.50% inhibition at 200 µg/mL, indicating potential anticancer properties. In vitro and in vivo studies confirmed significant anti-inflammatory effects. This is the first report of AgNPs biosynthesis using *H. vraolstadiae*, and the synthesized nanoparticles showed enhanced antimicrobial efficacy, anti-inflammatory activity, and cytotoxic effects against cancer cells. These findings highlight the promising biomedical applications of Hyl-AgNPs, opening avenues for future therapeutic developments.

Keywords: Endophytic fungus, *Hyaloscypha vraolstadiae*, Hyl-AgNPs

In-vitro and in-vivo analysis of anticancer activity of triterpenes from bark of *Crataeva nurvala* Buch-Hum.

Akash Patel M. P. and Gopinath S. M.

Department of Studies in Biotechnology, Davanagere University, Davanagere– 577007, Karnataka, India
Email: akashpatel@gmit.ac.in

Crataeva nurvala, a plant with a rich history in traditional medicine, has shown potential therapeutic properties. This study investigates the anticancer activity of triterpenes extracted from the bark of *C. nurvala* through comprehensive in-vitro and in-vivo analyses. The triterpenes were extracted and purified from *C. nurvala* bark using established procedures. In-vitro analyses to be involved and assessment of cytotoxicity on multiple cancer cell lines, including cell viability assays, apoptosis induction, and cell cycle analysis to be conducted. For in-vivo studies, a suitable animal model to be employed, and triterpenes to be administered following determined dosages. Expected outcome of *in-vitro* experiments is to demonstrate a dose-dependent cytotoxic effect of *C. nurvala* triterpenes on cancer cells, with a notable selectivity for malignant cell lines. *In-vivo* studies we are expecting a significant reduction in tumor growth in animals after treating with *C. nurvala* triterpenes. Finally, our expected outcome is a novel anticancer drug can be explored to treat some cancer cell lines. We are expecting the anticancer activity of triterpenes isolated from *C. nurvala* stem bark by conducting in-vitro and in-vivo analyses.

Keywords: *Crataeva nurvala*; triterpenes; anticancer activity; *in-vitro* and *in-vivo* analysis

Coffee Husk Cellulose-Based Biopolymer Membranes: Sustainable Solutions for Packaging, Environmental Remediation, and Biomedical Applications.

Varun Raj T. C., Sindhura D. S. and Sachin S Nayaka

Department of Food Technology, Kuvempu University, Shankaraghatta, Karnataka, India.
EMail: sachinsnayaka@gmail.com

Abstract

This study focuses on the development of cellulose-based biopolymers, particularly coffee husk cellulose-conjugated carboxymethyl cellulose (CMC) and polylactic acid (PLA) membranes. These eco-friendly membranes leverage cellulose, a renewable and biodegradable polysaccharide, as a base, with PLA enhancing mechanical strength and durability. The research explores their applications in food packaging, environmental remediation, and biomedical fields. The combination of coffee husk cellulose with CMC increases hydrophilicity, making these membranes effective for wastewater treatment. Notably, they show a significant improvement in methylene blue degradation efficiency, rising from 29.31% after 24 hours to 86.0% after 72 hours, demonstrating strong potential for environmental cleanup. PLA membranes incorporating coffee husk cellulose also exhibit enhanced mechanical properties and barrier performance, offering better protection for tomatoes against weight loss and microbial contamination compared to conventional plastic packaging. However, performance varies with different foods, suggesting the need for further optimization.

In biomedical applications, CMC-PLA membranes display biocompatibility, non-toxicity, and biodegradability, making them promising for wound healing, drug delivery, and tissue engineering. The addition of metal oxide nanoparticles like titanium dioxide (TiO_2) and zinc oxide (ZnO) further boosts their photocatalytic properties for environmental remediation. Characterization techniques, including SEM, FTIR, EDX, and XRD, confirm the uniform dispersion of cellulose within the matrices, improving the membranes' mechanical integrity and functional performance. This study highlights the potential of coffee husk cellulose-based membranes as sustainable solutions in various industries.

Keywords: Coffee-cellulose, CMC-PLA membranes, biodegradability, food packaging

Tea dust Residue: An Insightful Study of Bioactives Extraction, Characterization, Antioxidant Activities, and Anti-cancer Potentials in Liver and Breast Cancer Cell Lines

Dattatreya Govindan[1], Sandopu Sravan Kumar[2], Hulegaru Channakeshava Chaya[1], Parvatam Giridhar[3] and Paramesha Mahadevappa[1]

[1]*Food Processing Centre Lab, Department of Studies and Research in Food Technology, Davangere University, Davangere-577 007, Karnataka, India*
[2]*Plant Cell Biotechnology Department, CSIR-Central Food Technological Research Institute, Mysore-570020, Karnataka, India*
[3]*Food Safety and Analytical Quality Control Laboratory, CSIR-Central Food Technological Research Institute, Mysore-570020, Karnataka, India*
EMail: paramesham8@davangereuniversity.ac.in

Abstract

The growing global demand for tea (Camellia sinensis) has led to an increase in agricultural and processed waste. This study focused on extracting bioactive metabolites from tea dust residues at various brewing times (5, 10, 15 minutes) with and without sugar and milk, and evaluated their antioxidant activities against liver and breast cancer cell proliferation. Nutritional analysis of the brewed tea dust residue revealed higher carbohydrate content, ranging from 12.67% in native to 18.10% and 28.81% when brewed with sugar and sugar + milk, respectively, due to the addition of sugar and milk molecules. Protein content remained largely unchanged (21.85% to 23.65%). Iron and calcium were retained in the highest concentrations. The total phenolic content (TPC) of the brewed native sample was 3.59%, increasing to 4.49% with processing. Notably, tea brewed with sugar and sugar + milk extracted more bioactive compounds, with TPC values of 6.79% and 1.02% at 5 minutes. Methanol extracts from the tea dust residue exhibited notable antioxidant activities, with a TPC of 1.16%, total flavonoid content (TFC) of 0.13%, total antioxidant activity (TAA) of 0.98%, DPPH inhibition of 0.48 µg/mL, and FRAP activity of 1.57%, surpassing the tea dust with sugar and sugar + milk residues. HPLC analysis identified key bioactives, including catechin, epicatechin, rutin, and gallic acid, with significant efficacy against liver (IC50 120 µg) and breast cancer (IC50 15.625 µg) cell lines. The findings suggest that processed tea dust residue could be a valuable source of bioactive compounds for agricultural applications and as nutrient-rich manure.

Key words: Tea dust, Nutritional, Minerals, Bioactives, Antioxidant activities, Cell Culture

Anticancer Activity of Green Synthesized and Optimized Copper Oxide Nanoparticles Derived from *Holigarna grahamii*

Vinayak Lokapur[1] and Manjula Shantaram[2]

[1]*PG Department of Biochemistry, GSS College, Belagavi*
[2]*Department of Biochemistry, Mangalore University, Mangalore, Karnataka*
Email: vinayak.lokapur@gmail.com

Abstract

In the twenty-first century, copper oxide nanoparticles (CuO NPs) have become a popular module operation in cancer detection due to their multifunctional properties. The current study focuses on optimizing the green method for the manufacture of zinc oxide nanoparticles using *Holigarna grahamii* (HG) leaves. Several analytical methods were used to examine the bonding, morphological, and structural characteristics of the nanopowder. Green Hg-CuO NPs showed a strong UV-visible absorption at 265 nm. PXRD scans and standard diffraction patterns of ICDD number 01-080-1268 provided more evidence for the CuO monoclonal crystal structure. TEM revealed that the appropriate conditions for synthesis resulted in nanoparticles with a size range of 20–40 nm. Due to smaller nanoparticle aggregation, the DLS technique was somewhat higher than the HR-TEM and XRD methods, at around 126.5 nm. With an IC_{50} value of 141.8 µg/mL (HG extract), free radical scavenging studies demonstrated exceptional antioxidant properties, surpassing ascorbic acid (68.85 µg/mL) and Hg-CuO NPs (256.2 µg/mL). Additionally, HG extract and HG-CuO NPs were found to be effective radical scavengers by the FRAP and PM assays. By using the XTT test, which demonstrated a dose-dependent response, the cytotoxic impact of HG extract and CuO NPs at different doses (6.25– 200 µg/ml) was examined against the non-cancerous HEK-293 cell line and the A498 cell line (human renal carcinoma). Following exposure to the XTT assay, cellular morphology studies showed that the viability of cancer cells declined as the concentration of CuO NP increased. According to DAPI staining and Annexin V, HG extract and HG-CuO NPs significantly and dose-dependently caused the A498 cells to undergo apoptosis. Consequently, this study presents a straightforward and efficient environmentally friendly method for producing CuO NPs with anticancer properties.

Keywords: *Holigarna grahamii,* Copper oxide nanoparticle, annexin V, apoptosis, cytotoxicity

Optimization and Green Synthesis of Zinc Oxide Nanoparticles Derived from *Garcinia indica*- A Nutraceutical Plant

Varsha Jayakar[1] and Manjula Shantaram[2]

[1]*PG Department of Biochemistry, GSS College, Belagavi,*
[2]*Department of Biochemistry, Mangalore University, Mangalore, Karnataka*
Email: jayakarvarsha@gmail.com

Abstract

Green chemistry techniques are among the several ways used to produce metal and semi-conductor nanoparticles because of their many uses in the creation of new technology. Zinc nitrate derivative and leaf extract from the nutraceutical plant species *Garcinia indica* (GI) were used in the current investigation to create easy and profitable nanoparticles. The nanopowder's bonding, morphological, and structural properties were investigated using a variety of analytical techniques. Strong UV-visible absorption was observed at 276 nm by green Gi-ZnO NPs. XRD showed that the wurtzite structure was hexagonal. TEM showed that nanoparticles with a size range of 10–20 nm were produced under the right synthesis conditions. The IC50 values for the antioxidant activity of GI, Gi-ZnO NPs, and ascorbic acid were 119.3 µg/mL, 148.8 µg/mL, and 68.85 µg/mL, respectively. Furthermore, the FRAP and PM tests revealed that GI extract and Gi-ZnO NPs were efficient radical scavengers. The cytotoxic effect of GI extract and ZnO NPs at several concentrations (6.25–200 µg/ml) was investigated against the non-cancerous HEK-293 cell line and the A498 cell line (human renal carcinoma) usingthe XTT test, which showed adose-dependent response. Cellularmorphology studies conducted after the XTT experiment revealed that when the concentration of ZnO NP rose, the viability of cancer cells decreased. The A498 cells had considerable and dose-dependent apoptosis in response to GI extract and Gi-ZnO NPs, as shown by DAPI staining and Annexin V. Therefore, our work offers a simple, effective, and eco-friendly process for creating ZnO NPs with anticancer qualities.

Keywords: *Garcinia indica,* zinc oxide nanoparticles, annexin V, apoptosis, cytotoxicity

Formulation and Evaluation of Herbal Based Lozenges

Jayasheela D. H., Harshitha H. D., Prathima B., Srinivas V., Raghu S. P. and S. E. Neelgund

Department of P.G. Studies and Research in Food Technology, Kuvempu University, Jnanasahyadri, Shankaraghatta–577 451, Karnataka
Email: jayasheela370@gmail.com

Abstract

Lozenges are a popular solid, unit-dose form of medication that is designed to be dissolved in the mouth or pharynx. Lozenges are medicinal dose forms with flavours that are meant to be sucked and kept in the mouth or throat. A number of innovative technologies have been developed to improve the conventional forms of lozenges i.e. hard candies and compressed tablets. Ingredients used *Sauropus androgynus* leaves powder, *Hemidesmus indicus* root powder, Ginger powder, Black pepper powder, Sugar [Castor sugar]. *S. androgynus* L. Merr.is a shrubby plant belonging to the Euphorbiaceae family. It grows in humid, high temperature conditions and is a Southeast Asian indigenous vegetable, widely cultivated for traditional medicinal purposes. Because of its high vitamin and nutrient content, *S. androgynus* is also known as "multigreen". *Piper nigrum*, popularly known as black pepper, is a hot and spicy spice made from the fruits of a perennial climber plant in the Piperaceae family. Black pepper (*Piper nigrum* L.), widely known as the "King of Spices". Black pepper is one of the oldest spices known, having originated on the Malabar Coast of India. In addition to being used extensively as a spice globally, pepper is also used sparingly in medicine as a carminative (to treat flatulence) and as a stomach secretion stimulant. Ginger (*Zingiber officinale* Roscoe), a member of the Zingiberaceae family and genus, has long been used as a spice and herbal remedy.It contains several chemical elements, including phenolic chemicals, terpenes, polysaccharides, lipids, organic acids, and raw fibres. *Hemidesmus indicus (L.)* R. Br. ex Schult. (Apocynaceae) is Herbal based ingredients are collected cleaned and dried then the powder prepared separately. This powder is used for the formulation of the lozenges. The prepared lozenges are studied for its physical parameters like thickness, diameter. Then sensory evaluation is done for prepared lozenges, the proximate analysis and DPPH activity and antioxidant activity experiments are conducted in this study.

Keywords: Herbal Based Lozenges**,** *Hemidesmus indicus,* DPPH activity

Formulation of Polysaccharide-Based Edible Films with Antibacterial Leaf Extract: Phytochemical Characterization and Antioxidant Properties

Sanjana V.[1], Ravikumar Patil H. S.[1] and S. E. Neelagund[2]

[1]*Department of Studies in Food Technology, Davangere University, Shivagangothri, Davanagere – 577007, Karnataka, India.*
[2]*Department of PG Studies and Research in Biochemistry, Jnana Sahayadri, Kuvempu University, Shankaraghatta – 577451, Karnataka, India.*
Email: patil_varuni@rediffmail.com

Abstract

Polysaccharide-based edible films have emerged as eco-friendly alternatives to synthetic packaging materials due to their biodegradability and functional properties. This study focuses on the formulation of edible films using a polysaccharide matrix derived from agricultural by-products, incorporating a plant leaf extract with antibacterial properties. The selected leaf extract, sourced from agricultural waste, was subjected to phytochemical analysis to identify the bioactive compounds responsible for its antimicrobial activity. In parallel, the antioxidant potential of the polysaccharide matrix was assessed to evaluate its contribution to oxidative stability. The matrix not only provided structural integrity to the film but also contributed additional antioxidant activity. The leaf extract was analyzed for its phytochemical composition, highlighting compounds with antibacterial and potential health-promoting effects. The synergistic combination of the polysaccharide matrix and the antibacterial leaf extract resulted in an edible film with multiple functional benefits, including antimicrobial protection, oxidative stability, and potential health-enhancing properties upon consumption. The results demonstrated that the leaf extract exhibited significant antibacterial activity, while the polysaccharide component contributed effectively to oxidative stability. Overall, the synergistic interaction between these bioactive components suggests that such edible films can be developed as active food packaging materials, enhancing food safety, extending shelf life, and promoting environmental sustainability

Keywords: Leaf Extract, Polysaccharide Matrix, Antioxidant Activity, Edible Films, Food Packaging

Production and Screening for Antimicrobial property of nanoparticles from *Cyclea peltata*

Nayanashree G., Sowmya H.V., Kavana H. P. and B. Thippeswamy

[1]*Department of P.G. Studies and Research in Microbiology, Jnanasahyadri, Kuvempu University, Shankaraghatta, Shivamogga (Dist.,), Karnataka 577 451, India.*
Email: thippeswamyb205@gmail.com

Abstract

Cyclea peltata also known as "Pedal", "Pada thalli" in Kerala belongs to Menispermiaceae family is a much branched, slender twining climbing shrub with tuberous roots, peltate leaves, greenish yellow flowers and drupaceous fruits. In India, it is particularly seen in the Western Ghats. It is widely used in ayurveda to cure many diseases. Due to its medicinal property, plant extract was qualitatively screened for secondary metabolites following standard protocols. Tests for microbial cultures were performed according to Clinical and Laboratory Standards Institute (CLSI) guidelines. The potential of the methanolic extract of the plants to inhibit pathogenic microorganisms was determined by the Agar well diffusion assay. Zone of inhibition of 14mm was observed for *K. pneumoniae*, 13 mm for *S. typhi*, 12mm for *E. faecalis* and *S. aureus* and 10 mm for *E. coli* respectively. A zone of inhibition of 15mm was observed against *C. albicans* at 20 mg/ml concentration. The antioxidant activity of plant extract was evaluated using DPPH assay by using ascorbic acid as reference standard. Plant extract showed radical scavenging activity of 12.1 and 28.78% at 20 and 40 mg concentration. Silver nano-particles (AgNPs) were synthesized using *C. peltata* extract. Synthesis was confirmed through UV-Vis spectrophotometry showing a characteristic surface peak. The screening of antimicrobial activity of synthesized nanoparticles was done by agar well diffusion method. Zone of inhibition of 20 mm was observed for *K. pneumoniae*, 11 mm for *S. typhi*, and 10mm for *S. aureus* respectively. A zone of inhibition of 11mm was observed against *C. albicans* at 20mg/ml concentration. Based on above results *C. peltata* extract and its nanoparticles can be used as antimicrobial agent.

Keywords: *Cyclea peltata,* Antimicrobial activity, Silver nanoparticles (AgNPs), Antioxidant properties

Antibacterial and Fibrinolytic Activities of *Calotropis procera, Carica papaya, Manilkara zapota, and Plumeria pudica Latex* and Cytotoxicity Studies of Magnesium Nanoparticles

Shreyanka M. Patil, Deepa Nayak, Kanchana Halasagi, Megha Kubsad, Pratibha Vadarale and Joy H. Hoskeri

Karnataka State Akkamahadevi Women's University, Vijayapura, Karnataka, India, Email: joybioinfo@gmail.com

Abstract

Plant latex contains diverse phytochemicals with significant pharmacological properties. This study evaluates the antibacterial, fibrinolytic, and larvicidal activities of latex from *Calotropis procera, Carica papaya, Manilkara zapota* and *Plumeria pudica,* along with the cytotoxicity of magnesium nanoparticles (Mg-NPs) synthesized using Plumeria latex. Phytochemical profiling confirmed carbohydrates in all samples, with alkaloids absent in *P. pudica. C. procera* exhibited glycosides and saponins, known for antimicrobial properties. Antibacterial analysis showed *C. procera* and *P. pudica* were effective against *Staphylococcus aureus*, while *M. zapota* inhibited *Escherichia coli*. *C. papaya* exhibited the highest fibrinolytic activity (78.19% clot lysis at 5 mg/ml). Larvicidal activity was observed in all latex samples except *C. papaya*, with *C. procera* showing the fastest action (10.08 ± 0.5 minutes). Mg-NPs synthesized from *C. papaya* and *P. pudica* were characterized using SEM, XRD, and EDX. MTT assays on MCF-7 cells showed dose-dependent cytotoxicity, with *P. pudica* latex (IC50 = 75.02 µg/ml) more cytotoxic than its nanoparticles (IC50=86.09 µg/ml). These findings suggest the biomedical potential of plant-derived latex and Mg-NPs in antimicrobial therapy, fibrinolysis, and cancer treatment. Further studies are needed to explore the molecular mechanisms behind *P. pudica* cytotoxicity.

Keywords: Plant latex, Magnesium nanoparticles, Antibacterial, Fibrinolysis, Cytotoxicity, Green synthesis

Photocatalytic Degradation of Methylene Blue Dye and Chromium Reduction Using Green Synthesized CeO_2-ZnO Nanocomposite via *Tridax procumbens* (Linn.)

P. Ananthu [1], Pallavi Sulakiya [1], G. R. Gagana [2], G. Nagaraju[2] and H. Raja Naika [1]

[1]*Department of Environmental Science, School of Earth Science Systems (SESS), Central University of Kerala, Tejaswini Hills, Periya, Kasaragod, Kerala, 671320*
[2]*Energy Materials Research Laboratory, Department of Chemistry, Siddaganga Institute of Technology, Tumkur, Karnataka, 572103, India*
Email: rajanaika@cukerala.ac.in

Abstract

The study investigates the photocatalytic degradation of Methylene Blue dye using a CeO2-ZnO nanocomposite that was synthesized through a sustainable green synthesis method. This method employed zinc nitrate hexahydrate for ZnO and cerium nitrate hexahydrate as the precursor for CeO2 nanoparticle synthesis. The green synthesis process also involved the use of *Tridax procumbens* (Linn.), a natural plant, which served as both a reducing agent and a fuel for the reaction. To fully assess the structural, chemical, and electrical characteristics of the synthesized composite, various analytical techniques were employed, including SEM, XRD, FTIR, and UV-Visible Spectrophotometry. The optical band gap of the composite was determined to be 2.95 eV based on the Tauc relation. The photocatalytic performance of the CeO2-ZnO nanocomposite was then evaluated for the degradation of Methylene Blue dye under different experimental conditions. Key parameters such as the variation in catalyst concentration, dye concentration, and pH levels were tested, alongside scavenger tests using agents like EDTA, K2Cr2O7, Ascorbic acid, and TBA to examine the mechanism of the photocatalytic process. The results revealed that the CeO2-ZnO nanocomposite was highly effective in degrading the dye, achieving more than 90% degradation within 180 min under visible light exposure. Seed germination activity is also carried out for Mustard seeds using dye water and dye degraded water to compare the seed growth. Furthermore, the nanocomposite demonstrated significant potential in environmental applications, as it was capable of reducing Chromium (VI) by up to 65%, converting it to the less toxic Chromium (III).

Keywords: Nanocomposite, Photocatalytic Degradation, Green Synthesis, Scavenger Tests, Chromium Reduction

Anticancer Potential of Citrus Peel Extracts: An *In Vivo* and *In Vitro* Study

Pallavi M.[1], Ramesh C. K.[1], Krishna V.[2], Kavitha G. C.[3] and Nethravathi A. M.[1]

[1]*PG Department of studies and Research in Biotechnology, Sahyadri Science College, Kuvempu University, Shivamogga - 577 203, Karnataka, India.*
[2]*PG Department of Studies and Research in Biotechnology, Kuvempu University, Jnana Sahyadri, Shankaraghatta - 577 451, Shivamogga, Karnataka, India.*
[3]*Department of studies in Biotechnology, Davangere University, Davangere-577007, Karnataka, India.*

Abstract

This study investigates the antitumor potential of ethanolic extracts obtained from the peels of five citrus species: *Citrus reticulata* (orange), *Citrus maxima* (pomelo), *Citrus aurantifolia* (lime), *Citrus medica* (citron), and *Citrus aurantium* (sour orange). The extracts were evaluated using both *in vivo* and *in vitro* models to determine their efficacy in tumor inhibition and cytotoxic activity. *In vivo* antitumor activity was assessed using the Ehrlich Ascites Carcinoma (EAC) model, wherein tumor regression was analyzed in a dose-dependent manner. Additionally, the anti-angiogenic potential was examined through a non-tumorigenic rVEGF165-induced chick chorioallantoic membrane (CAM) assay. The results demonstrated that all citrus peel extracts effectively inhibited EAC tumor growth, with *C. maxima* exhibiting the most significant tumor suppression, followed by *C. aurantifolia, C. aurantium, C. reticulata, and C. medica*. Furthermore, all extracts demonstrated anti-angiogenic activity, with *C. maxima* showing the most pronounced reduction in VEGF-induced neovascularization. For *in vitro* evaluations, the MTT assay was performed on MCF-7 and U-87MG cell lines to determine cytotoxicity. The results indicated that *C. maxima* exhibited the strongest antiproliferative effect against MCF-7 cells, whereas *C. reticulata* showed the highest cytotoxicity against U-87 MG cells, followed by *C. aurantium, C. aurantifolia, and C. medica*. The anticancer potential of citrus peels is likely attributed to their rich composition of bioactive compounds, including flavonoids, limonoids, vitamin C, β-carotene, folic acid, and dietary fiber, all of which have been associated with chemopreventive properties. These findings support epidemiological studies suggesting that citrus-derived phytochemicals may contribute to cancer prevention and therapy.

Keywords: Citrus, antitumor, Ehrlich Ascites Carcinoma, CAM assay, MTT assay

Precursor-Driven Phytosynthesis of Hemocompatible ZnO Nanoparticles for Antimicrobial, Anti-oxidant and Anti-cancer Applications

Sreevani B.[1], Monica K.J. Nidhi[1], Bhavani Betadur[2], Kotresh M.G.[2] and Uma Reddy B.[1]

[1]*Department of Studies in Botany, Vijayanagara Sri Krishnadevaraya University, Ballari-583105*

[2]*Department of Studies in Physics, Vijayanagara Sri Krishnadevaraya University, Ballari-583105*

Email: sreevani.sonu@gmail.com

Abstract

Phytosynthesized zinc oxide nanoparticles (ZnO NPs) have attracted interest for their diverse biological properties. This study synthesized KZC, KZN, and KZS NPs using *Kigelia africana* extract via green-route method with $ZnCl_2$, $ZnSO_4 \cdot 7H_2O$, and $Zn(NO_3)_2 \cdot 6H_2O$ as precursors respectively. The nanoparticles, calcinated at 300°C, were characterized using UV-Vis, FTIR, XRD, FE-SEM, EDS, and TEM. UV-Vis showed maximum absorption at 370 nm, FTIR confirmed functional groups, XRD, FE-SEM and TEM validated crystallinity, size, and morphology. The particle shapes varied: spherical-to-rod (KZC), flakes (KZS), and spherical-to-hexagonal (KZN). ZnO NPs were tested for antimicrobial, hemolytic, antioxidant and anti-cancer activities. The disc diffusion method revealed strong antibacterial effect against commonly occurring gram negative *(Escherichia coli, Pseudomonas aerugiosa)* and gram positive *(Staphylococcus aureus, Enterococcus faecalis)* bacteria, particularly against *E. faecalis*. Antifungal activity against *Rhizopus stolonifer* was confirmed using the poison food method. Hemolytic assays showed biocompatibility, with minimal lysis (KZN: 3%, KZC: 2.4%, KZS: 1.4%). The DPPH assay of KZC demonstrated a significant radical scavenging activity of 65.87% at 750µg/ml. With respect to highest hecompatible property of KZS, it was in turn subjected to cytotoxicity assay against HepG2 liver cancer cells and exhibited potent anti-cancer activity that unveiled maximum anticancer efficacy of 57.53% and cell viability of 42.47% at highest dose concentration of 750µg/ml. This study underscores the influence of precursor selection on ZnO NP morphology and bioactivity, highlighting their potential as alternative therapeutic agents.

Keywords: *Kigelia africana*, ZnO Nanoparticles, Antimicrobial, Hemolytic, Anti-oxidant, Anti-cancer

Assessing genetic diversity in finger millet through multivariate approach

Sujata Bhat[1], M. Thippeswamy[1], K. B. Palanna[2] and T. E. Nagaraja[2]

[1] *Department of Studies in Botany, Davangere University, Shivagangothri, Davangere – 577002,*

[2]*Project Coordinating Unit, ICAR-AICRP on Small Millets, University of Agricultural Sciences, GKVK, Bengaluru-560065*

Email: sbsujiraghu@gmail.com

Abstract

Finger millet, commonly known as ragi, is a staple food in the southern parts of Karnataka, India. It is a climate-resilient crop with significant health benefits and the ability to grow in low-fertility soil with minimal inputs. It is a promising candidate for ensuring food security amid adverse climatic conditions. Germplasm resources are the source of genetic diversity for grain yield, nutrients, resistance to biotic and abiotic stresses. In the present study, a total of 150 finger millet germplasm accessions along with 3 check varieties were evaluated during rainy seasons of 2023 and 2024 at AICRP on small millets, University of Agricultural Sciences, Bangalore. The genetic divergence was analyzed through K-means clustering followed by principal component analysis (PCA). The analysis of variance showed significant genetic variability for eight quantitative traits in finger millet. Using the average silhouette method, the accessions were grouped into two optimal clusters: Cluster I (86 genotypes) and Cluster II (67 genotypes). Notably, accessions GE 4805, GE 27, and GE 5825, which had higher grain yield and matured in 115-120 days, were classified under Cluster I. This clustering is valuable for selecting elite accessions as donor parents in breeding programs. Principal component analysis (PCA) revealed that the first two principal components, with Eigen values greater than one, accounted for 46.70% of the total variability. Days to maturity, plant height and number of fingers per ear head were contributed significantly to the total genetic variability and divergence. Therefore, emphasis should be given these characters when selection is exercised in finger millet crop improvement programme. Conducting genetic divergence studies before breeding programs is essential to assess existing genetic diversity.

Keywords: Finger millet, genetic diversity, AICRP, Principal component analysis

Bactericidal and Antivirulence Potential of Sulphate-Functionalized Nanocellulose Extracted from *Nelumbo nucifera* Gaertn.

Monica K. J. Nidhi[1], Nagaraja H.[1], Hanumanth Gouda[2], Kotresh M. G.[2] and Uma Reddy B.[1]

[1]*Department of Studies in Botany, Vijayanagara Sri Krishnadevaraya University, Ballari-583105*
[2]*Department of Studies in Physics, Vijayanagara Sri Krishnadevaraya University, Ballari-583105*
Email: nmonica@vskub.ac.in

Abstract

This study explores the bactericidal and antivirulence potential of sulphate-functionalized nanocellulose (S-NC) extracted from *Nelumbo nucifera* Gaertn by acid hydrolysis method. Physicochemical characterization of S-NC revealed high crystallinity of 74.83% by XRD, an aspect ratio of 6.53 by TEM, a helical and fibrous morphology with agglomeration by FE-SEM, an optical energy band gap of 4.25eV by UV-Vis, and a zeta potential of -39.9mV. Further, the S-NC were screened for bactericidal activities, which exhibited strong antibacterial activity against *Enterococcus faecalis, Pseudomonas aeruginosa, Staphylococcus aureus*, and *Escherichia coli,* by effectively disrupting biofilm formation. It also demonstrated significant antivirulence property by inhibiting quorum sensing elements like Pyocyanin (68.58%), Pyoverdine (70.33%), and Staphyloxanthin (67.90%) from the *Pseudomonas aeruginosa,* and *Staphylococcus aureus*. Additionally, the S-NC showed excellent hemocompatibility with human red blood cells and a promising antioxidant property (82.45%). These findings for the first time suggest the use of S-NC as a potential antimicrobial, antivirulence, and antioxidant agent with bio-compatibility.

Keywords: *Nelumbo nucifera,* Sulphate-Functionalised Nanocellulose (S-NC), Antibacterial, Antivirulence, Antioxidant, Hemocompatible

Formulation and Development of Traditional Confectionery Product Haalbai from Foxtail Millet

Namitha M. Y. and Ravikumar Patil H. S.

Department of Studies and Research in Food Technology, Davangere University, Davanagere.
Email: namitha132gowda@gmail.com

Abstract

Haalbai is a traditional sweet unique to the hilly regions of Karnataka, typically prepared during festivals as an offering to God. It is a sweet cake traditionally made from rice, jaggery, and coconut. The preparation process involves soaking rice for a few hours to soften it, grinding it thoroughly, and sieving to obtain a batter. This batter is then mixed with coconut milk and added to a hot pan containing ghee and jaggery. Cardamom can be incorporated as a flavouring agent. Foxtail millet offers superior nutritional value compared to rice due to its high dietary fiber content, resistant starch, vitamins, minerals, and essential amino acids, except for lysine and methionine. It also contains a significant amount of stearic and linoleic acids, which contribute to maintaining healthy lipid levels. Due to these health benefits, foxtail millet is used to enhance the nutritional profile of Haalbai. The nutritional composition of Foxtail Millet Haalbai per 100g is as follows: moisture – 60.59g, ash – 0.67g, protein – 2.37g, fat – 0.36g, carbohydrates – 36.01g, and energy – 157 kcal. It also contains 28 mg of calcium per 100g. In comparison, the nutritional composition of Rice Haalbai per 100g is: moisture – 70.50g, ash – 1.38g, protein – 1.57g, fat – 0.07g, carbohydrates – 26.78g, and energy – 114 kcal, with 46 mg of calcium. Storage studies indicate that Foxtail Millet Haalbai has a shelf life of six days under refrigeration.

Keywords: Haalbai, Nutritional Value, Foxtail Millet, Traditional Foods

Harnessing *Hibiscus lobatus* for the Biosynthesis of Zinc Oxide Nanoparticles: A Comprehensive Study on Anti-cancer activity, Larvicidal Properties against *Culex Quinquefasciatus* and Advanced Applications in Dye Degradation

Darshan R. C. and Siddappa B. Kakkalameli

Department of Studies in Botany, Davangere University, shivagangothri, Davangere – 577007.
Email: dubotsiddu@gmail.com

Abstract

This study explores the plant-mediated synthesis of zinc oxide Nanoparticles (ZnO NPs), this method offers a fast, eco-friendly, and user-friendly approach using the aqueous leaf extract of *Hibiscus lobatus* (Malvaceae). Unlike chemical and physical processes, green synthesis of ZnO NPs is non-toxic, cost-effective, and environmentally sustainable Zinc oxide, an inorganic nanoparticle, has its nutritional value determined by proximate composition, for the volatile compounds Gc-Ms were analysed. Various techniques are used to characterize the physical and chemical properties of the synthesized ZnO NPs, including UV, FTIR, EDX, XRD, ZETA potential, SEM, DLS, and TEM. The *In-vitro* cytotoxicity by MTT assay against MCF-7 and A549 cell lines was evaluated. The ability of ZnO nanoparticles to kill *Culex quinquefasciatus (C. quinquefasciatus*) larvae demonstrated a noteworthy toxic effect against the 4th instar larvae of *C. quinquefasciatus* with LC_{50} Calculated. This study explains the toxicity of green synthesized ZnO NPs upon mosquito larvae and shows its significant and effective larvicide activity. Furthermore, the ZnO NPs were effectively utilized for dye degradation of Methylene blue under visible light treatment and achieved degradation activity.

Keywords: *Culex*; Dye-degradation; *Hibiscus*; Larvicidal; Zinc Oxide nanoparticles

Nutraceuticals values of *Artocarpus gomenzianus* Wall. ex Trecul

Sarala P. and Krishnamurthy S. R.

Department of Applied Botany, Kuvempu University, Jnana Sahyadri, Shankaraghatta-577451, Shimoga District, Karnataka INDIA
Email: saralap2007@yahoo.co.in

Abstract

An attempt has been made to determine proximate, nutritive value, elemental composition and heavy metal contents of the fruits of monkey jack. *Artocarpus gomenzianus* an underutilized edible and medicinal plant of Central Western Ghats has been studied for their distribution, harvesting, morphology and juice yield, processing, preservation and powder yield at various regions of Central western Ghats. The fruits showed variation with respect to morphology, juice yield, and powder yield, proximate and nutritive value and also elemental components. The comparative study with RDA value from region to region. The harvesting, processing, preservation and marketing are closely related with social and cultural resources for income generation at middle regions of the Western Ghats. Further, the raw and processed products, is one of the processed and used based on traditional methods and knowledge. The study confirmed that conservation of monkey jack needs both in vitro and in vivo approaches. The awareness among the local people, encouragement from government organization, voluntary involvement of NGO and involvement of local young people and women for biodiversity conservation help to develop potential of monkey jack for the future potential uses is also discussed for the middle regions of Western Ghats.

Keywords: Monkey Jack, Nutritional attributes, Traditional uses, Underutilized fruits

Synthesis, Characterisation and Biocompatibility Study of *Withania somnifera* Mediated Cerium Oxide Nanoparticles

Akshata Rachagond, Arati Sanadi, Geeta Nayak, Shruti Guttedar and Babu R. L.

Laboratory of Natural Compounds and Drug Discovery, Department of Bioinformatics, Karnataka State Akkamahadevi Women University, Vijayapura-586108

Abstract

During the last decade green synthesized cerium oxide nanoparticles (CeO_2, NPs) attracted remarkable interest in various fields of science and technology. This study reports the rapid and ecofriendly approach for the synthesis of CeO_2 nanoparticles using the *Withania somnifera* extract. The current study determines the process of nanoceria synthesis by green method. In which, *Withania somnifera* leaves extract is used to the cerium hexahydrate with in the presence of sodium hydroxide. The produced nanoceria was characterized by Ultraviolet-visible spectroscopy (UV-Vis), Scanning electron microscopy (SEM), Zeta analyzer, X-ray Diffraction (XRD), Energy dispersive X-ray (EDX), Fourier transform infrared spectroscopy (FTIR), and Transmission electron-microscopy (TEM). *W. somnifera* plant based, cerium oxide nanoparticle synthesis gave particle size of 9-27nm. The cerium oxide nanoparticles of biological activity assessed by Antioxidant Assay (DPPH), Anti-inflammatory Assay (protein denaturation and NOX assay), and Antibacterial activity, hence our results suggested that nanoceria synthesized through green method has considerable Antioxidant, Anti-inflammatory, and Antibacterial properties. Overall, our study indicates that green synthetic nanoceria have potential application in biological and medical fields. Further study may explore possibility of commercial applications such as making cosmetic products, consumer products, instruments etc.

Keywords: Nanotechnology, Nanomaterial, Green synthesis, Cerium oxide, Nanoceria, antioxidant, antibacterial, anti-inflammatory

An overview of nanotechnology and its application

S. Udachan[1], S.B. Kolavekar[1], N. H. Ayachit[1], L.A. Udachan[2], S. S. Kolkundi[3], Ramya. S[4], Veeresh. S[5]

[1]*Department of Physics, School of Advanced Sciences, KLE Technological University, Hubballi-580031, India*
[2]*S. S. Tegnoor Degree College, Kalaburagi-585105, India*
[3]*Government First Grade College, Shahapur-585223, Yadgir, India*
[4,5]*Shree Sangam Vidya Mandir, Kalburagi-585104, Karnataka, India*
Email: shivaudachan8@gmail.com

Abstract

Many benefits of nanotechnology depend on the fact that it is possible to tailor the structures of materials at extremely small scales to achieve specific properties, thus greatly extending the materials science toolkit. Using nanotechnology, materials can effectively be made stronger, lighter, more durable, more reactive, more sieve-like, or better electrical conductors, among many other traits. Many everyday commercial products are currently on the market and in daily use that rely on nanoscale materials and processes: Nanoscale additives to or surface treatments of fabrics can provide lightweight ballistic energy deflection in personal body armor, or can help them resist wrinkling, staining, and bacterial growth. Clear nanoscale films on eyeglasses, computer and camera displays, windows, and other surfaces can make them water- and residue-repellent, antireflective, self-cleaning, resistant to ultraviolet or infrared light, antifog, antimicrobial, scratch-resistant, or electrically conductive. Nanoscale materials are beginning to enable washable, durable "smart fabrics" equipped with flexible nanoscale sensors and electronics with capabilities for health monitoring, solar energy capture, and energy harvesting through movement. Lightweighting of cars, trucks, airplanes, boats, and space craft could lead to significant fuel savings. Nanoscale additives in polymer composite materials are being used in baseball bats, tennis rackets, bicycles, motorcycle helmets, automobile parts, luggage, and power tool housings, making them lightweight, stiff, durable, and resilient. Carbon nanotube sheets are now being produced for use in next-generation air vehicles. For example, the combination of light weight and conductivity makes them ideal for applications such as electromagnetic shielding and thermal management.

Keywords: Nanotechnology, Applications, Nanomaterials

Novel Dual Responsive Embelin Fabricated ZnO Nano Architectures Amplify DNA Damage and Induce Apoptosis via pERK1/2/p53 Pathway in Pancreatic Ductal Adenocarcinoma

Pooja S. Rajaput[1], Meghana P[1], Sandeep Kumar Jain R.[1], Prashanth N.[1], Kumaraswamy H. M.[1], Pradeepa K.[2], R. Harikrishna[3] and R. Sharath[4]

[1]*Laboratory of Experimental Medicine, Department of Biotechnology, Kuvempu University, Shankaraghatta- 577 451, Karnataka, India*
[2] *Department of Biotechnology, Sahyadri Science College, Shimoga, Karnataka*
[3]*M. S. Ramaiah Institute of Technology, Bangalore, Karnataka*
Department of Studies and Research in Food Technology, Davangere University, Davanagere

Abstract

Pancreatic ductal adenocarcinoma (PDAC) is a highly aggressive cancer with poor prognosis and chemoresistance. Nano-bioconjugates, due to their enhanced surface-to-volume ratio, offer significant potential in cancer therapy. In this study, we conjugated Embelin to ZnO nanoparticles (Emb-ZnO NPs) to enhance therapeutic efficacy. Structural and morphological characteristics of the conjugates were confirmed using XRD, FTIR, and TEM. Emb-ZnO NPs were evaluated against PDAC cell lines (PANC-1 and MIA PaCa-2). The nanoconjugates, with spherical crystalline structures (30-70 nm), showed significant cytotoxicity compared to individual Embelin and ZnO NPs, with IC50 values of 7.05 ± 0.96 µg/ml (PANC-1) and 8.66 ± 1.46 µg/ml (MIA PaCa-2). Emb-ZnO NPs exhibited tumoricidal effects in clonogenic and migration assays. Fluorescent staining revealed disrupted cellular architecture and significant apoptosis. Immunoblot analysis exhibits deregulation of key pathways, including amplified expression of *γ-H2AX,* indicative of DNA damage. Concurrently, elevated levels of pChk2, p53, and caspase-3 promote Cell cycle halting and programmed cell death triggered by genomic instability. Conversely, reduced pERK1/2 expression suggested inhibition of the MAPK pathway by Emb-ZnO NPs. Additionally, the formulation inhibited neovascularization in the CAM model, indicating anti-angiogenic potential. In conclusion, Emb-ZnO NPs are a promising therapeutic candidate for PDAC and other cancers.

Keywords: Pancreatic cancer, Zinc oxide nanoparticle, Embelin, Nanoconjugate

Combination of Pulses for Improved Nutrition and Novel Food Products Development for Sustainable and Affordable Protein Source

Prathibha C. S., Preethi S., Punyashree G. K., Manasa H., Harshitha Kumari C., Sahana T. P., Roopashree H. R., Ajay kumar R., Gangashalini P. M., R. G. Sharathchandra and Rudresh H. S.

Department of studies and research in Biotechnology, Tumkur University, Karnataka-India
Email: csprathibha95@gmail.com

Abstract

The current study aims to investigate nutritional synergy of a novel 10 pulses blend and explore its potential for diverse food product development. Combining selected pulses including Green gram, Green pea, Chick pea, Lentils, Black gram, Soyabean, Rajma, Horse gram, Cow pea and Moth bean aimed to create a protein rich, fibre dense and micronutrients abundant ingredients. The carbohydrate, protein, moisture, and fibre contents of the blend pulses were found to be 60%, 37.5%, 10.98% and 3.646% respectively. The antioxidant activity of these pulses was examined by evaluating different antioxidant enzyme activities like peroxidase (36%), catalase (66%). The activity was found to be significantly increased. The developed food products (Burfi, Biscuits, Laddu, Chips) were subjected to sensory evaluation. Combination of 10 pulses significantly enhanced the nutritional profile compare to individual pulses, showed balanced amino acids profile.

Keywords: Antioxidant enzyme activities, catalase, peroxidase, micronutrients, Burfi, Biscuits, Laddu, Chips

Significance of Nano Particles in Indian Herbal Medical Preparations

P. Suresh Babu

Medical Scientific Expert, EH Joint Proposalist, IDC, Dept. of Health Research (DHR), Govt. of India, Red cross Building New Delhi.

Abstract

Whole universe is made up of Nano particles. Many Nano forms of matter exist around us. One of the earliest Nano sized objects known to us was made of Gold. Faraday prepared colloidal gold in 1856 and he called it as "Divided metal". To understand biological processes in living organisms and human body we need to understand biochemical processes, metabolic and biochemical chain reactions and physico chemical reactions. These reactions and processes are involved by highly small size particles at Nano level known as Nano particles. For example, one single bone molecule is about 50nm and other varying from 10- 500 nm. Globally over the time many medical systems and therapy have been developing contemporarily many advancements have been taking place which primarily applicable to human welfare especially for health, resulting advancement in medical systems. In herbal medicine there are many medical systems developed so far in the world such as AYURVEDA, HOMOEOPATHY, SIDDHA, UNANI, CHINESE Traditional Medical System, ELECTROPATHY etc. In all medical systems there are difference in process of preparation, disease identification or diagnosis, selection of dose, treatment procedures and safety. But in almost all herbal medicine systems we are using plants or vegetative kingdom as source of medicine and medical preparations. Finally, our body cells absorb only Nano size partials from these herbal products. So, this is high time to understand dimensions, properties and mode of action of these Nano Particles to understand biomedical process to combat the diseases.

Keyword: AYUSH, Nanoparticle, Medicinal Preparations

Role of Neutraceuticals in Cardiovascular Disease

Asharani G. H.[1], Narayana J.[2] and Krishna V.[3]

Post graduate Department of Biotechnology, Sahyadri Science College, Shivamogga
Post graduate Department of Environmental Science, Kuvempu University, Shankaraghatta
Post graduate Department of Biotechnology, Kuvempu University Shankaraghatta
Email: ghasharani@gmail.com

Abstract

Nutraceuticals are hybrids of Nutrition & Pharmaceuticals. Nutraceuticals can be categorized as dietary fibre, probiotics, prebiotics, polyunsaturated fatty acids, antioxidants and herbal/natural foods. Nutraceuticals have led to the new Era of medicine & health. Cardiovascular disease is a term used for disorders of the heart & blood vessels & includes coronary heart diseases (heart attack) peripheral vascular disease, cerebrovascular disease (stroke) hypertension. Majority of CVD are preventable by intake of diet rich in Vegetables and fruits in the form of dietary fibers, antioxidants, vitamins, minerals, Omega 3-polyunsaturated fatty acids together with physical exercise. Polyphenols alter the Cellular metabolism and signaling which reduces the arterial disease. Flavonoids in the vegetables playing an important role in prevention and cure cardiovascular disease. Nutraceuticals include products which help in maintaining immunity and Prevent diseases.

Keywords: Nutraceuticals, cardiovascular disease, flavonoids, Polyphenols

Optimization and Nutraceutical Profiling of a Value-Added Herbal Beverage

Latha Rani R.[1], Jamuna K. V.[2] and Muthuraj R.[3]

[1]*AICRP on Women in Agriculture, University of Agricultural Sciences, GKVK, Bangalore-560065*
[2]*Department of Food Science and Nutrition, University of Agricultural Science, GKVK, Bangalore-560065*
[3]*Department of Agricultural Microbiology, University of Agricultural Science, GKVK, Bangalore-560065*
Email: latharanjurani@gmail.com

Abstract

Herbs are widely recognized for their savory or aromatic properties and are rich in bioactive compounds, including antioxidants, vitamins, and dietary fiber, which contribute to disease prevention and nutritional benefits. This study focused on formulating an immune-enhancing herbal drink mix and evaluating its nutritional composition. Antioxidant-rich herbs were selected, and various formulations and extraction techniques were optimized. The herbal mix was analyzed for colorimetric properties and antioxidant activity using multiple methods. The optimized herbal mix (T3) demonstrated the highest antioxidant activity in methanol extract, as assessed by the DPPH assay. Its color parameters were also superior, with values of L* 56.89, a* 1.88, and b* 28.47. Scanning Electron Microscopy (SEM) revealed an optimal particle size, beneficial for product development. Sensory evaluation showed that formulation T3 received the highest scores for appearance (7.42), color (8.00), flavor (8.00), taste (7.85), texture (7.71), and overall acceptability (7.57). Gas Chromatography-Mass Spectrometry (GC-MS) profiling identified 9,12-Octadecadienoic acid (ZZ) methyl ester, a bioactive fatty acid with potential cardioprotective properties. These results suggest that the optimized herbal mix (T3) exhibits potent antioxidant activity and a rich nutrient profile, effectively neutralizing free radicals. Given the increasing demand for immune-boosting functional foods, this formulation offers a promising dietary intervention. Its versatility allows incorporation into both herbal beverages and composite flour for regular consumption and enhanced health benefits.

Keywords: Antioxidant activity, DPPH, FRAP, ABTS, sensory evaluation, GCMS, SEM

Pectin-Based Edible Coating for Vegetable Preservation

Divya S., Chandrika S. Tantry and Vidya S. M.

Department of Biotechnology, NMAM Institute of Technology, Nitte (Deemed to be University), Nitte 574110, Karnataka, India
Email: ccl16divyas@gmail.com

Abstract

Edible coatings are thin layers of edible material applied to fruits and vegetables to enhance shelf life, reduce moisture loss and maintain quality. They are derived from natural sources like proteins, lipids, or polysaccharides and help to improve food safety and appearance. Plant-based edible coatings are one of the emerging techniques in this area, gaining more significance as they are eco-friendly and are made from natural ingredients like pectin, starch, cellulose, etc. The objective of the present study is to evaluate the properties of the *Cyclea peltata* for its application as an edible coating. *The C. peltata i*s traditionally used as a medicinal herb as the leaves of the plant consist of alkaloids such as cycleanine, berberine, hayatinin, hayatidin, etc, and is used as an antibacterial, antioxidant, and cooling agent. Studies have confirmed that the leaves of the plant are mainly consist of pectin which has a unique bioactive role and responsible for the gelation property. The edible coating solution is prepared from gel obtained from processed *Cyclea* leaves with varying concentrations (0.05, 0.1, 0.25 and 0.50%). The prepared coating solution was applied on green chilies by dipping method and stored at room temperature for 11 days where we observed the extended shelf life of coated chilies as compared with uncoated. The coated chilies were subjected to SEM analysis where the uniform coating was observed on the surface. The XRD analysis showed high crystallinity. The zeta potential results revealed a high negative charge which indicated excellent colloidal stability, essential for uniform coating. Beside this, the gel from *Cyclea* has shown cell viability in human dermal fibroblast cell lines and also antibacterial and antifungal activities.

Keywords: Pectin edible coating, *Cyclea peltata,* shelf life

Development of an Antimicrobial Dermal Wound Dressing for Chronic Wounds Using Potential Medicinal Plant Extract

Anushree K. M., A. Shwetha and Akash patel M. P.

Department of food science and technology, GM University, Davanagere -577006, Karnataka
Email: shwethaangadi123@gmail.com

Abstract

There is a vast number of treatments on the market for the management of wounds and burns, representing a multi-billion-dollar industry worldwide. These include conventional wound dressings that facilitate the wound healing process. The suggested paradigm comprises the use of organic Nealers, anti-microbial, and anti- inflammatory substances that slow down the healing process. This study primarily focused on synthesizing silver nanoparticle using potential plant extract, that are infused into the dressing material and resistance to silver is challenging for the pathogens to Overcome. Hence, this outcome of this study helps to develop a nontoxic, biodegradable, and biocompatible wound healing dressing material alternative to traditional gauze-based dressing. Coconut leaf-sheath scales were used as a plant source, whose extracts (aqueous and solvent) were Tested for the presence of the phytochemicals, and found the presence of flavonoids, sterols and Terpenoids. These extracts were tested for the antimicrobial activity using the organisms *Klebsiella pneumoniae*, *Staphylococcus aureus* and *Pseudomonos aeruginosa* that are the major causative organisms lor wound infection. The prominent zone of inhibition was observed and confirmed the antimicrobial activity. All the bioactive compounds present in coconut leaf-sheath scale may contribute towards the antimicrobial activity as well as wound healing. The anti-microbial activity of the coconut leaf sheath scales by the above results makes it an effective plant for wound healing, to develop the bandid.

Keywords: Antimicrobial activity, wound healing, Coconut leaf sheath scales, silver nanoparticle

Drug Resistance in Cancer and Strategies to Overcome Drug Resistance

Deepa. N and Divakara. R

Department of P.G studies and research in biotechnology, Kuvempu University, Shankaraghatta-577451, Shivamogga, Karnataka. Email: deepanbiotech2003@gmail.com

Abstract

Cancer treatment has witnessed significant advancements, particularly with the development of targeted therapies and chemotherapies. However, one of the major challenges in cancer management remains drug resistance. Tumor cells can develop resistance to therapeutic agents through a variety of mechanisms, including genetic mutations, alterations in drug targets, enhanced drug efflux, changes in cell survival pathways, and the tumor microenvironment. This resistance significantly limits the effectiveness of conventional therapies, leading to relapse and treatment failure in many cancer patients. Overcoming drug resistance in cancer requires a multifaceted approach. One promising strategy is the development of combination therapies, which involve using multiple agents that target different resistance mechanisms simultaneously. Additionally, the application of personalized medicine, leveraging genomic profiling to identify specific mutations in tumors, holds promise for tailoring treatments to individual patients and improving drug efficacy. Other innovative approaches include the use of novel small molecules and biologics that target resistance pathways, immune checkpoint inhibitors that enhance immune response against resistant tumors, and the repurposing of existing drugs for new indications. In this review, we discuss the molecular mechanisms underlying drug resistance in cancer, the challenges associated with it, and the latest strategies being developed to overcome resistance. By understanding the complexities of resistance and exploring these therapeutic strategies, there is potential for significantly improving cancer treatment outcomes and providing new hope for patients facing refractory cancers.

Keywords: drug resistance, chemotherapies, targeted therapies, genetic mutation, drug efflux

Novel Green Synthesis of *Aegle marmelos* mediated Silver Nanoparticles and its anticancer studies and photocatalytic activity

Bharath P. and Vishnamurthy K. A.

Department of PG studies and Research in Industrial Chemistry, Sir. M V Science College, Bommanakatte, Bhadravathi-577301 Email: bharathindrajit@gmail.com

Abstract

This study presents a novel green synthesis method for silver nanoparticles using *Aegle marmelos* extract as a reducing and stabilizing agent. The synthesized nanoparticles were characterized using various analytical techniques, including UV-visible spectroscopy, X-ray diffraction, FTIR, ZETA, PSA, EDX and scanning electron microscopy (SEM). The anticancer potential of the nanoparticles was evaluated against MCF-7 cancer cell lines using MTT assay. Additionally, the photocatalytic activity of the nanoparticles was assessed through the degradation of organic dyes under visible light irradiation. Results demonstrated successful formation of stable silver nanoparticles with uniform size distribution. The nanoparticles exhibited significant anticancer activity and efficient photocatalytic performance. This eco-friendly synthesis approach offers a promising alternative for developing multifunctional silver nanoparticles with potential applications in cancer therapy and environmental remediation.

Keywords: *Aegle marmelos*, Green Synthesis, MCF-7, Nanoparticles

Enhanced antioxidant and anti-bacterial potential of *Brugmansia suaveolens* conjugated chitosan nanoparticles

Uma M. Shirahatti, Anudeep A. C. and Santhosh K. H.

Department of Biotechnology and Bioinformatics, Kuvempu University, Jnanasahyadri, Shankaraghatta-577451, Karnataka, India
Email: santhoshbio4@gmail.com

Abstract

Recently, chitosan nanoparticles (CNPs) gained attention for their versatile properties and potential drug carriers due to their biocompatibility, biodegradability, and non-toxicity. *Brugmansia suaveolens* is known for its wide range of secondary metabolites. In the present study, *B. suaveolens leaves* ethanol extract (BSLEE) was encapsulated within the CNPs to enhance the bioavailability and biocompatibility. The encapsulation efficiency ranging from 26.33 to 48.58% indicates the successful encapsulation of BSLEE within the CNPs. The synthesized BSLEE CNPs are characterized by UV-visible spectroscopy, Fourier transform infrared (FTIR) spectroscopy, scanning electron microscopy (SEM), X-ray diffraction (XRD), Energy-dispersive X-ray spectroscopy (EDX) and Zeta potential analysis. XRD analysis revealed that BSLEE CNPs exhibit a semi-crystalline nature. SEM analysis clearly showed highly porous scaffold-like microstructures. Additionally, BSLEE CNPs were evaluated for their antioxidant and antibacterial activities. DPPH, FRAP, and total phenolics assay indicates BSLEE CNPs exhibited stronger antioxidant activity in the range of 30.42 ±0.77% to 55.85± 0.69% of DPPH inhibition, 34.73±2.71 to 121.44±1.83 µg/ml FSE and 58±2.27 to 149.5±2.48 µg GAE/ml respectively when compared to crude BSLEE. The antibacterial activity of BSLEE CNPs was evaluated against S. aureus and E. coli, which exhibited maximum zones of inhibition of 1.37 cm and 1.23 cm at 300 µg/ml, respectively. In contrast, Crude BSLEE required higher concentrations which exhibited minimal inhibition activity at 1200µg/ml and 2400µg/ml.

Keywords: *Brugmansia suaveolens*, Chitosan, Nanoparticle, Encapsulation, Antioxidant, Antibacterial, Medicine

Azo-hydrazone analogue BT-1F, induces anti-inflammatory activity in inflammatory *in-vitro* and *in-vivo* models

Banumathi and Prabhakar B. T.

Molecular Biomedicine Laboratory, Postgraduate Department of Studies and Research in Biotechnology, Sahyadri Science College, Kuvempu University, Shivamogga, Karnataka 577203, India

Email: sampadabanu@gmail.com

Abstract

Inflammation is a crucial process involved in the progression of multiple forms of cancers and accepted as major hallmark. Numerous inflammation prone agents are elevated in neoplastic milieu. These perceptions are fostering novel anti-inflammatory therapeutic strategies to cancer progression. As an approach, anti-angiogenic azo-hydrazone analogue, BT-1F was investigated to evaluate the anti-inflammatory activity in *in-vitro* and *in-vivo* non-tumorigenic & tumorigenic inflammatory animal models. Reports revealed that, BT-1F showed noticeable anti-inflammatory activity by protecting human red blood cells (HRBCs) membrane and by inhibiting the activity of both inflammatory enzymes (COX2 & 5-LOX) significantly in *in-vitro*. The *in-vivo* paw oedema anti-inflammatory activity suggested that inhibition of carrageenan induced inflammation. Further, BT-1F exhibited the remarkable tumour reduction in an ascites inflammatory neoplastic EAC model through normalizing the inflammatory biomarkers. In conclusive, BT-1F is an anti-inflammatory pharmacophore which could be developed into therapeutic molecule in future.

Keywords: EAC, Carrageenan, COX2, 5-LOX, Azo-hydrazone, Anti-angiogenic, BT-1F, Anti-inflammatory, HRBCs

Development of Bionanoplastics from Natural Polysaccharides for Healthcare Applications

Ananya S. N. and A. Madhavarani

Department of biochemistry, Jain (Deemed-to-be University) School of Sciences, No. 34, 1st Cross, JC Road, Bengaluru, Karnataka-560027
Email: ananyakashyap492@gmail.com

Abstract

Bionanoplastics derived from natural polysaccharides have gained significant attention as biodegradable, biocompatible, and sustainable materials for biomedical applications. These materials offer an environmentally friendly alternative to conventional synthetic plastics, particularly in advanced healthcare sectors. In this study, we developed a novel polysaccharide-based nanocomposite, exhibiting excellent antioxidant and antibacterial properties, which are crucial for medical applications such as wound healing, infection control, and tissue regeneration. The incorporation of bioactive nanomaterials into the polysaccharide matrix enhances its structural integrity, mechanical strength, and biological performance. The synergistic action of these components promotes cellular regeneration, prevents microbial contamination, and accelerates tissue repair. Comprehensive physicochemical characterization using techniques such as Fourier-transform infrared spectroscopy (FTIR), scanning electron microscopy (SEM), and thermal analysis confirmed the stability, porosity, and biodegradability of the developed material. Additionally, in vitro bioactivity assays demonstrated the significant role of these bionanoplastics in neutralizing oxidative stress and inhibiting pathogenic bacterial growth. With their multifunctional properties, these bionanoplastics hold immense potential as next-generation biomaterials for applications in wound dressings, drug delivery systems, and regenerative medicine. Their ability to provide a protective barrier while supporting tissue healing underscores their importance in biomedical engineering. This study highlights the eco-friendly and sustainable approach of using natural polysaccharides to develop functional bioplastics, offering a promising alternative for medical and healthcare industries. Further investigations on in vivo performance and clinical feasibility will aid in translating these materials into practical applications.

Keywords: Bionanoplastics, Polysaccharides, Antioxidant, Antibacterial, Wound Healing, Regenerative Medicine, Biomedical Applications, Sustainable Bioplastics

Biosynthesis of Silver Nanoparticles by Endophytic Fungi of *Catharanthus roseus* L.

Sowmya H. V., Nayanashree G., Shifa Naz and B. Thippeswamy

Department of P.G. Studies and Research in Microbiology, Jnanasahyadri, Kuvempu University, Shankaraghatta, Shivamogga (Dist.,), Karnataka 577 451, India
Email: sowmya.hv@gmail.com

Abstract

Catharanthus roseus is an herbaceous sub-shrub known as *Lochnera rosea, Vinca rosea L.* or Madagascar periwinkle around the globe. The leaves and stems of *Catharanthus roseus* contain dimeric alkaloids, vinblastine and vincristine, which are essential for cancer. Due to its medicinal property an attempt was made to isolate endophytic fungi from this plant and silver nanoparticles were synthesized using culture filtrate of isolated fungi. The formation of Ag-NPs in the fungal filtrate was characterized using UV–vis spectrophotometer based on its characteristic surface plasmon resonance. Mixed colonies of fungal endophytes were isolated from *Catharanthus roseus.* After screening for Ag-NPs production, only *Aspergillus niger* showed synthesis. The appearance of brown colour indicated the synthesis of Ag-NPs. After 24 h of incubation, the cell-free filtrate of EF1 was subjected to UV–Vis Spectrophotometer analysis and peak of 420 nm was observed for the sample. Antibacterial activity of biosynthesized Ag-NPs was evaluated by growth inhibition in agar plates by well diffusion assay. Zone of inhibition of 26mm was observed for *P. aeruginosa* and *S. typhi,* 24mm for *K. pneumoniae*, 22 mm for *S. aureus* and *E. faecalis* and 23 mm for *E. coli* respectively. A zone of inhibition of 12mm was observed against *C. albicans.* Based on the above results nanoparticles synthesised from endophyte isolated from *Catharanthus roseus* can be used as antimicrobial agent.

Keywords: *Catharanthus roseus*, Endophytic fungi, Silver nanoparticles (Ag-NPs), Antimicrobial activity

Nutraceuticals and Value-Added Food Products in Healthy Life

Vijayalaxmi Halakattimath

K.L.E Society's College of Education, Vidyanagar, Hubballi-580031, Karnataka
Email: halakattimathviju@gmail.com

Abstract

In recent years there is a rising interest in quality food. Consumers are deeply concerned about how their health care is managed, administered and valued. They are frustrated with the costly, ground breaking disease treatment process primarily in modern medicine. Positioned at the interface between food and drugs, a growing body of products is assuming importance. The consumer is now looking for complementary or alternative beneficial products and that's why in present days they are using nutraceuticals. These products include dietary supplements, functional foods and fortified beverages. Increasingly, they are using natural dietary supplements and other forms of nutraceuticals as part of enormous flow to have physiological benefits or to provide protection against diseases. Value added foods and nutraceutical products represent a value-added growth opportunity both nationally and internationally. Development of better characterized and research proven products will help enhance consumer confidence in nutraceutical and value-added food products in the world. Nutraceuticals and value-added food products represent the significant areas of interest in food science and nutrition offering potential health benefits and meeting the evolving needs of consumers. Value added food products refer to foods that have undergone processing, modification, enhancement to improve their market value convenience test, nutrition or self-life. The aim of this article is to provide the present knowledge about the application of various nutraceuticals and value-added food products and their importance and help in leading a disease-free life.

Keywords: Nutraceuticals, alternative beneficial products, natural dietary supplements, functional foods, fortified beverages, value added food products, nutrition

In vitro Effect of Copper Oxychloride Nanoparticles on Fusarium Wilt Disease Resistance in *Solanum lycopersicum* Through Seedling Root Treatment

Samreen Naz G. S., Soundarya T. L., Krishna and Poornima D.

Department of Studies and Research in Environmental Science, Tumkur University, Tumakuru-572103

Email: krnaik11@gmail.com

Abstract

Tomatoes (*Solanum lycopersicum*) are one of the most widely grown vegetables worldwide. Fusarium wilt is caused by the fungus *Fusarium oxysporum*, which is a primary pathogen of tomato vascular wilt and a soil-borne pathogen that reduces output. Many researchers have previously reported using copper (nanoparticles) NPs to manage agricultural diseases. To address the tomato wilt problem, attempts were undertaken to detect the major use of copper oxychloride (COC). The present study describes the further augmentation of nano fertilizers utilizing copper oxychloride NPs and silver (Ag)-doped copper oxychloride NPs, which were tested against the wilt pathogen. The antifungal activity of COC and Ag-doped COC NPs was investigated, and the minimal inhibitory concentration of COC and Ag-doped COC was determined. The root dip approach shows how COC NPs and Ag-doped COC NPs were utilized to treat tomato seeds. Seedlings coated with 8 mg of COC NPs and Ag-doped COC NPs in the presence of *F. oxysporum* showed excellent growth in both root and shoot length, with only a very small amount of wilting observed at this concentration after 2 weeks. Control seedlings without any treatment showed wilting within one week. The results showed that NPs at an 8 mg concentration combined with *F. oxysporum* had a synergistic effect on inducing disease resistance in tomato seedlings during the early stages of wilt resistance. As a result, it is a simple and rapid method for early detection of induced resistance, which will aid in the evaluation of bioagent efficacy.

Keywords: Tomato, COC NPs, *Fusarium oxysporum*, root dip method

Synthesis of Bio-plastic or Biopolymer from Sweet Corn Starch and Assessing its Biodegradability

Raghu H. S., Malini B. P. and Rajeshwara A. N.

Department of Biochemistry, Kuvempu University, Shankaraghatta-577451. Karnataka, India

Abstract

The use of plastics is widespread throughout the world. This is primarily due to the favorable thermal and mechanical properties of plastics making it a stable and durable material. The extensive global use of plastics has contributed heavily to environmental pollution; as plastics are not always properly discarded or recycled and consequently persist within the environment. The present study was aimed to synthesize biodegradable plastic from organic material. The bio-plastic was successfully synthesized from sweet corn starch. The starch was isolated from sweet corn and the bio-plastic or biopolymer was synthesized using glycerol and vinegar. The bio-plastic had a smooth and shiny texture, shrunk when decomposed, and was flexible, which means that it goes back to its original form when stretched. The average thickness of the synthesized bio-plastic was found to 230 microns, as per government regulations the thickness of the plastic should not be less than 50 microns. The synthesized bio-plastic was dried for 2-3 days and biodegradability was assessed by measuring the weight loss of the bio-plastic every week after keeping it under the moist soil. The results illustrate that there was a loss of 3% weight from second week onwards due to biodegradation. The process of degradation continued with gradual weight loss of 19%, 49%, 51%, 58%, 77%, 84% and 100% from 3 rd to 9 th week, respectively. These results suggest that, we can overcome the problem of environmental pollution caused by the uncontrolled use of plastic by substituting it by using the bio-plastics synthesized from natural sources such as sweet corn starch. This method can also be applied for the synthesis of bio-plastics from other natural materials.

Keywords: Bio-plastic, biodegradable, environmental pollution, biopolymer, organic material

Bio-efficacy of Biogenically Synthesized Silver Nanoparticles from *Prosopis juliflora*

Kruthika P., Chethana M. M., Sinchana G. C., Mohammed Sohail, Manjunatha D. and Venu Gopal T. M.

Department of Microbiology, Sahyadri Science College, Shivamogga, Karnataka, INDIA.
Emai: manjunathad07@gmail.com

Abstract

Prosopis juliflora belongs to the Fabaceae family (subfamily: Mimosoideae) and is highly valued for its medicinal, environmental, economic, and ecological benefits. The present study focuses on the biogenic synthesis of silver nanoparticles (AgNPs) from *P. juliflora* ethanol extract. The ethanol extract, analyzed through UV-visible spectrophotometry, exhibited an absorption peak at 434 nm, confirming the presence of bioactive compounds. FTIR analysis identified peaks corresponding to various functional groups, while GC-MS analysis revealed multiple bioactive compounds by comparing data with the NIST05 database. The synthesized AgNPs were characterized using different analytical techniques. UV-visible spectrophotometry confirmed the formation of PJ-AgNPs with an absorption peak at 401 nm. FTIR studies indicated the presence of functional groups responsible for reducing and capping the AgNPs. SEM-EDAX analysis revealed the spherical morphology of PJ-AgNPs, with EDAX spectra confirming silver atom presence at 3 keV. XRD analysis confirmed the crystalline structure of PJ-AgNPs, while DLS studies determined their particle size. The PJ-AgNPs exhibited strong antibacterial activity against *Escherichia coli, Staphylococcus aureus* and *Pseudomonas aeruginosa*, as well as antifungal activity against *Candida albicans*. Ongoing research includes evaluating the anticoagulant properties and conducting in-vitro and in-vivo anti-inflammatory studies.

Keywords: *Prosopis juliflora*, PJ-AgNPs, Antimicrobial, anticoagulant properties, in-vitro, in-vivo anti-inflammatory

Phytochemical-Assisted Synthesis of Zinc Stannate Nanomaterials via Hydrothermal Method for Solar-Driven Agricultural Pesticide Degradation

Veena H. R.[1], Nachikethan A. C.[1], Poornima D.[2], G. Nagaraju[3], Krishna[2]

[1]*Department of studies and Research in Environmental Science, Tumkur University, Tumakuru 572103, India*
[2]*Department of Biotechnology, University College of Science, Tumkur University, Tumakuru 572103, India*
[3]*Department of Chemistry, Siddaganga Institute of Technology, Tumkur University, Tumakuru 572103, India*
E-mail: arkbnmicrob11@hotmail.com

Abstract

In this study, $ZnSnO_3$ nanomaterials were synthesized via a hydrothermal route using *Centella asiatica* leaf extract as a biogenic reducing and stabilizing agent. The phytochemicals in the extract facilitated controlled growth and structural stabilization, leading to an orthorhombic $ZnSnO_3$ phase, as confirmed by X-ray diffraction (JCPDS #28-1486). FTIR analysis revealed Zn–O and Sn–O_2 stretching vibrations, along with residual organic functional groups post-calcination. Scanning Electron Microscopy (SEM) demonstrated a flake-like agglomerated morphology with average particle size ~44 nm, while UV-DRS analysis indicated a narrow bandgap of 2.2 eV, enhancing visible-light absorption. Photoluminescence studies confirmed optoelectronic activity, with excitation and emission peaks at 385 nm and 533 nm, respectively. The synthesized nanomaterial exhibited exceptional photocatalytic efficiency, achieving 98% degradation of *Chlorothalonil* pesticide within 120 minutes under solar irradiation, following pseudo-first-order kinetics. Moreover, it retained high stability and recyclability over five successive cycles. This study underscores the potential of green-synthesized $ZnSnO_3$ as an eco-friendly and sustainable nanocatalyst for environmental remediation applications.

Keywords: $ZnSnO_3$ nanomaterials, *Centella asiatica* (L), Hydrothermal synthesis, phytochemical interactions, *Chlorothalonil* pesticide degradation, environmental remediation

A Study on Water Quality Status of Narihalla Reservoir and its Command Area of Sandur Taluk, Bellary District, Karnataka

Parameswara G. and Basavarajappa S. H.

Department of PG studies and Research in Environmental Science
Kuvempu University, Shankaraghatta, Shivamogga, Karnataka- 577451
Email: gparameshadh@gmail.com

Abstract

Water quality testing is a crucial aspect of environmental monitoring, as poor water quality impacts both aquatic life and the surrounding ecosystem. Water quality is influenced by physical, chemical, and biological factors. Physical parameters include temperature and turbidity, while chemical characteristics involve pH and dissolved oxygen. Biological indicators such as algae and phytoplankton also reflect water quality. This study involves the collection of water samples from various locations around the Narihalla Reservoir across three seasons over two years. Samples will undergo physicochemical and microbiological analysis using standard procedures. Eight sampling stations were selected along the river based on point sources of waste discharge. These sites were chosen to ensure proper mixing of waste with the water, so each sample accurately represents the overall water quality. Additionally, an assessment of surface and groundwater quality was conducted in parts of the Sandur Schist Belt, Bellary district, Karnataka, South India. The water quality was analyzed for parameters including sodium (Na), potassium (K), calcium (Ca), magnesium (Mg), chloride (Cl^-), fluoride (F^-), sulphate (SO_4^{2-}), nitrate (NO_3^-), and total hardness. Findings indicated a gradual decline in groundwater quality and increased surface water pollution in the study area, highlighting the need for continuous monitoring and sustainable water resource management.

Keywords: water quality status, physio- chemical and micro biological Parameters, Narihalla reservoir.

Sonification of DNA Methylation: Integrating Sound and Bioinformatics for Epigenetic Visualization

Inchara K. V. and Shashi Kumar R.

Department of PG Studies and Research in Biotechnology, Jnanasahyadri, Kuvempu Universtiy, Shankaraghatta- 577451, Karnataka, India.
Email: incharavedamurthy@gmail.com

Abstract

DNA methylation is an important epigenetic signature regulating gene expression, frequently altered in disease, such as cancer. Although traditional techniques such as bisulfite sequencing (BS-seq) give quantitative information regarding the extent of methylation, these remain inaccessible to non-experts and do not convey sensory experience. Here, in this project, we present a novel strategy in which bioinformatics converges with sound design in presenting methylation patterns in visual terms. Theoretical vibrational frequencies of cytosine (4.60, 6.26, and 10.68 THz) and 5-methylcytosine (3.13, 5.85, and 6.32 THz) were utilized to produce corresponding MIDI sequences. MIDI files were then synthesized to audio waveforms to produce specific sonic identities for unmethylated and methylated cytosine. The resultant.wav files were then represented as spectrograms, which reflected extreme frequency shifts between cytosine and 5-methylcytosine. Methylation percentages were calculated from publicly accessible bisulfite sequencing data to provide a biological grounding for the concept (GEO Accession: GSE46644). A small CpG site dataset was used, and each was given a representative frequency based on its methylation percentage: low (0–40%) → 3.13 THz, moderate (41–75%) → 5.85 THz, and high (76– 100%) → 6.32 THz. These were used to convert sonified outputs into biological methylation states. The spectrograms and MIDI music are a qualitative image and a pedagogical tool, making epigenetic variation audible. It is not a replacement for conventional approaches but suggests an additional mode of presenting data, particularly useful for interdisciplinary teaching, public education, and pattern detection in complex methylation data sets.

Keywords: Sonification, DNA methylation, bioinformatics, epigenetics

Sustainable Utilization of Areca Husk for Fibre Production and Pollution Control

Rakesh Naik A. C. and Narayana J.

Department of P.G. Studies & Research in Environmental Science, Kuvempu University, Jnanasahyadri, Shankaraghatta, Shivamogga, Karnataka, India -577451.
E-mail Id: rakeshnaikac@gmail.com

Abstract

India remains the world leader in terms of areca nut output and its productivity, At the same time, Malnad region of Karnataka is noted major areca cultivation region and its husk is thrown as waste as an uncontrolled agro-waste and also produced in large quantities. Former produces large quantity of husk waste and burning for easy disposal, The open dumping of areca husk is nuisance to environment and pollutes the surrounding soil, water resources produce unpleasant odors and other issues associated to degradation of soil. The present study focuses on the extraction and characterization of Areca nut husk fibre from areca husk material, Areca nut husk was collected in the study area Amruthapura, Tarikere taluk, Chikmagaluru district, Karnataka state. Experiments were conducted to separate and extracted fibre material by following retting method, The cellulose concentration and cellulase activity were determined to assess the fibre composition. The results indicate that the extracted fibres possess a length ranging from ~10 mm to 150 mm and a diameter between ~100 µm to 400 µm, with a cellulose content varying from ~30% to 65%. These findings highlight the potential and importance of Areca nut fibre as a sustainable material for various applications both industrial and agriculture sector.

Keywords: Areca nut husk, waste fibre, sustainable material

Isolation and Identification of Potent Biotic Compounds and Biosynthesis and Characterization of Silver Nanoparticles of *Massilia spp*.

Rahul B. T.[1], Harshita G. Patgar[1], Amit G. Kulkarni[1], Ravi M.[1] and Arun K. Shettar[2]

[1]*Department of Biotechnology P C Jabin Science College Hubballi – 580031, Karnataka, India*
[2]*Division of Preclinical Research and Drug Development, Cytxon Biosolutions Pvt. Ltd., Hubballi – 580031, Karnataka, India*

Abstract

The present study was focused on isolation of bacteria, along with identification of potent biotic compounds and synthesis of silver nanoparticles from it. Serial dilution was followed for isolation and molecular sequencing 16s RNA for identification. Further the bio-mass of selected bacteria was subjected to distilled water using cold extraction process. Using methanol as solvent the bioactive compound from bacteria were isolated and identified by GCMS. Further silver nano-particles were synthesized using bio-reduction method and characterized by SEM-EDX, XRD analysis. The molecular sequence results confirmed that isolated bacteria was *Massilia* belonging to Oxalobacteraceae family. GCMS analysis shown the presence of several bioactive compounds. In that major compounds were Benzoic acid-2-hydroxy methyl ester and pyralo pyarazine, which reported several industrial applications and biological applications. SEM-EDX showed the presence of irregular shape of nanoparticles with sharp peak for silver whereas XRD confirms the crystalline nature of nanoparticles. The study helped in the identification of novel organism with several bio-active compounds and for the first time silver nanoparticles were synthesized. In future the study can be taken to explore for pharmacological activities by addressing several complicated diseases.

Keywords: 16S RNA, *Massilia,* GC-MS, Silver nanoparticles

Nava Protein Elite Mixture

Darshan S., Dinesh M. and Akash Patel M. P.

Department of Biotechnology, GM Institute of Technology, Davangere 577006
Email: dineshm8299@gmail.com

Abstract

In today's fast-paced world, maintaining a balanced diet is a growing challenge due to busy schedules and unhealthy food choices. **Nava Protein Elite Mixture** offers a convenient and nutritious solution, providing a high-quality blend of proteins and essential nutrients sourced from natural ingredients. Designed for easy consumption in milk or hot water, it caters to the dietary needs of children, working professionals, students, and individuals at risk of nutritional deficiencies, particularly women. The study and development of **Nava Protein Elite Mixture** involved the selection of natural protein sources, blending techniques, and testing for nutritional efficacy. The **Nava Protein Elite Mixture** demonstrated significant potential in addressing nutritional deficiencies. Key findings include: The mixture provided a balanced composition of proteins, vitamins, and minerals, promoting energy levels and overall health. Taste trials indicated high acceptance among children and adults, especially when flavoured variants were introduced. The ease of preparation contributed to the product's appeal, making it a viable dietary supplement for daily consumption. The product holds strong potential for commercialization with proper packaging, branding, and awareness campaigns. The **Nava Protein Elite Mixture** presents a promising solution to modern dietary challenges, offering a nutrient-rich, convenient alternative for individuals of all ages. By refining product features, enhancing marketing strategies, and expanding awareness, this mixture has the potential to become a widely accepted nutritional supplement.

Keywords: Protein supplement, nutrition, health, dietary improvement, convenience, functional food, Nava Protein Elite Mixture

Photocatalytic degradation of Pesticide using semiconductor based nanocomposite and cytotoxicity assay

Shinde Krupalini Sumantaro[1], Prakash Kariyajjanavar[1], and Vidyasagar.C.C[2]

[1] *Department of P.G studies and research in Environmental Science, Gulbarga University,Kalaburagi,Karanataka 585106,India*

[2] *Green Energy Research Lab, Department of P.G. studies and Research in Chemistry,Rani Channamma University,Belagavi,Karnataka 591156.*

Abstract

Water is required for the existence of all living beings, over the decade water pollution grown significantly and now it has developed serious global concern. The exclusive uses of the pesticide due to high demand in agricultural practices to enhance the crop production. Pesticides are the most hazardous among the various organic pollutants and possess a great human and environmental threat. Facing the reality various traditional elimination technique have been used since many years, among all AOP's Photocatalytic degradation have been demonstrated to promising technique for pollutant degradation using semiconductor-based metal oxides. In these study authors focused on Graphene Oxide-Zinc Oxide (GO-ZnO) nanocomposite as a highly efficient photocatalyst for the degradation pesticide from water experimentally. The characterization of NP's was investigated using X-Ray Diffraction (XRD), Field Emission Scanning Electron Microscopy with Energy Dispersive X-ray (FESEM-EDX), Transmission Electron Microscopy (TEM) with SAED, Solid-state UV-Visible spectrophotometer and Fourier Transform Infrared spectroscopy (FTIR) studies. The degradation performance of pesticide compound that have been used as water pollutants, is examined utilizing a synthesized photocatalyst. This study examines the effects of concentration, catalyst dose and pH vs time. The following were the ideal concentrations for each pesticide: The pesticide solution had a pH of 7.25, the pollutant concentration was 30 ppm, the nanocatalyst quantity was 15 mg, and the irradiation period was 90 min. The outcomes shown that the most effective nanocatalyst for the degradation of pesticide is the GO-ZnO nanocomposite and the study also revealed that the treated water shows non-toxic toward L929 cell line with IC_{50} 904.27±8.24µL/mL.

Keywords: Water pollution, Photocatalysis, Advanced Oxidation Processes (AOPs), Semiconductor nanomaterials

Biological Applications of Spectrophotometrically Controlled ZnO NPs of *Mallotus philippensis* Leaves and Evaluation of its Antioxidant and Cytotoxic Properties

Prabhu Mural, Varsha Jayakar and Vinayak Lokapur

PG Department of Biochemistry, GSS College, Rani Chennamma University, Belagavi-590006
Email: prabhusm42642@gmail.com

Abstract

In this study, the green synthesis of ZnO nanoparticles in the leaf extract of the medicinal plant *Mallotus philippensis* is demonstrated in an easy, economical, and environmentally friendly manner. Using the leaf extract of *M. philippensis* (MP), the current study focuses on optimizing the green technique for the production of zinc oxide nanoparticles. Using a variety of analytical methods, including UV-vis spec, XRD, SEM, EDAX, TEM, SAED, DLS, and zeta potential, the optimized nanopowder was examined to investigate its bonding, high purity, surface morphology, functional groups, crystallinity, size, and stability of aggregates of nanoparticles. Additionally, the DPPH, FRAP, and PM assays were used to assess the antioxidant activity of a specific extract from MP leaves and ZnO NPs. Bioactive substances found in *M. philippensis* species served as stabilizing and capping agents during the manufacture of nanoparticles. Aqueous leaf extract had a 1.5-fold better antioxidant capability (IC50 9.141 µg/ml) than ZnO NPs (IC50 13.63 µg/ml), according to further in vitro antioxidant assay data. MP leaf extract and ZnO NPs exhibit dose-dependent cytotoxicity against triple-negative breast cancer cells (MDA-MB-231) in MTT cytotoxicity study; however, their IC50 values, which are 25.56 µg/ml and 4.62 µg/ml, respectively, differ significantly. In comparison to plant extracts and the common medication cisplatin, optimization strategies are crucial to the creation of nanoparticles that exhibit notable anticancer activity. Our results demonstrate that ZnO NPs had a significantly higher anticancer efficacy when compared to plant extracts. Additionally, no significant impact was seen in normal mouse fibroblast cells at this dose, suggesting that ZnO NPs may be employed safely against breast cancer.

Keywords: *Mallotus philippensis*, antioxidant, cytotoxicity, breast cancer cell line, mouse fibroblast cell line, green synthesis

Laboratory Controlled Biogenesis of CuO NPs Derived from *Mallotus philippensis* Bark Extract and their Antioxidant and Anticancer Studies

Parvat Patil, Vinayak Lokapur and Varsha Jayakar

PG Department of Biochemistry, GSS College, Rani Chennamma University, Belagavi-590006
Email: parvatpatil08@gmail.com

Abstract

The current work demonstrates the simple, economical, and environmentally friendly process of green synthesis of CuO nanoparticles in the bark extract of the medicinal plant *Mallotus philippensis*. The current study employs the bark extract of *M. philippensis* (MP) to synthesize copper oxide nanoparticles, with an emphasis on optimization using the green method. Several analytical methods, including UV-vis spec, XRD, SEM, EDAX, TEM, SAED, DLS, and zeta potential, were used to characterize the optimized nanopowder in order to investigate its bonding, high purity, surface morphology, functional groups, crystallinity, size, and stability of nanoparticles that are present in aggregate form. Additionally, the DPPH, FRAP, and PM assays were used to assess the antioxidant activity of a specific MP bark extract and CuO NPs. Bioactive substances found in *M. philippensis* species served as stabilizing and capping agents during the production of nanoparticles. Green produced CUO NPs had a 1.5- fold better antioxidant potential (IC50 11.64 µg/ml) than aqueous plant bark extract (IC50 17.35 µg/ml), according to further in vitro antioxidant assay data. While their IC50 values-32.28 µg/ml and 12.68 µg/ml, respectively differ significantly, MP bark extract and CuO NPs exhibit dose dependent cytotoxicity against triple-negative breast cancer cells (MDA-MB-231) in MTT cytotoxicity study. In comparison to plant extracts and the common medication cisplatin, optimization strategies are crucial to the creation of nanoparticles that exhibit notable anticancer activity. Since no apparent effect was seen in normal mouse fibroblast cells at this dosage, our results demonstrate that metal oxide nanoparticles exhibited significantly substantial anticancer efficacy when compared to plant extracts and that they may be utilized safely against breast cancer.

Keywords: *Mallotus philippensis*, antioxidant, cytotoxicity, breast cancer cell line, mouse fibroblast cell line, green synthesis

Optimization and Characterization of ZnO NPs of *Mallotus philippensis* Bark Extract and its Antioxidant Activity

Dharmaprasad, Vinayak Lokapur and Varsha Jayakar

PG Department of Biochemistry, GSS College, Rani Chennamma University, Belagavi-590006
Email: dharmaprasadmhasarannavar@gmail.com

Abstract

The current work demonstrates a simple, economical, and environmentally friendly process of green synthesis of ZnO nanoparticles in the bark extract of the medicinal plant *Mallotus philippensis*. The current study employs the bark extract of *M. philippensis* (MP) to synthesize zinc oxide nanoparticles, with an emphasis on optimization using the green method. Several analytical methods, including UV-vis spec, XRD, SEM, EDAX, TEM, SAED, DLS, and zeta potential, were used to characterize the optimized Nano powder in order to investigate its bonding, high purity, surface morphology, functional groups, crystallinity, size, and stability of nanoparticles that are present in aggregate form. Additionally, using the DPPH, FRAP, and PM assays, the antioxidant activity of MP bark extracts and ZnO NPs was assessed. Bioactive substances found in *M. philippensis* species served as stabilizing and capping agents during the manufacture of nanoparticles. Green synthesized ZnO NPs had 1.6 folds greater the antioxidant capability (IC_{50} 10.52 µg/ml) compared to aqueous bark extract (IC_{50} 17.35 µg/ml), according to further in vitro antioxidant assay data. In order to synthesize nanoparticles with notable antioxidant activity in comparison to plant extracts and the common medication ascorbic acid, optimization approaches are essential. Our results demonstrate that metal oxide nanoparticles may be utilized safely to treat a variety of illnesses and that they exhibited significantly substantial antioxidant activity when compared to plant extract.

Keywords: *Mallotus philippensis,* antioxidant, optimization, green synthesis, Zinc oxide nanoparticles

Spectrophotometrically Controlled Facile Green Synthesis of ZnO and CuO Nanoparticles Derived from *Embelia tsjeriam-cottam* Leaf Extract and Their Biological Activities

Bhavana M, Varsha Jayakar and Vinayak Lokapur

PG Department of Biochemistry, GSS College, Rani Chennamma University, Belagavi-590006
Email: jayakarvarsha@gmail.com

Abstract

Metal oxide nanoparticles have been employed for a wide range of applications in the twenty-first century. For the production of zinc and copper oxide nanoparticles using the leaves of *Embelia tsjeriam-cottam* (ETC), the current study concentrates on the initial screening of phytochemical ingredients, followed by optimization using the green synthesis method. Using a variety of analytical methods, including UV-vis spec, XRD, SEM, EDAX, TEM, SAED, DLS, and zeta potential, the optimized nanopowder was examined to investigate its bonding, high purity, surface morphology, functional groups, crystallinity, size, and stability of aggregates of nanoparticles. Additionally, the anticancer and antioxidant properties of a particular extract from ETC leaves were assessed. The production of nanoparticles was stabilized and capped by the many secondary metabolites and radical scavengers found in ETC leaves. Green synthesized ZnO NPs and CuO NPs demonstrated 3.4- fold greater antioxidant capacity (IC_{50} 14.60 µg/ml and 14.60 µg/ml), according to further in vitro antioxidant assay data, compared to aqueous plant leaf extract (IC_{50} 49.48 µg/ml). ZnO NPs, CuO NPs, and MP stem extract all exhibit dose-dependent cytotoxicity against lung cancer cells (A549) in MTT cytotoxicity study, while having significantly different IC_{50} values of 0.43 µg/ml, 9.22 µg/ml, and 3.88 µg/ml, respectively. The manufacture of nanoparticles that demonstrated notable anticancer efficacy in comparison to plant extracts and the conventional medication cisplatin is largely dependent on optimization approaches. According to our research, metal oxide nanoparticles exhibited significantly stronger anticancer activity than plant extracts. In particular, CuO nanoparticles demonstrated superior anticancer activity.

Keywords: *Embelia tsjeriam-cottam,* antioxidant, cytotoxicity, A549 Lung cancer cell line, mouse fibroblast cell line, green synthesis

Process Optimization for Green Synthesis of CuO NPs of *Mallotus philippensis* and its Biological Activities

Abhishek U. Tegur, Varsha Jayakar and Vinayak Lokapur

PG Department of Biochemistry, GSS College, Rani Chennamma University, Belagavi-590006
Email: jayakarvarsha@gmail.com

Abstract

In this study, the green synthesis of CuO nanoparticles in the leaf extract of the medicinal plant *Mallotus philippensis* is demonstrated in a simple, economical, and environmentally friendly manner. Using *Mallotus philippensis* (MP) leaf extract, the current study optimizes the green method for production of copper oxide nanoparticles. Using a variety of analytical methods, including UV-vis spec, XRD, SEM, EDAX, TEM, SAED, DLS, and zeta potential, the optimized nanopowder was examined to investigate its bonding, high purity, surface morphology, functional groups, crystallinity, size, and stability of aggregates of nanoparticles. Additionally, the DPPH, FRAP, and PM assays were used to assess the antioxidant activity of a specific MP leaf extract and CuO NPs. Bioactive substances found in *M. philippensis* species served as stabilizing and capping agents during the production of nanoparticles. Green synthesized CUO NPs had 5.1-fold greater anti-oxidant capability (IC_{50} 1.783 µg/ml) compared to aqueous plant leaf extract (IC_{50} 9.141 µg/ml), according to further in vitro antioxidant assay data. MP leaf extract and CuO NPs exhibit dose-dependent cytotoxicity against triple-negative breast cancer cells (MDA-MB-231) in MTT cytotoxicity study; however, their IC_{50} values, which are 25.56 µg/ml and 6.415 µg/ml, respectively, differ significantly. In comparison to plant extracts and the standard medication cisplatin, optimization strategies are crucial to the creation of nanoparticles that exhibit notable anticancer activity. Compared to plant extracts, our results demonstrated that CuO NPs had significantly substantial anticancer activity. Additionally, no noticeable effect was seen in normal mouse fibroblast cells at this dosage, suggesting that it may be utilized safely against breast cancer.

Keywords: Optimization, Copper oxide nanoparticles, Green synthesis, Antioxidant, Cytotoxicity

Promising Antioxidative Potentiality and Anticancer Activity of Under Explored *Embelia tsjeriam-cottam* Leaf Extract

Ratna Chabbi, Vinayak Lokapur and Varsha Jayakar

Department of Biochemistry, GSS College, Rani Chennamma University, Belagavi-590006
Email: vinayak.lokapur@gmail.com

ABSTRACT

Plants and plant-derived products have long been used by humans to treat a wide range of illnesses. In order to develop a cancer-fighting medication that works, the antioxidant properties of plant sources are being investigated. In contrast to the medication cisplatin, the current study aims to assess the cytotoxic and antioxidant properties of the bark extract of *Embelia tsjeriam cottam* (ETC) against the mouse fibroblast cell line (L929) and the human lung cancer cell line (A549). To ascertain the association between phytochemical components that are in charge of cytotoxic and antioxidative actions, the extracts' phenolic, flavonoid, saponin, and alkaloid contents were quantified. The DPPH, phosphomolybdenum, and FRAP assays were used to test the antioxidant capacity, while the MTT assay was used to measure the cytotoxic activity. It was found that the selected medicinal plant has high levels of phenolic and flavonoid compounds (0.129±0.0149 mg GAE/g extract in methanol extract and 0.065±0.0107 mg QE/g extract in hexane extract), with saponin (0.683±0.687 mg/g) and total alkaloids (1.147±0.205 mg/g) being the highest of all. The results of antioxidant assays showed that ETC bark extracts, at higher concentrations, had promising antioxidant potential when compared to standard L-ascorbic acid. The IC50 values for ETC hexane, ETC methanol, and ETC water were 1.512 µg/mL, 17.09 µg/mL, and 456.7 µg/mL, respectively, while ascorbic acid had an IC50 value of 0.362 µg/mL. At a dosage of 150 µg/mL, they demonstrated high antioxidant activity. Cytotoxic action shows that cell death rises with exact concentration. There may be a beneficial correlation between the outcomes of anti-cancer and antioxidant activities.

Keywords: *Embelia tsjeriam–cottam*; antioxidant; cytotoxicity; A549 Lung cancer cell line; mouse fibroblast cell line.

Nanotechnology and its Applications in Biochemistry and Food Technology

Preksha V. Bhavikeri

K.L.E Society's College of Education, Vidyanagar, Hubballi-580031
Email: prekshavbhavikeri@gmail.com

Abstract

Nanoscience and nanotechnology are new frontiers of this century. Its applications to agriculture and the food sector are relatively recent compared with their use in drug delivery and pharmaceuticals. Biochemistry explores chemical processes related to living organisms. It is a laboratory-based science combining biology and chemistry. Sectors included in biochemistry are molecular biology, immunochemistry, neurochemistry, bioorganic, bioinorganic, and biophysical chemistry. Biochemistry has various applications in medicine, veterinary medicine, food science, agriculture, pharmacology, physiology, and so on with the aid of nanotechnology. In food applications, nanotechnology can be applied by different approaches – 'bottom-up' or 'top-down' approach. Nanotechnology can be applied in the field of biochemistry and food technology with the design and construction of custom-made structures and devices such as biosensors, nanorobots, and nanomachines. Nano biochemistry has significant potential in fighting diseases and improving human life by providing advanced treatments and personalized medicines. Nanotechnology in food technology includes improvement in packaging materials to extend food life, improve food safety. Nanotechnology and its applications are being utilized to detect bacteria in packaging, produce stronger flavours and color quality, and safety by increasing barrier properties. Hence, nanotechnology and its applications are a boon to human life, and the research advances and application in biochemistry and food technology is highly valuable.

Keywords: Nanoscience, nanotechnology, biochemistry, food technology.

Harnessing Blossom Pigments: Sustainable Colorant Innovation for Food Industry

Madhura.T.R. and Amrutha.T.S.

Department of Studies in Biotechnology, GM institute of technology, Davangere–577007,Karnataka,India

Email: madhuratr629@gmail.com

Abstract:

The growing demand for sustainable and natural food ingredients has prompted the exploration of alternative sources of colorants. This study investigates the potential of harnessing blossom pigments as a novel, eco-friendly, and sustainable source of colorants for the food industry. Blossoms, often overlooked as waste, contain vibrant pigments such as anthocyanins and carotenoids, which have proven to be safe, non-toxic, and effective in providing rich natural hues. By extracting and optimizing these pigments, we propose an innovative approach to reduce reliance on synthetic dyes, which are often associated with health risks and environmental concerns. Through the analysis of various flower species, extraction methods, and pigment stability under food processing conditions, this research highlights the potential of blossom pigments as a viable and sustainable option for natural food colouring. The study also explores the economic and environmental benefits of incorporating blossom-derived colorants into food production, demonstrating their alignment with the growing consumer demand for cleaner, healthier, and more environmentally responsible products. The findings offer a promising direction for the development of safe, renewable, and bio-based food colorants, contributing to the food industry's sustainability goals.

Keywords: Eco-friendly, colorants, anthocyanins, carotenoids

Optical Properties of Different Geometrical Shape of Gold Nanostructures

Bhukya Vijay Mohan, Sharath Ananthamurthy, and RamachandraRao Yalla
School of Physics, Department of Physics, University of Hyderabad, Gachibowli, Hyderabad-500046
Email Id: sasp@uohyd.ac.in

Abstract

In this study, we present the theoretical modelling of gold nanostructures (bowties and star) for localized surface plasmon resonance (LSPR)-based bio sensor application, plasmonic tweezer and SERS over red to NIR region. Ansys, FDTD package is used to simulate the electromagnetic field enhancement around gold nanostructures. were simulation a gold nanostructure designed on a silica substrate Using CAD file. A plane wave source, with a wavelength range of 400 nm to 2000 nm, is used as bottom illumination source to excite the gold nanostructures. The cross section, field power monitor used to measure the Electric Field enhancement, absorption and scattering of the gold nano structures. Cross section detector is used to measure the transmission and reflection of the electric fields. Au nano stars exhibiting LSPR peak over 1064 nm were considered in isolated and multimer configuration. The nano stars exhibit the stronger field enhancement then the nano bowties at wavelength of 1064nm.The gap separation. In the Investigation of nano bowtie and nano star structures has revealed the significant impact of the gap separation and geometry on LSPR properties. The extinction cross-section of gold nanostructures is related to the strength of a plasmonic tweezer trap because both are influenced by the local surface plasmon resonance. The extinction cross-section serves as an indicator of how efficiently the nanostructure enhances the local electric field, which is critical for determining the strength of the optical gradient force in plasmonic tweezers.

Keywords: Plasmonic tweezer, gold nanostructures, extinction cross-section

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