



**MAHARISHI  
UNIVERSITY**



**Proceedings of  
International Conference on  
“Innovation in Science and Technology for  
Sustainable Development” (ISTSD-2023)**

**21<sup>st</sup> - 23<sup>rd</sup> November, 2023**

**ISBN: 978-93-88901-87-1**

**Organized by:  
Department of Science,  
Maharishi School of Science and Humanities,  
Maharishi University of Information Technology, Lucknow**



**Editors:  
Dr. Sneha Verma  
Dr. Neeraj Jain  
Dr. Kanchan Awasthi**

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# “Innovation in Science and Technology for Sustainable Development”

Organized by: Department of Science, Maharishi School of Science and Humanities

21<sup>st</sup>- 23<sup>rd</sup> November 2023 (Tuesday - Thursday)

**Aim:** The aim of this Conference is to bring academicians and researchers from forefront areas on a single platform to discuss and share their valuable thoughts on recent advances in science, and technology, to link the innovative work amongst academicians, scientists, scholars and young students in different field of science and technology, and also to promote interdisciplinary research for the betterment of the society and sustainable development.

## Highlights:

Various knowledge/ Technical sessions on diverse aspects of Science and Technology

- Plenary lectures by eminent speakers from across the world.
- Scientific presentations in various disciplines of Science by Academicians/ Research Scholars/ PG students.
- Discussion about the practical challenges and the solutions adopted.
- Proceedings of Conference with ISBN.

## Disciplines:

- Life Science
- Agricultural Science
- Chemical Science
- Physical Science
- Mathematical Science
- Pharmaceutical Science
- Engineering and Technology

## Important Dates:

- Conference Dates : **21-23 November 2023**
- Last date of Abstract submission: **11 November 2023**
- Notification for Acceptance: **15 November 2023**
- Last date for Registration: **17 November 2023**

## Call for Abstracts:

Abstracts of original research are invited from Educators/ Scientists/ Researchers/ Technologists/ students for presentations during the conference.

**Guidelines:** The abstract in MS Word, Times New Roman, not exceeding 500 words should be in the following format: Title: (Capital and Bold, Font size 14); Author's name (bold, presenting author's name underlined, font size 12) and affiliation (address of institution with an email of corresponding author). Title, author details center aligned. Keywords (italics, bold, font size 10, limited to 5 words). Text (justified, single line spacing, margins-0.5 inches on all sides). Stream-related abstract(s) in the given format should reach on or before the last date of abstract submission.

**Proceedings:** All accepted abstracts will be published in Conference Proceedings with ISBN as e-copy.

All the presenters will be eligible to receive an e-copy of Conference Proceedings.

**Best Paper Awards:** The best paper award will be given in each Discipline to the **Presenting Author**.

- **Junior Scientist Award:** Eligibility criteria- UG/PG student category.
- **Young Scientist Award:** Eligibility criteria- PhD pursuing/ Completed category.

**Certificate :** All attendees will receive e-certificate subject to min 60% attendance and submission of Feedback Form.

## Organizing Committee:

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(Chancellor, MUIT)  
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**Dr. Kanchan Awasthi**  
(Organising Secretary)

**Dr. Nishant Kumar**  
(Organising Secretary)







**MAHARISHI UNIVERSITY**



## International Conference

on

# “Innovation in Science and Technology for Sustainable Development”

21<sup>st</sup>– 23<sup>rd</sup> November 2023 (Tuesday - Thursday)



Chief Patron

**Shri Ajay Prakash Shrivastava**  
Chancellor, MUIT



Patron

**Prof. (Group Capt.) O. P. Sharma**  
DG, MUIT



Chief Guest (Inauguration)

**Dr. Uttam Kumar Sarkar**  
Director, ICAR- National Bureau of Fish Genetic Resources, Lucknow



Chief Guest (Valedictory)

**Prof. Naveen Kumar Arora**  
Professor & Dean, School of Earth and Environmental Science, BBAU (A Central University), Lucknow



Patron

**Prof. (Dr.) B. P. Singh**  
Vice Chancellor, MUIT

### Inauguration Ceremony

📅 21<sup>st</sup> November, 2023 (Tuesday) | 11:30 AM

### Valedictory Ceremony

📅 23<sup>rd</sup> November, 2023 (Thursday) | 2:40 PM

## Invited Speakers



**Dr. Vishnu D. Rajput**

Associate Professor,  
Southern Federal University,  
Rostov-on-Don,  
Russia



**Dr. Akhilesh Kumar**

Founder & CEO:  
Eden Horticulture Services  
Advisor, ABZ Agri-GARD,  
Israel



**Dr. Jyoti Joshi**

Associate Professor and Head,  
Department of Geography,  
Soban Singh Jeena University,  
Almora



**Dr. Rupesh Dewang**

Associate Professor,  
NITTR, Bhopal



**Dr. Neeraj Tiwari**

Professor & Head, Department  
of Statistics, Soban Singh  
Jeena University,  
Almora



**Dr. Rahul Dev**

Associate Professor,  
MNNIT, Allahabad

Conveners :

Dr. Sneha Verma and Dr. Ramakant

Organising Secretary :

Dr. Kanchan Awasthi and Dr. Nishant Kumar

Mode:



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## **PREFACE**

It is with immense pleasure that we introduce the Proceedings of the International Conference on “**Innovation in Science and Technology for Sustainable Development**” (**ISTSD-2023**) from 21<sup>st</sup> November- 23<sup>rd</sup> November 2023, organized by the Department of Science, Maharishi School of Science and Humanities, Maharishi University of Information Technology, Lucknow. This collection represents the significant collaborative research in science and technology aiming to explore and share transformative innovation, ideas and discoveries for human welfare and ecosystem sustainability. As we stand on the cusp of a new era of modern techniques, this Proceeding serves as a testament to the vitality of innovative approaches in the direction of Sustainable Development Goals (SDGs). The conference addresses recent developments and innovations in the following areas, viz., Life Science, Agricultural Science, Chemical Science, Physical Science, Mathematical Science, Pharmaceutical Science and Engineering and Technology.

This conference sought to capture the essence of this transformation by bringing together invited speakers, foreign delegates, students, research scholars, scientists, innovators, and faculties from around the world to exchange their ideas, and innovations, share insights, and present their latest research findings. We have been fortunate to bring in esteemed speakers from around the globe to contribute to the theme of the Conference. We also received immense responses from participants towards registration and abstract submission. We received more than 200 responses towards registration including those presenting their abstracts. The submitted abstracts, after thorough screening made it made it to the Proceedings for publishing and will be presented by the participants.

This Proceeding aims to serve as a valuable resource for research scholars and all participants dedicated to advancing the frontiers of science and technologies. We believe that the ideas, research findings, and best practices presented within these pages will inspire ongoing dialogue and innovation in the field of Science and Technology for Sustainable Development.

It is a privilege for us to witness this great conference, and we truly hope that there will be continued association with our esteemed speakers and participants for collaborative research and fruitful interaction towards our quest for human welfare.

Finally, we wish that this conference will be a success and our participants will be benefited from it and we are looking forward to the next great conference.

**Editors**

## **Acknowledgement**

We are thankful to each and everyone who has directly or indirectly contributed in bringing out this document in its wholeness. We express our heartfelt gratitude to our Hon'ble Chancellor (Shri Ajay Prakash Shrivastava), Hon'ble DG (Prof. (Gp. Capt.) OP Sharma), Hon'ble Vice Chancellor (Prof. BP Singh), Hon'ble Registrar (Prof. A. P. Singh) for their continued guidance, encouragement and motivation in all our endeavours. We are immensely thankful to FO (Shri Varun Shrivastava), Dy. Registrar (Shri Girish Chhimwal), AFO (Shri AP seth) for their unconditional support in extending all facilities and resources including financial support in bring out the proceedings. We are hugely thankful to all our Dean-Academics (Dr. Sapan Asthana), Dy Dean -Academics (Dr. Vijay Srivastava), Dean-MSOSH (Dr. Neeraj Jain) and Dy. Dean-MSOSH (Dr. Rupam Singh) and all the faculty members for their support and encouragement throughout the making of these Proceedings. We are highly grateful to our esteemed speakers and participants who contributed immensely to this Conference and the Proceeding. Their contribution is most valuable and highly encouraging. Last but not the least, we are thankful to our publisher for their patience and support in timely delivery of the Proceedings in its current form as you are perusing it now.

## About The University

### Maharishi University of Information Technology

The Maharishi University of Information Technology (MUIT) was established under MUIT Uttar Pradesh Act No. 31 of 2001 Notification No. 573 dated 06 October, 2001. His Holiness Maharishi Mahesh Yogi Ji was the first Chancellor of the University. Presently, Shri Ajay Prakash Shrivastava is the Chancellor of the University. It has developed phenomenally since its inception to be recognized as a premier University in the country today. It offers Bachelor, Master and Doctoral programmes in one of the widest range of disciplines, including Science, Commerce, Management, Humanities, Pharmacy, Engineering, Animation, Journalism & Mass Communication, Law and Enrichment Courses. The goal for every student is enlightenment — the systematic development of full potential from within. This is the key to true fulfilment in daily life and any career.

#### Motto

*“From Potentiality to Actuality through Creative Intelligence”*

*“भावातीत चेतना से समृद्धि”*

This is the motto of our university. Every individual is being educated and trained to grow into a complete individual who is physically enduring, emotionally mature, intellectually enlightened, aesthetically developed, morally sound and spiritually inclined.

#### Vision

The vision of MUIT is to transform the potentiality of each student into actuality and the full unfoldment of their mental potential through Creative Intelligence. Enhancing the employability and entrepreneurship potential is the thrust focus.

#### Mission

The Mission of the MUIT is to facilitate the process of education and training to let each student grow into a complete individual who is physically enduring, emotionally mature, intellectually enlightened, aesthetically developed, morally sound and spiritually inclined.

## **Transcendental Meditation**

Creative Intelligence: It refers to TM, the Transcendental Meditation, a simple process to reach the innermost for knowing the true self for unfoldment.

This technique is a very simple, natural, and effortless way of letting your mind settle down into an extremely calm state of restful alertness. It has been associated with many benefits of physical and mental well-being. Few top benefits are related to brain functioning, heart health and of course, stress management and relief of anxiety. Best effects are produced with regular practice of two times twenty minutes a day. It is an effective way to unfold the full creative potential latent in every individual.

It is an integral part of every staff, faculty member and each student of MUIT.

## **About the School**

### **Maharishi School of Science & Humanities**

Maharishi School of Science and Humanities provides an extensive range of various courses across various disciplines in the field of Science and Humanities. Students at the institute can pursue a Bachelor of Science (B.Sc.) and Master of Science (M.Sc.) in subjects like Mathematics, Physics, Chemistry, Botany, Zoology and Biotechnology, and Bachelor of Arts (B.A.) and Master of Arts (M.A.) in diverse fields such as English, Hindi, History, Political Science, Education, Psychology, Sociology and Economics allowing them to develop a strong foundation and advance knowledge in these scientific disciplines. The school also offers Ph.D. in all the above disciplines of Science and Humanities. Additionally, the school also offer BSW (Bachelor of Social Work), MSW (Master of Social Work) and BLIS (Bachelor of Library and Information Science) programs. This broad range of options enables students to explore their academic interests and pursue their passion in various subjects. With experienced faculty members and state-of-the-art facilities, Maharishi School of Science and Humanities aims to provide quality education and equip students with the necessary scales and knowledge for a successful career in their chosen fields.



**Shri Ajay Prakash Shrivastava**  
**Hon'ble Chancellor, MUIT**

Dear participants,

It gives me immense pleasure to write this message for the Proceedings of the Conference focussed on Innovation in Science and Technology for Sustainable Development. Innovation and technological advancement are vital for the progress and welfare of society. However, we cannot ignore the present global challenges stemming from factors such as rapid industrialization, urbanization, population explosion, and deforestation that cause environmental degradation and ecological imbalance.

Therefore, it is essential to incorporate sustainable development principles in innovation and scientific advancements. The Sustainable Development Goals have been set to guide us in making informed decisions for the betterment of society and the well-being of mankind. To achieve these ambitious goals, we need value-based education that instills social and environmental responsibilities in individuals.

In this context, Maharishi Mahesh Yogi's Science of Creative Intelligence provides a unique perspective on aligning individual consciousness with the laws of nature and cultivating a sense of responsibility towards society and the environment. Integrating these principles into our approach to innovation and technological advancements is vital in addressing global challenges holistically and promoting equitable development.

I urge all participants to engage in constructive dialogues on these issues and identify innovative solutions that ensure sustainable development while embracing our interconnectedness with the environment and each other.

I wish you a fruitful and thought-provoking conference. Thank you.



## MESSAGE

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**Prof. (Group Capt.) O. P. Sharma**

**Founder Director General,**

**MUIT**



Dear All,

So happy in scripting the message for the Proceedings of ISTSD-2023 with focused theme on Sustainable Development through innovative research in science and technology. The international dimension of the conference is yet another distinguishing feature. My kudos to the team for such a landmark initiative. Good show indeed!

All development got to be sustainable however, it is not so and generally the innovation in research trends to find solution to immediate issues. This mindset got to change to shift focus on SUSTAINABLE DEVELOPMENT besides finding solutions to immediate transitory issues. Surely such a conviction will be the undercurrent of all deliberations in the Conference. CLIMATE CRISIS is the most urgent issue and all science and technology must find answer to sustain our survival. My salutation to the speakers for selecting related titles in similar direction.

Not to miss that faculty and all in governance in higher education got to play leadership role with due mentoring based on VALUES. To remember that no sustainable development can never be realized minus the VALUE based character manifestation in our conduct. Such a concept must provide necessary direction in our deliberations in this conference as well as in all our thinking, feeling and doing!

All the best! Stay blessed Dear All!

## MESSAGE

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**Prof. (Dr.) Bhanu Pratap Singh**

**Vice-Chancellor,**

**MUIT**



Sustainable development is the key to survival, progress and global peace and harmony, in the present scenario when we are facing challenges like climate change, food security, water scarcity, discord among nations etc. Sustainable development aims to meet the needs of the existing generation without compromising on the resources of the generations to come. It also aims for management, continuous replenishment and finding suitable alternatives for existing resources for future readiness and security. Innovation in science and technology are means to this end. Through innovation and technology, one can judiciously use the existing resources and find innovative solutions for their management aiming for sustainable development. Researchers, engineers, scientists, throughout the world, keep on generating new and innovative ideas and technologies for the betterment of humanity and society, to provide a safe haven to one and all; not only the present but also the future generations. One has to aim for an all-round sustainable development include human, social, economic and environmental. Today's world is just not for aiming for physical and materialistic development but also for spiritual and emotional development of mind and body so as to meet the sustainable development goals for a holistic progress of humanity and society. Consciousness development can play an important role in realizing the sustainable development goals as it will help to develop the capacity of an individual to perceive challenges, formulate ideas and solutions, and develop leadership and work in collaboration for a larger good. We at Maharishi University offer to our students a course in Science of Consciousness along with their knowledge and skill development in science and technology which is going to go a long way in their being a part of sustainable development. This conference is one such effort to bring about awareness and knowledge sharing across the globe in area of sustainable development through innovation in science and technology.

I congratulate the organizers for putting together such an event and convey my best wishes to for its huge success.

## MESSAGE

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**Dr. Uttam Kumar Sarkar**

**Director**

**ICAR-NBFGR**



It is a profound honour to contribute to the proceedings of the International Conference on "Innovation in Science and Technology for Sustainable Development," hosted by Maharishi University of Information Technology, Lucknow. This gathering of minds, at the forefront of scientific and technological innovation, symbolizes a collective commitment to advancing sustainable development goals (SDGs).

In the current global scenario, the urgency for sustainable development is paramount. The challenges we face – climate change, resource depletion, and social inequities – require not just attention but actionable solutions. The role of science and technology in this endeavour cannot be overstated. Innovations in these fields offer the most promising pathways to creating a sustainable future for all. Key areas where innovation plays a pivotal role include renewable energy technologies, sustainable agriculture practices, water resource management, and waste reduction strategies. The development of clean energy solutions, such as solar and wind power, is crucial in mitigating climate change impacts. Similarly, advancements in agricultural technologies can significantly enhance food security while minimizing environmental footprints.

The conference's focus on interdisciplinary collaboration is commendable. It is through the blending of diverse scientific disciplines and the integration of technology with socio-economic policies that we can achieve holistic and sustainable solutions. The role of education in fostering an innovation-driven mindset cannot be ignored. It is imperative to nurture future generations of scientists and technologists who are not just skilled but also ethically responsible and environmentally conscious.

In conclusion, the deliberations, and outcomes of ISTSD-2023 are not just academic exercises but steps towards a more sustainable and equitable world. The Maharishi University of Information Technology, through this conference, has set a precedent in driving the agenda of sustainable development through innovation in science and technology. Let us carry forward the insights and collaborations from this conference to make a tangible impact in our respective fields and communities. Together, we have the power to shape a sustainable future, and it is through gatherings like ISTSD-2023 that we rekindle our collective commitment to this cause.

Warm regards,

## MESSAGE

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**Prof. Naveen Kumar Arora,**  
**Professor & Dean,**  
**School of Earth and Environmental Science,**  
**Babasaheb Bhimrao Ambedkar University,**  
**Lucknow (A Central University)**



I am pleased to know that the Department of Science, Maharishi School of Science and Humanities, Maharishi University of Information Technology, Lucknow is organizing an International Conference on “Innovation in Science and Technology for Sustainable Development” on November 21<sup>st</sup> -23<sup>rd</sup>, 2023.

The international conference will provide a platform to academicians, industry experts and researchers to share their innovative ideas, research work and technical skills and discuss hybrid ideas, technologies and research findings to promote interdisciplinary research. I hope this conference will provide an insight into the technical difficulties and advancements in sciences and highlight key findings of recent years with future challenges which will subsequently give new directions to scientific research.

I am sure that the conference will have meaningful discussions and yield constructive results. I extend my best wishes to the organizers of the International Conference as well as to the participants.

Warm Regards,



## MESSAGE

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**Dr. Sapan Asthana**

**Dean-Academic,**

**MUIT, Lucknow Campus**



Science has become an important and integral part of our daily life. We cannot think of a single aspect of daily living that Science has not made easier, faster and safer. Science gives us the platform to ask the “what, how, and why” of nature and is the reason for the ever-increasing understanding that people have about the world around them. It is therefore, important to educate people about innovations in science and technology.

Along with that, it is also important to realise the significance of aiming towards sustainable development through innovation in science and technology. The sustainable development approach focuses on environmental stability and the betterment of humankind without hampering the economic growth of a nation.

In this context, this International Conference on **“Innovation in Science and Technology for Sustainable Development”** being organized by the Department of Science (Maharishi School of Science and Humanities, MUIT) is highly relevant. It will provide a platform for interaction with the experts in the area.

I extend my best wishes to invited speakers, foreign delegates, research scholars and all participants. I hope that the conference will be a grand success. The dedicated efforts of faculty members of the Department of Science, for organizing the conference are highly appreciable. We intend to take such events ahead as an annual feature, the motive not only is to generate discussions around contemporary issues but also to propel the culture of academic exchange, which is the only way to achieve excellence in this field.

Warm regards,

## **ORGANIZING COMMITTEE**

### **Chief Patron**

Shri Ajay Prakash Srivastava, Honorable Chancellor, MUIT

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Dr. Sneha Verma, Assistant Professor, MSOSH, MUIT

Dr. Neeraj Jain, Dean, MSOSH, MUIT

Dr. Kanchan Awasthi, Associate Professor, MSOSH, MUIT

## SCIENTIFIC SCHEDULE AT A GLANCE

Day 1: 21 <sup>st</sup> November 2023, Tuesday	
Time	Programme
11:30 AM - 01:00 PM	<p><b>Inaugural Ceremony</b></p> <p>Chief Guest: <i>Dr. Uttam Kumar Sarkar, Director, Indian Council of Agricultural Research- National Bureau of Fish Genetic Resources, Lucknow</i></p>
01:30 PM – 02:10 PM	<p><b>Invited Talk 1</b></p> <p><i>Dr. Vishnu D. Rajput, Associate Professor (Leading Researcher), Academy of Biology and Biotechnology, Southern Federal University, Rostov-on-Don, Russia</i></p> <p><b><i>Nanotechnology in Restoration of Soil Health and Crop Production: Concern and Perspective</i></b></p>
02:15 PM - 02:55 PM	<p><b>Invited Talk 2</b></p> <p><i>Dr. Rupesh Dewang, Associate Professor, NITTTR, Bhopal</i></p> <p><b><i>In The Crosshairs: Navigating The Challenges of Review Spam and Building Trust</i></b></p>
02:55 PM - 04:25 PM	<p><b><i>Oral Presentations Sessions (Agricultural Science)</i></b></p>
Day 2: 22 <sup>nd</sup> November 2023, Wednesday	
10:00 AM - 02:30 PM	<p><b><i>Oral Presentations Sessions (Life Science &amp; Physical Science)</i></b></p>
02:30 PM – 03:10 PM	<p><b>Invited Talk 3</b></p> <p><i>Dr. Neeraj Tiwari, Professor, Department of Statistics, Soban Singh Jeena University, Almora, Uttarakhand</i></p> <p><b><i>Detection of Geo-Statistical Hot Spots for Tuberculosis in Achieving the United Nation’s Goal of Good health and Well-being for Sustainable Development</i></b></p>
03:10 PM – 03:50 PM	<p><b>Invited Talk 4</b></p> <p><i>Dr. Akhilesh Kumar, Founder &amp; CEO-Eden Horticulture Services; Advisor, ABZ Agri –GARD, Israel</i></p> <p><b><i>Agri entrepreneurship model through plug seedling production in soil less media</i></b></p>
03:50 PM – 04:25 PM	<p><b><i>Oral Presentations Sessions (Pharmaceutical Science)</i></b></p>

### Day 3: 23<sup>rd</sup> November 2023, Thursday

10:00 AM - 01:00 PM	<b><i>Oral Presentations Sessions (Chemical Science, Mathematical Science &amp; Engineering &amp; Technology)</i></b>
01:20 PM – 02:00 PM	<b><i>Invited Talk 5</i></b> <b>Dr. Rahul Dev</b> , Associate Professor, MNNIT, Allahabad <b><i>Solar Energy and its Application</i></b>
02:00 PM - 02:40 PM	<b><i>Invited Talk 6</i></b> <b>Dr. Jyoti Joshi</b> , HoD, Department of Geography, Soban Singh Jeena University, Almora, Uttarakhand <b><i>Watershed Management and Sustainable Development</i></b>
02:40 PM – 04:25 PM	<b><i>Valedictory session</i></b> Chief Guest: <b>Prof. Naveen Kumar Arora</b> , Professor & Dean, School of Earth and Environmental Science, Babasaheb Bhimrao Ambedkar University, Lucknow (A Central University)



## CHIEF GUEST



**Dr. Uttam Kumar Sarkar**

**Director**

**ICAR-National Bureau of Fish Genetic Resources,**

**Lucknow**

**Present Position:** Director, ICAR-National Bureau of Fish Genetic Resources, Lucknow.

**Past Positions:** Scientist 1996-2006; Senior Scientist 2006-2012, Principal Scientist 2012-2015, ICAR-National Bureau of Fish Genetic Resources, Lucknow; Principal Scientist & Head of the Division, Reservoir and Wetland Fisheries Division, ICAR- Central Inland Fisheries Research Institute, Barrackpore, Kolkata 2015-2022; Director, ICAR- National Bureau of Fish Genetic Resources, Lucknow, October 2022 to till date.

**Awards/Honours:** Arun Sen Memorial Prize award, 1984; Best Scientist Award, ICAR-NBFGR, Lucknow (2008-09); Secretary, Aquatic Biodiversity Conservation Society (ABCS) 2010-2015; Editorial Board Member, ABCS Newsletter; Bioved fellowship award, 2013; Dr. V.R.P. Sinha Medal 2013; Appreciation letter from BIS, Govt. of India for developing standards of 'Good aquaculture practice for cage culture in the freshwater ecosystem; Guest Editor, Special issue of Aquatic Ecosystem Health & Management, Canada; Best Division of the Year Award (Reservoir and Wetland Fisheries Division) of ICAR-CIFRI for the year 2020 as HoD; Awarded Sadar Patel Outstanding ICAR Institution Award (Large Category) 2020 (Endorsed as HoD); Member, Board of Management, Acharya Narendra Deva University of Agriculture and Technology; Jt. Coordinator, FAO sponsored workshop on 'Inland Fisheries of India and the Creation of Capacity in the Collection and Analysis of Inland Fisheries Statistics'2022; President, Aquatic Biodiversity Conservation Society (ABCS) from October 2022- till date; Co-coordinator, National Surveillance Programme for Aquatic Animal Diseases (NSPAAD); Co-convener, 3<sup>rd</sup> International Conference on Aquatic Animal Epidemiology (AquaEpi III).

**Fellow:** Zoological Society of India (ZSI); Academy of Environmental Biology (AEB); Indian Academy of Environmental Science (IAES); Inland Fisheries Society of India (IFSI).

**Research Areas:** Fisheries Resource Management, Aquatic Biodiversity and Conservation; Sustainable Fisheries Enhancement; Climate Resilience Management Plan for Inland Fisheries, Ecosystem Approach in Fisheries.

## CHIEF GUEST



**Prof. Naveen Kumar Arora**

**Professor & Dean,**

**School of Earth and Environmental Science,**

**Babasaheb Bhimrao Ambedkar University,**

**Lucknow (A Central University)**

**Prof. (Dr.) Naveen Kumar Arora**, PhD in Microbiology, Fellow of International Society of Environmental Botanists (FISEB), Professor in Department of Environmental Science, Dean in School of Earth and Environmental Sciences, Former Head, Department of Environmental Science and Former Head of Department of Environmental Microbiology, Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow, Uttar Pradesh, India is a renowned researcher in the field of Environmental Microbiology and Biotechnology. His specific area of research is plant microbe interaction and sustainable agriculture and environment. Before joining Babasaheb Bhimrao Ambedkar University, he was Head, Department of Microbiology, Chhatrapati Shahu Ji Maharaj University, Kanpur, Uttar Pradesh, India from 2006-2011. He has more than 100 research articles published in premium international journals and several articles published in magazines and dailies. He is editor of 46 books, published by Springer Nature He is the Series Editor of book series “Microorganisms for Sustainability” published by Springer Nature and Guest Editor of *Frontiers in Microbiology*. He is the Editor in Chief of the journal “Environmental Sustainability” published by Springer Nature. He is also the member of several national and international societies, in editorial board of 04 journals and reviewer of several international journals. He has 01 patent to his name. He has successfully completed 06 R&D projects sanctioned by funding agencies such as DST, DBT, CSIR, UPCST and UGC and at present 03 projects ongoing under him funded by Ministry of Science and Technology, New Delhi, India. As per the list released by Stanford University in collaboration with Elsevier he is among the top 2% scientists of the world. He has delivered lectures in conferences and seminars around the globe some of which include Lead Lectures at University of Lisbon, Lisbon, Portugal, SIIRT University, Turkey, University of Tashkent, Tashkent, Uzbekistan, Ibn Zohr University, Agadir, Morocco, IUSS Conference at Philadelphia, USA and conferences at Beijing (China), Hanoi (Vietnam) and several conferences in India. He has been advisor to 126 post graduate and 18 doctoral students. He has also received awards for excellence in research by the Honorable Governor of Uttar Pradesh, Asian PGPR Society, Samagra Vikas Welfare Society and Research & Academic Excellence Award in the discipline of Life Sciences by Babasaheb Bhimrao Ambedkar University (A Central University), Lucknow, Uttar Pradesh, India. Although an academician and researcher by profession he has a huge obsession for the wildlife and its conservation and has authored a book, *Splendid Wilds*. He is President of Society for Conservation of Wildlife and is also Secretary of Society for Environmental Sustainability (website: [www.ses-india.org](http://www.ses-india.org)). He is the member of several academic bodies in Universities of India.

## INVITED SPEAKER



**Dr. Vishnu D. Rajput**

**Associate Professor (Leading Researcher),  
Academy of Biology and Biotechnology,  
Southern Federal University,  
Rostov-on-Don, Russia**

**Dr. Vishnu D. Rajput**, Leading Researcher (Assoc. Prof.), Academy of Biology and Biotechnology, working as Head of ‘Soil Health Lab’ at Southern Federal University, Rostov-on-Don, Russia. His ongoing research is based on the investigation of effective remediation approaches using biochar/nano-biochar based sorbents and nanomaterials. With long experience and experimental work, Dr. Rajput comprehensively detailed the state of research in environmental science in regard to “how nanoparticles/heavy metals interact with plants, soil, microbial community, and the larger environment as well as possible remediation technology using nanoparticles/nano-biochar. He has published 331 scientific publications, 70 chapters, 18 books, **H-Index: 37**. He is an internationally recognized reviewer, received an Outstanding Reviewing Certificate by Elsevier and Springer. He is an editorial board member of various high-impacted journals such biochar. He is holding national and international projects including Mega-Grant, BRICS. Dr. Rajput has received “Certificate for Appreciation 2019” 2021, “Certificate of Honor 2020”, Diploma Award 2021 & 2022, Letter of Gratitude 2022, by Southern Federal University, Russia, for outstanding contribution in academic, creative research, and publication activities. He has also received “Highly Qualified Specialist” status by Russian government. In year 2023, he is included in the list of 2% worlds potential scientists by Elsevier BV publishing house.

## INVITED SPEAKER



**Dr. Akhilesh Kumar**

**Founder & CEO: Eden Horticulture Services**

**Advisor, ABZ Agri –GARD,**

**Israel**

Dr. Akhilesh Kumar is a Plant Biotechnologist by education but now turned into an Agri-entrepreneur. After spending 15 years of his academic research on transgenic development (GM crop), he realized that he needed to focus on applied science. He spent four years of his academic career, as a visiting scientist in Israel, working at Volcani Centre (Ministry of Agriculture and Research Organization). His academic journey has been accomplished with a US patent, several international publications. After having exposure of the Israeli start-up ecosystem, he decided to return to India and worked at the first Centre of Excellence (Indo-Israeli project) at Gharaunda in Karnal (Haryana). Later, he founded his own consultancy firm called Eden Horticulture Services ([www.edenhorti.in](http://www.edenhorti.in)) and is in the process of promoting Hi-Tech horticulture in India. Eden motto is to Educate: Empower and Employ the people. He has consulted several agriculture projects in more than 15 states of India thus having good knowledge of crop cluster and supply chain management. Dr Akhil is working as advisor for few Israeli companies (ABZ Agri – Global Agriculture & Rural Development) and representing India as local leader at Volcani International Partnership (Leadership | Volcani International Partnerships ([vipartnerships.org](http://vipartnerships.org))). Eden Horticulture provides hands on training, consultancy, educational projects and conducts Agri-study tours. He also publishes a bi-monthly magazine named EDEN HORTI (RNI ARENG/2017/74778) to educate people about emerging potential in the horticulture sector. Dr Akhil also lends a hand to budding entrepreneurs to develop innovative products in the agriculture domain through mentorships.



## INVITED SPEAKER



**Dr. Jyoti Joshi**

**Associate Professor and Head,  
Department of Geography,  
Soban Singh Jeena University, Almora**

Dr. (Mrs) Jyoti Joshi is working as an Associate Professor and Head, Department of Geography, Soban Singh Jeena University, Almora, Uttarakhand. She has obtained Masters in Geography (First Position) from Kumaun University and completed her Ph.D. Environmental Geomorphology. She has been awarded with Young Scientist DST, Women Scientist DST, Research Associate, CSIR. She has more than 38 years of research experience and 19 years of Teaching Experience. She also had nearly four dozen publications.

## INVITED SPEAKER



**Dr. Rupesh Dewang,**  
**Associate Professor,**  
**NITTR, Bhopal**

Dr. Rupesh Kumar Dewang is affiliated to the Department of Engineering/Computer Science & Engineering Education, National Institute of Technical Teachers' Training and Research, Bhopal. Dr. Rupesh Kumar Dewang is currently providing services as Associate Professor.

Dr. Rupesh Kumar Dewang has an experience of 14 years in teaching and research. He has provided his services in NLIU Bhopal, RGPV Bhopal and MNNIT Allahabad. He has completed B.E. in CSE, M.Tech. in IT and Ph.D in CSE.

He has published numerous publications in various national and international peer-reviewed journals and presented scientific papers across the world. He has also published one patent recently. He has guided many PG students and Two Ph.D students.

Dr. Rupesh Kumar Dewang has been recognized by subject experts around the world. Dr. Rupesh Kumar Dewang contributions are appreciated by various reputed awards. Dr. Rupesh Kumar Dewang clinical and scientific research interests include Machine learning, Data Mining, Big data Analytics, Cyber/Information Security.

## INVITED SPEAKER



**Dr. Rahul Dev,**  
**Associate Professor,**  
**MNNIT, Allahabad**

Dr. Rahul Dev is an Associate Professor in Mechanical Engineering Department, Motilal Nehru National Institute of Technology (MNNIT) Allahabad, Prayagraj. He had been graduated in B.Tech. Mechanical Engineering from Institute of Engineering & Technology, Lucknow in year 2004. He had received Master of Technology degree in Energy Studies from Centre for Energy Studies, Indian Institute of Technology Delhi in year 2007. He also did his Ph.D. in the field of Solar Distillation on topic '*Thermal Modeling and Characteristic Equations for Passive and Active Solar Stills*' from Centre for Energy Studies, Indian Institute of Technology Delhi in year 2012. In MNNIT Allahabad, several experimental setup of solar energy has been installed by him. And he has guided 25 M.Tech. theses, and 4 Ph.D. theses so far. 5 PhD and 2 M.Tech. scholars are currently doing their thesis work under his guidance. He has also guided 20 B.Tech. projects so far.

Dr. Rahul Dev has an interest in the field of Solar Energy Applications. He has mainly worked on solar thermal areas such as Solar Distillation, Solar Passive Buildings, Daylighting, Solar Greenhouse Dryers, Solar Water Heating, Solar Air Heater and 'Photovoltaic integrated thermal application'. He has published 33 (24 SCI/SCOUPUS) research papers in International Journals, 61 research paper in International Conferences, 9 research papers in National Conferences and 2 book Chapters on 'Solar distillation' and 'Solar Water Heating' in a books published by Springer. One more book chapter "Solar distillation and water heating systems integration with photovoltaic technology" is accepted for publication in Springer.

He has delivered 22 invited lectures in different engineering colleges. He has also organized an invited lecture and three (03) short term courses on "Alternative Sources of Energy for Sustainable Development (ASESD-2017)", "Emerging trends in Thermal Engineering (ETTE-2018)" and "Emerging trends in Renewable Energy Technologies (ETRET-2022)".

He has been teaching Engineering Thermodynamics, Heat & Mass Transfer, Thermal Engineering, Thermo-fluid dynamics, Solar Energy & Its Applications, and Solar Architecture, Non-conventional Energy Sources, Energy Conversion Techniques in UG and PG courses in MNNIT Allahabad.

## INVITED SPEAKER



**Prof. (Dr.) Neeraj Tiwari,**  
**Professor & Head,**  
**Department of Statistics,**  
**Soban Singh Jeena University, Almora**

Prof. (Dr.) Neeraj Tiwari is a Data Scientist and Statistician presently working as Professor and Head in the Department of Statistics, Kumaun University, S.S.J. Campus, Almora, India. He started his career as Assistant Professor at S.D.(P.G.) College in January 1990 and joined Kumaun University in 1995. He has published more than 80 research papers in various reputed national and international journals. He has also published three research books and edited two other books. He has visited many countries such as U.S.A., China, Czech Republic etc. for delivering invited talks in various conferences. He has also delivered invited talks and lectures in I.S.I. Kolkata, I.A.S.R.I. New Delhi, I.I.M. Bangalore, Central University of Rajasthan, H.N.B. Garhwal Central University, F.R.I. Dehradun, A.S.C. Nainital and many other universities/research institutes in India. His research interests are Sample Surveys, Sequential Analysis, Reliability and Life Testing, Demography, Environmental Statistics, Geoinformatics, Health Geostatistics, Clustering and Soft Computing. He is the Member of Operational Society of India, Indian Society of Bayesian Statistics, India, Editor of international journals 'InterStat' and 'Earth Sciences', Member of various Academic Bodies in Kumaun University, Nainital and many other universities in India. He is also reviewer of various International and National journals such as International Journal of Health Statistics, Communications in Statistics-Theory and Methods, International Journal of Environment Statistics, PLOS ONE, Hessepe Journal of Mathematics and Statistics, Statistics and Applications, Journal of Indian Society of Agricultural Statistics, Journal of Tropical Medicine and International Health etc. He is the expert member of U.P., Bihar and Uttarakhand Public Service Commission. He has successfully completed three major projects of ICMR, UGC and Uttarakhand Council of Science and Technology. He has expertise in GIS, Remote Sensing, SPSS, SYSTAT and R softwares. He also has vast administrative experience as Proctor, D.S.W., N.S.S. Coordinator and Superintendent Exams.

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## **ABSTRACTS**



**EXPLORING THE ANTI-INFLAMMATORY AND ANTIPYRETIC PROPERTIES OF  
ETHANOL EXTRACTS FROM *GREWIA FLAVESCENS* JUSS. AND *GREWIA  
RHAMNIFOLIA* ROTH.**

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**Abstract:**

Inflammation and pain occur due to different pathological condition in humans. Plant based drugs traditionally used for management of these conditions. The current study was aimed at investigating the anti-inflammatory and antipyretic activity of ethanol extract of *Grewia flavescens* Juss. and *Grewia rhamnifolia* Roth. Anti-inflammatory activity of the selected extracts was tested by the carrageenan-induced rat paws edema method and antipyretic activity of the sample extracts were tested against yeast induced pyrexia in rats at the dose of 400 mg/kg. A significant highest paw edema inhibition (94. 16%) was observed in rats at a dose of 400 mg/kg of the *G. flavescens* leaf dried powder extract. The dried powdered stem ethanol extracts of the selected plant showed moderate activity and lowered the rectal temperature in time dependent manner in antipyretic study. The antipyretic activities of ethanolic extract may be due to the presence of alkaloids, sterols and flavonoids. These findings suggest that the selected extracts possess significant anti-inflammatory and antipyretic property.

**Keywords:** Anti-inflammatory, *G. flavescens*, ethanolic extract, Flavonoids and Carrageenan.

## **INTEGRATED FARMING SYSTEM (IFSS): A TOOLS FOR DIVERSIFICATION OF AGRICULTURE WITH SUSTAINABILITY**

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### **Abstract:**

Agriculture as the main source of farmers income in India, provides sustainable livelihood to more than half (54.06%, Census; 2011) of total population. Integrated Farming System (IFS) is a holistic approach in which different enterprises are utilized in a collaborative way, where the resources are managed efficiently. It is based on the concept that 'there is no waste' and 'waste is only a misplaced resource' which means waste from one component becomes an input for another part of the system. The IFS is actually a mixed farming system where different enterprises like dairy, fish, poultry, and other beneficial enterprises give an enhanced returns with lower risks, which can intermediate the losses of crops in case of severe climatic conditions. Agriculture faces many challenges such as the infertility of land, low productivity, improper land distribution in which a few medium and large farmers have major share in land holdings, lack of irrigation facilities, extreme weather conditions, like droughts, short-term rain and flooding in fields add to the uncertainties, and seasonal migrations. This scenario prepared a strategy, sources of agricultural growth, and suggests technological, institutional policy options for making agriculture a remunerative enterprise and improve the income of farmers via, reduction in cost of cultivation, productivity growth, food processing, and grading, agricultural diversification, minimize post harvest losses and mostly get completely knowledge related to IFS. IFS are the best approach for farmers because the approach involving synergic blending of crops, horticulture, dairy, fisheries, poultry, etc. seems viable option to provide regular income and at site employment to small land holder, decreasing cultivation cost through multiple uses of resources and providing much needed resilience for predicted climate change scenario in specific region.

**Keywords:** IFS, Climate change, Agricultural Waste, Diversification and Income.

**MORPHOLOGICAL ANALYSIS OF CESTODE PARASITE OF THE DOMESTIC  
GOAT *CAPRA HIRCUS* (L.) IN AURANGABAD DISTRICT (M. S.), INDIA**

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**Abstract:**

The present communication deals with a new species of the genus *Stilesia shindeii*, Sp. Nov. from *Capra hircus*, Linnaeus, 1758 (Family: Bovidae) from Aurangabad district (M. S.), India. The present Cestode i. e. *Stilesia sp.* differs other all known species is having the scolex large, quadrangular in shape, mature proglottids almost seven to eight times broader than long, testes small in size, oval to rounded, two lateral fields, 10-11 in each segment, cirrus pouch oval, ovary large in size, compact, bean shaped, vitelline gland is absent.

**Keywords:** Anaplocephalidea, Aurangabad, *Capra hircus*, India, *Stilesia*

**ICHTHYOFAUNAL FRESH WATER BIODIVERSITY OF TRAI BELT REGION  
DISTRICT LAKHIMPUR KHERI UTTAR PRADESH, INDIA**

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**Abstract:**

India is a mega biodiversity hot spot contributing 11.72% of globe fish biodiversity with (2800) species (marine and fresh water). Total fish production has contributed 1.07% in Gross Domestic Product (GDP) and 5.34% contribution in agricultural GDP. Uttar Pradesh itself have 124 fish species, 74 genera and 28 families and contributed about 14.11% Indian fresh water fish diversity. The present study based on the diversity of Lakhimpur Kheri district. Several species are founded during the survey of local area which included in the 10 order, 21 family and 70 species which are distributed among several water bodies located in the district. The study revealed that biodiversity of fishes was declining due to several anthropogenic and natural activities so it's needed to be conserved with several aspects.

**Keywords:** Fish Biodiversity, Lakhimpur, Fisheries Diversity Conservation.



**QUANTITATIVE ASSESSMENT OF OESOPHAGUS DOSE-VOLUME METRICS IN  
THE RADIOTHERAPY OF BREAST CARCINOMA: A COMPARATIVE  
INVESTIGATION WITH AND WITHOUT OESOPHAGUS BOUNDARY  
CONTOURING**

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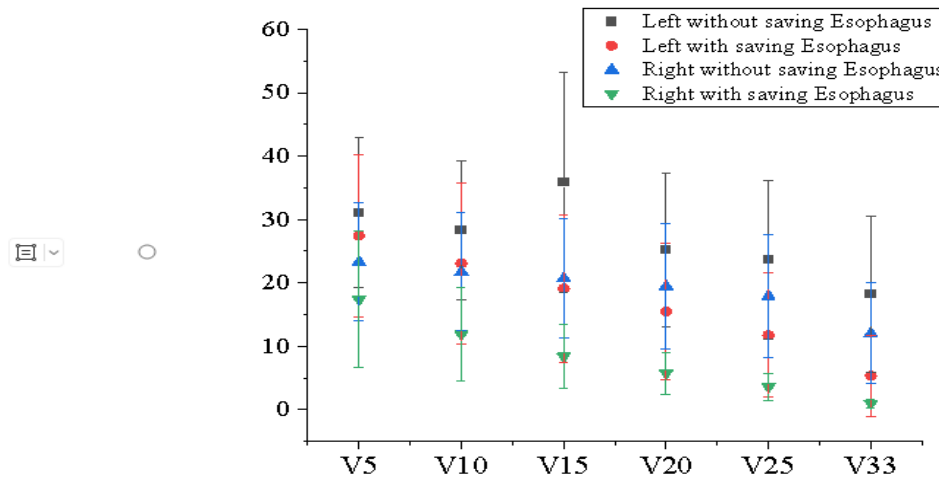
**Abstract:**

**Aim:** Breast cancer holds the unfortunate title of being the widest spread type of cancer in women across the globe. Treatment of Breast cancer can be done by Surgery, Chemotherapy, Radiation therapy, Hormonal therapy & Targeted therapy. Breast cancer management is indisputable with radiotherapy emerging as a pivotal component of the multifaceted treatment approach which involves the targeted irradiation of various areas such as the conserved breast, post mastectomy chest wall, and supraclavicular fossa nodal region. This may increase frequency and severity of acute radiation esophagus during treatment. The aim of this study is to compare dose volume parameters of oesophagus in radiation treatment of breast with and without contouring.

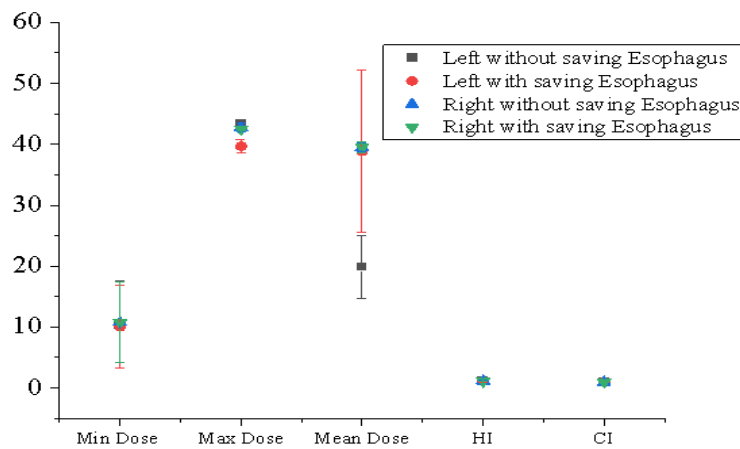
**Material and Methods:** The patients were simulated 16 Slice GE healthcare CT with slice thickness 2.5mm. All patients were on supine position and angulated breast board both arms were elevated and neck were tilted. Treatment plans of 20 patients has done on Monaco Treatment planning system version 6. patients were received 3DCRT at the chest wall along with supraclavicular fossa with a dose of 40Gy in 15 fractions. Oesophagus was later contoured considering oesophagus as an organ at risk and treatment re-planned using 3DCRT. Dosimetric parameters like the maximum dose(Dmax), mean dose(Dmean), Minimum dose(Dmin) the percentage of oesophagus volume receiving  $\geq V5Gy$ ,  $\geq V10Gy$ ,  $\geq V15Gy$ ,  $\geq V20Gy$ ,  $\geq V25Gy$ ,  $\geq V30Gy$ ,  $\geq V33Gy$  and conformity index( $V95/VPTV$ ) where V95 is the volume of the 95% isodose and VPTV volume of the PTV and Homogeneity index( $D5/D95$ ) where D5 is the minimum dose in 5% of PTV and D95 is the minimum dose received by 95% PTV volume were compared with already executed plans in which oesophagus was not contoured.

**Results and Discussion:** The significant difference for the mean dose of Planning Target Volume was not observed in all four cases. However, max dose for left breast with save oesophagus was less as compared to others. In addition, mean dose for left breast without saving

oesophagus was sharply less as compared to others. In the case of left breast, volume covered by 15Gy dose without saving oesophagus (35.8%) was more as compared to with saved oesophagus (19.12%) but in case of right breast, volume covered by 15Gy dose without saving oesophagus (20.72%) was more as compared to with saving oesophagus (8.41%). The maximum change was observed in case of V15 as compared to V5, V10, V20, V25, V33.



**Fig. 1: volume received 5Gy, 10Gy, 15Gy, 20Gy, 25Gy, 33Gy**



**Fig. 2: various parameters such as Min dose, Max dose, Max dose, Homogeneity index, Conformity index for left and right breast in both case with and without save oesophagus**  
**Keywords:** Breast Cancer, Radiation Therapy, Oesophagus dosimetric Parameters and 3DCRT.

## SYNTHESIS OF SILVER NANOPARTICLES (AGNPS) AND ITS TOXICITY ON THE COMMON CARP, *CYPRINUS CARPIO*

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### Abstract:

Among metal nanoparticles, silver nanoparticles (AgNPs) are currently being utilized in various commercial products including health care products like burn dressings, antimicrobial applications and medical devices. AgNPs are used in a number of products viz. cosmetics, textiles, food industry, etc. which is ultimately causing environmental pollution. AgNPs have a very broad range of toxicity, affecting organisms from bacteria to mammals, especially the aquatic life forms. In the current experiment we have chemically synthesized the (AgNPs) of different concentrations viz. 1mM, 3mM and 5mM. Furthermore, UV-Vis spectrometry and Dynamic Light Scattering (DLS) analysis is done for characterizing these nanoparticles. The size of AgNPs synthesised for 1mM, 3mM and 5mM silver nitrate concentration are 44.44 nm, 51.18 nm and 41.92 nm respectively. Similarly, the zeta potential of AgNPs synthesised for 1mM, 3mM and 5mM silver nitrate concentration was found to be -27.4 mV, -21.2 mV and -23.3 mV respectively. These results indicate that there is no effect of silver nitrate concentration on particle size and zeta potential of the synthesised AgNPs. But, with the increase in concentration of AgNPs, increase in the wavelength of absorption maxima is observed. Scanning Electron Microscopy reveals particle size of AgNPs were 20-50 nm. Energy Dispersive X-Ray analysis shows silver is present in highest amount, next nitrogen and oxygen. Further, the toxicity of synthesized AgNPs will be tested against common carp *Cyprinus carpio* at different concentrations which will provide an insight to better understand the impact nanoecotoxicity of AgNPs in *Cyprinus carpio* and also in other aquatic organisms. In previous studies, maximum bioaccumulation of silver nanoparticles was in the liver, followed by the intestine, gills, and muscles of *Cyprinus carpio* exposed to AgNPs. The antioxidant enzyme system of AgNPs treated fish was mostly active in the liver showing liver was the most severely affected organ. Histological analysis of liver showed atrophy of the hepatocyte nucleus and accumulation of eosinophilic granules.

**Keywords:** Silver nanoparticles (AgNPs), chemical synthesis, characterization, toxicity, *Cyprinus carpio*

## **MORPHOLOGICAL CHANGES IN THE PLANT DUE TO TOXIC LEVEL OF IRON**

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### **Abstract:**

Iron (Fe) is an essential micronutrient for plant growth and development, but excessive iron uptake can cause iron toxicity, leading to damage to plant cell membranes, reduced growth, yield, and overall health. Iron is the fourth abundant element in the earth crust. Iron toxicity causes severe morphological and physiological disorders, including reduced germination percentage, interferes with enzymatic activities, nutritional imbalance, membrane damage, and chloroplast ultrastructure. Iron toxicity is a problem that affects crops such as rice, soybean, wheat, vegetables, some pulses and is a common issue in Southeast Asia, Brazil, Africa, Australia, and the United States. Iron toxicity is more likely to occur in soils with high pH, high organic matter, or elevated levels of available iron. Iron can be toxic at high concentrations. To cope with iron excess, plants have evolved complex adaptive responses that include morphological and physiological modifications. The highly dynamic adjustments in overall root system architecture (RSA) determine root plasticity and allow plants to efficiently adapt to environmental constraints. However, the effects of Fe excess on RSA are poorly understood. Free iron in cells can disrupt the cell redox balance toward a pro-oxidant state, generating oxidative stress. Classic symptoms of iron toxicity are leaf discoloration (bronzing) and a stunted root system. To cope with, and survive, adverse iron-toxic soil conditions and excessive iron accumulation in tissue, plants have evolved morphological and physiological avoidance and/or tolerance strategies. These include restricting excessive iron absorption at the root level, immobilization of active iron that entered the tissues in "dumping sites, ". One of the most effective ways is to modify soil conditions by adjusting the pH or adding organic matter, such as compost or manure, to the soil. Soil testing and assessment of specific soil conditions are important to determine the appropriate remedial measures for mitigating iron toxicity. Another strategy is to use iron-tolerant plant species, which have developed mechanisms to withstand high levels of iron in their environment. Other methods include chelation, limiting waterlogging, and using iron-efficient cultivars.

**Keywords:** Iron toxicity; cell membrane; yield; reducing growth; root system architecture.

**RECENT ADVANCES IN INDAZOLE-BASED DERIVATIVES OF VEGFR-2 KINASE  
INHIBITORS AS AN ANTI-CANCER AGENT**

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**Abstract:**

Cancer is a leading cause of death worldwide, accounting for nearly 10 million deaths in 2020. Cancer continues increasing a serious threat to a people health. Cancer is the uncontrolled growth of abnormal cells in the body, cancer develops when the body's normal control mechanism stops working. Many anti-cancer agents have been developed in recent year but survival rate does not satisfy. Therefore, through many efforts to develop novel anti-cancer agents to cover up for deficiency. Indazole is class of heterocyclic bioactive compounds, making structural modification on active indazole derivatives giving a variety of biological activities such as anti-depressant and antitumor anti-bacterial, anti-inflammatory, anti- hypertensive. These study through various literature focus on recent research of indazole derivatives as an anti-cancer will be useful for further development of Indazole base derivatives with new scaffold and high potency as anti-cancer agent. Recently many efforts have been taken for the development of indazole derivatives as vascular endothelial growth factor-2 (VEGFR-2) kinase inhibitors give good anti-tumor activities. Vascular endothelial growth factor-2 plays a role in tumor angiogenesis. Newly synthesized 2-(4-(1H-indazol-6-yl)-1H-pyrazol-1-yl) acetamide derivatives were designed as VEGFR-2 inhibitors based on scaffold hopping strategy. These compounds exhibited the excellent inhibitory in both VEGFR-2 and tumor cells proliferation. A novel VEGFR-2 inhibitor CHMFL-VEGFR2-002 showed high selectivity among structurally closed kinases including PDGFRs, FGFRs, CSF1R etc. CHMFL-VEGFR-2-002 given potent inhibitory activity against VEGFR-2 kinase. CHMFL-VEGRF-2-002 as a research tool for developing new function of VEGFR-2 kinase as well as a potential antiangiogenetic agent for the cancer therapy.

**Keywords:** Anti-cancer, Angiogenesis, Bioactive compounds, Biological activities, Cancer, indazole, VEGFR2 kinase inhibitor.

**THE ROLE OF LAMBDA AND GAMMA DISCRIMINANT PARAMETERS IN TIME  
SERIES METADATA OF ENVIRONMENT PROFILING**

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**Abstract:**

In riverine environments, the intricate relationship between soil and water quality plays a pivotal role in shaping the diversity of fish species across various river landscapes. The Ganga River system, a lifeline for millions of riverine communities and home to more than 300 unique freshwater fish species, is a prime example of this interdependence. Our study delves into a comprehensive profiling of the Ganga River, aimed at unravelling the complex dynamics of water quality, distribution, movement, and ecological interactions within this vital riverine ecosystem. To achieve this, we gathered secondary data from various published sources, focusing on three key landscapes within the Ganga River basin: Allahabad, Kanpur, and Varanasi. This dataset spanned the years 1960 to 2019 and encompassed a wide array of water quality parameters, including temperature (°C), pH, total dissolved solids (mg/l), electrical conductivity (mhos/cm), sulphate (mg/l), phosphate (mg/l), alkalinity (mg/l), chloride (mg/l), total hardness (mg/l), nitrate (mg/l), dissolved oxygen (mg/l), biological oxygen demand (mg/l), and chemical oxygen demand (mg/l). Our rigorous statistical analysis revealed significant variations across these environmental parameters within the three landscapes. Notably, temperature, pH, phosphate, alkalinity, total hardness, dissolved oxygen, and biological oxygen demand emerged as crucial factors impacting the riverine ecosystem's health. Employing Welch-ANOVA and Games-Howell tests for non-homogeneous variance and multiple comparisons, respectively, we unveiled these pivotal influences. Furthermore, our study employed the Shapiro-Wilk W statistic to establish the normality of these environmental parameters, identifying nine as significantly normally distributed ( $p < 0.05$ ). Leveraging linear discriminant function analysis with regularised Lambda and Gamma functions, we uncovered that a Lambda and Gamma value 1 offered the most ideal and highest likelihood percentages among the three landscapes. This study demonstrates that each selected landscape exhibits distinct environmental parameter distributions, contributing to their unique profiles and ability to support fish diversity in diverse ways. These findings hold immense value for policymakers, providing essential insights to aid in conserving and managing the Ganga River landscape's rich biodiversity.

**Keywords:** Ganga River, Landscape analysis, Water environment profiling, Discriminant analysis, Metadata analysis



## GANGA AQUARIUM: EXPANDING KNOWLEDGE ON FISH DIVERSITY AND CONSERVATION THROUGH STAKEHOLDER

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### Abstract:

Public aquarium is the place, specially designed to attract the general people where diverse aquatic fauna is demonstrated to make them aware of the importance of life below water. The first public aquarium was open in Regent's Park, London, in 1853 since then number of public aquariums has grown with the aim of aesthetic, educational, entertainment, research and conservation. Among several public aquarium across the world, Ganga aquarium of ICAR-National Bureau of Fish Genetic Resources (ICAR-NBFGR) is one of the most attractive aquariums of India situated at Lucknow, Uttar Pradesh. Apart from the entertainment and education, the main objective of the Ganga Aquarium is to make the general public aware in respect of ornamental fish biodiversity and conservation. A total of 47 aquaria with 65 fish species belonging to 30 families are exhibited in the aquarium gallery which is equipped with an aquatic life support system required for creating the conducive environment under captivity. Digital displays along with each fish tank represent taxonomic and other biological information about fish to enhance environmental awareness and encouraging people to adopt environmentally responsible behaviour. Exhibited fishes in the gallery include 65% freshwater, 25% marine, 4% brackish and 6% living in both brackish and freshwater fishes. Cyprinidae is the most dominant family, contributing 23.08% among all total fish species. According to IUCN (2023) status, 61.54% fishes displayed are least concern, 6.15% are vulnerable, 4.62% are threatened and 3.08% are endangered, 3.08% are critically endangered, 3.08% are threatened and the conservation status of 18.46% of fishes are not evaluated. Among all the species demonstrated in the Ganga aquarium, 66.15% belong to indigenous and 33.85% are exotic fishes. About 10000-12000 people including school students, farmers, graduate and postgraduate students, women and tourists visited this facility every year and connects themselves to aquatic environments. Thus, the aesthetic environment of Ganga aquarium with the diverse aquatic ornaments support tourism and promotes a Government initiative of *Mission Ornamental* by sensitizing the people especially unemployed youth, fishermen, fisheries entrepreneurs, women, and fish farmers about the ornamental fish as a livelihood option and playing an important role to aware the common citizen towards the importance of fish diversity and their conservation.

**Keywords:** Public aquarium, Fish diversity, conservation, awareness

## **SPICES: USES, THEIR SIGNIFICANCE IN HEALTH AND WELL-BEING**

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### **Abstract:**

The COVID-19 pandemic, which swept across the globe, prompted unprecedented challenges to public health. While vaccines and preventive measures have taken center stage, emerging research highlights the potential role of spices in supporting overall health and immune function during these trying times. This abstract delves into the importance of spices during the COVID-19 pandemic and their potential benefits. Spices have long been celebrated for their culinary contributions, flavor-enhancing properties, and cultural significance. However, recent scientific investigations have revealed that many spices possess bioactive compounds with remarkable health-promoting attributes. Several spices, including turmeric, ginger, garlic, cinnamon, and black cumin, have demonstrated immunomodulatory and anti-inflammatory properties. Curcumin, the active ingredient in turmeric, has been extensively studied for its antioxidant and anti-inflammatory effects. It may help reduce the severity of respiratory symptoms and enhance immune response. With its anti-inflammatory and anti-viral properties, Ginger has gained attention for its potential to alleviate respiratory distress and gastrointestinal symptoms commonly associated with COVID-19. Garlic, renowned for its immune-boosting qualities, has been investigated for its potential to enhance immunity and reduce the risk of respiratory infections. Cinnamon, rich in antioxidants, may help combat oxidative stress and inflammation, while black cumin, with its immunomodulatory properties, has been studied for its potential to strengthen the immune system. Beyond their immunological benefits, spices have played a role in promoting mental and emotional well-being during the pandemic. The sensory pleasures of consuming flavorful, aromatic foods seasoned with these spices have offered comfort and joy during a challenging period of isolation. Moreover, spices have played a crucial role in traditional medicine systems, where they have been used for centuries to support overall health and prevent illness. Integrating these spices into one's daily diet, has been considered a proactive step toward safeguarding health. In conclusion, spices have emerged as valuable allies in the battle against the COVID-19 pandemic. While not a replacement for medical guidance, their immunomodulatory, anti-inflammatory, and mental health-supporting properties make them an intriguing subject of study and a flavorful addition to our daily lives. Embracing the use of spices may offer a holistic approach to health and well-being during these unprecedented times and beyond, fostering resilience and vitality in the face of adversity.

**Keywords:** Spices, immunomodulatory, anti-inflammatory, anti-viral, antioxidant.

## MILLETS: HUMBLE YET HEALTHY GRAINS- ALTERNATIVE FOR SUSTAINABLE AGRICULTURE AND HEALTHY LIFE

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### Abstract:

The millets have gained popularity due to their health, environment and economic benefits. They are good for health as they are nutrient (minerals- Calcium, Magnesium, Zinc, Iron, Manganese, Phosphorus, Potassium; vitamins- A and B) and fiber rich, all of which provide them with anti-inflammatory, antibacterial and antioxidant properties. With zero gluten and lower glycemic index (than many other grains) they are very beneficial for diabetics. It is also believed to be beneficial for our heart, liver, digestive system and immune system. Due to these numerous benefits, they are also termed as superfoods. They are environment friendly and hardy crops as they are drought resistant and can be grown on marginal and arid lands, with low amount of fertilizers. Millets are C4 plants which have high-water use efficiency and can be grown as summer crop in high temperatures. Pearl millet (bajra) has the highest yield potential of all millets under drought and heat stress. The millets are economical as they require less investment, are fast growing plants that can fetch good returns with their increasing popularity not only with the masses but also the classes.

Millets are of various kinds. In India, millets also known as 'Shree ann' commonly include barnyard millet, pearl millet, finger millet, common or proso millet, foxtail millet, little millet, kodo millet, buckwheat and sorghum millet. These different millet species belong to the family Poaceae and can be broadly divided into two categories viz., pearl millet and "small" millets. Pearl millet (*Pennisetum* spp) ('bajra'), is the most widely grown of all millets. Finger millet (*Eleusine coracana*), (ragi), is rich in protein and helps to prevent malnutrition. Proso or Common millet (*Panicum miliaceum*) (proso bajra) is rich in Magnesium. Foxtail millet (*Setaria italica*), (kagani), is rich in Vit B12. It is the highest grown millet. Barnyard millet (*Echinochloa crusgalli*, *E. colona*), (sanwa), requires removal of husk layer for human consumption, and Kodo millet (*Paspalum scrobiculatum*), (kodo), both are rich in Iron. Little millet (*Panicum sumatrense*) (kutki), widely grown in India, has nutty flavor and is rich in Potassium and

Magnesium. Sorghum millet (*Sorghum bicolor*) (jowar) is considered as king of millets. Buckwheat (*Fagopyrum esculentum*) (kuttu), a popular fasting diet ingredient in India, has also been included in category of millets, although it is a pseudocereal and it belongs to family Polygonaceae. Besides this there are other species, more common outside India are Jobs tears (*Coix lachryma-jobi*), Teff (*Eragrostis tef*) is White fonio (*Digitaria exilis*), Black fonio (*Digitaria iburua*), and Guinea millet (*Brachiaria deflexa*).

With changing fast pace of life, one has to really work upon the food habits to maintain a healthy body and mind. Along with that there is a bigger challenge of climate change to combat that requires immediate attention. Going back to the roots is the key to meet these challenges. With millets- the ancient grains, we are going back to basics aiming towards healthy life and sustainable agriculture and development. The millets have been a part of our diet since ancient times but had taken a backseat due to preferred cultivation of rice and wheat. Millets are now fast gaining popularity once again all around the world owing to India's efforts on the global front. At the behest of the Government of India, with the aim to creating awareness and increasing production & consumption of millets, United Nations declared 2023 as the 'International Year of Millets'.

**Keywords:** Millets, Sustainable Agriculture, Shree Ann, Superfoods, Dietary Fiber

**THE STUDY ON PHYTOPLANKTON DIVERSITY AND THEIR SEASONAL  
VARIATION OF FRESHWATER LAKE OF KARIMNAGAR DISTRICT,  
TELANGANA STATE, INDIA**

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**Abstract:**

Phytoplankton is an important base of freshwater ecosystem and also performs a major role in the production of organic matter. The presence of phytoplankton in any water body can lead to productive and sustainability of that water body. The main aim of the present study was to explore the phytoplankton from Mulukanoor Freshwater Lake, study the diversity pattern and assess quality of the lake. In the present study was carried out of one year from June 2015 to May 2016. A total number of 25 species were recorded. The phytoplankton diversity study provided several new data with many of the phytoplankton taxa being recorded for the first time in study site, such as 10 species among the Chlorophyceae, 6 species of the Cyanophyceae, 4 species of the Euglenophyceae and 5 species of the Bacillariophyceae. The present observations revealed that Chlorophyceae species were dominant followed by Cyano phyceae, followed by Euglenophyceae and Bacillariophyceae were observed during the study period. There were percentage of Chorophyceae (37%), Cyanophyceae (24%), Euglenophyceae (21%) and Bacillariophyceae (18%).

**Keywords:** Mulukanoor Freshwater Lake, Phytoplankton Diversity, Seasonal Variation.

**CYTOGENETIC ANALYSIS OF PLOIDY IN SNOW TROUT *SCHIZOTHORAX RICHARDSONII***

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**Abstract:**

Triploid fish are excellent models for use in commercial scale because they can show higher rates of growth, carcass yield and meat quality. In the present study, we evaluated the triploidy induction efficiency (pressure shocks) in the fish Snow trout *Schizothorax richardsonii*, the most important coldwater species used for aquaculture. There are several methods for ploidy determination of fish those have been developed by many researchers until to date. For these methods, the cost and the applicability of each stage of fish development are very important. The aim of this study was to confirm triploidy induction through the chromosome analysis between diploid and triploid snow trout at the fry stages. The analysis of 50 metaphase plates of each groups revealed the chromosome number in diploid and triploid *S. richardsonii* were  $2n=98$  and  $3n=147$ , respectively, that were selected from the well-spread metaphase chromosomes.

**Keywords:** Triploidy, chromosomes, snow trout, pressure shock

**CONTEMPORARY APPLICATIONS OF SCIENCE IN ADVANCING THE FISHERIES  
SECTOR: A COMPREHENSIVE REVIEW**

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**Abstract:**

The fisheries sector plays a vital role in global food security and economic stability. In recent decades, the integration of scientific advances has significantly changed various aspects of fisheries management, aquaculture and resource conservation. This comprehensive review explores the contemporary applications of various scientific disciplines in advancing the fisheries sector. The review begins by examining the role of advanced technologies such as remote sensing, GIS and underwater robotics in improving fisheries monitoring and management. These tools enable real-time data collection, enhancing our understanding of marine ecosystems and supporting informed decision-making processes. Additionally, the application of genetic and molecular techniques in fisheries science has revolutionized stock assessment, conservation efforts, and selective breeding programs. It further delves into the integration of artificial intelligence and machine learning algorithms for data analysis, prediction modeling, and decision support systems, providing a more accurate and timely understanding of fish stock dynamics. Additionally, the review highlights the role of molecular techniques in combating illegal, unreported and unregulated (IUU) fishing activities, thereby ensuring a more transparent and accountable fishing industry. In the context of climate change scientific advances contribute to assessing the impact of changing environmental conditions on fish populations, ecosystems and communities dependent on fisheries. The incorporation of climate models and predictive tools helps develop adaptive strategies for sustainable fisheries management. In conclusion, diverse applications of science besides the present will provide a comprehensive understanding and methods for sustainable fisheries in the future. By taking these scientific advancements, stakeholders can tackle the complex challenges facing the fisheries sector and work towards promoting resilience, equity and environmental stewardship.

**Keywords:** Fisheries sector, Contemporary, Scientific advances, Aquaculture, Conservation, sustainable

**ANTI-FUNGAL POTENTIAL OF PHYTOCHEMICALS PRESENT IN MANGIFERA  
INDICA: AN IN-SILICO APPROACH**

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**Abstract:**

Every year, fungal pathogens cause at least 13 million infections and 1.5 million deaths worldwide, mostly in those with compromised immune systems. Multiple fungus with pathogenic activities has been identified and multiple researches have been performed but the current treatment strategies have shown some side effects and toxicities. So, to combat these current issues, the natural products can be good option. Herein, this study aimed to assess the phytochemicals from *Mangifera indica* as potential antifungal agent, using molecular docking methods. The docking study was performed by using PyRx software on two proteins, Crystal structure of sterol 14-alpha demethylase (CYP51B) from a pathogenic filamentous fungus *Aspergillus fumigatus* (PDB: 5frb) and Nucleoside Diphosphate Kinase (NDK) from *Aspergillus Flavus* (PDB ID: 6k3h). The results demonstrate the effectiveness of this screening strategy especially in case of pathogenic fungus. The results revealed that Mangiferin (- 8.2 to - 8.8 kcal/mol) has a strong potential for both pathogenic fungus model. Toxicity prediction performed by ProTox II software indicated all the compounds especially Mangiferin is having class 5-6 level toxicity with high LD50 values. MolPredictX predicted effectiveness of Mangiferin in various fungal enzyme. So, compounds from *Mangifera indica* especially Mangiferin can evolve as a promising anti-fungal drug in the future.

**Keywords:** *Mangifera indica*; Molecular docking; Antifungal; Toxicity prediction



**REPLACING FISHMEAL WITH PLANT BASED DIETS FOR FRESHWATER FISH,  
*CYPRINUS CARPIO***

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**Abstract:**

The aim of this study was to investigate the impact of replacing fish meal with varying levels of *Gliricidia maculata* plant leaf protein on growth performance, feed utilization, and digestive enzyme activity in freshwater fish, *Cyprinus carpio*. Seven experimental diets were used, each containing different levels of *G. maculata* protein source. The proportions of plant leaf powder used were 20%, 30%, 40%, 50%, 60%, and 70%. The control diet did not contain any plant powder. *C. carpio*, with a mean initial weight of  $2.3 \pm 0.05$  g, were fed the experimental diets for 120 days. The findings indicate that 40% replacement of fish meal with *G. maculata* plant protein resulted in the highest growth performance. However, replacing 70% of fish meal significantly decreased growth, feed utilization, and digestive enzyme activity in comparison to the control.

**Key words:** *Gliricidia maculata*, Plant Protein Source; Growth; Digestive enzyme activity; *Cyprinus carpio*

## **NUTRITION DIET FOR ORNAMENTAL FISH**

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### **Abstract:**

The knowledge of nutritional requirements in ornamental fish species is essential to improve the productive development; However, ornamental fish are most popular pets in the United States, and 95% of domestically produced fish originate from Florida. In ornamental fish, a correct formulation of the diet improves the nutrition digestibility and supply the metabolic needs, reducing the maintenance cost and at the same time the water pollution. Inert food such as meal powder, wheat gluten, fish oil, shrimp, soyabean, dextrin, egg white, beef heart meal, rice brain, corn, pregelatinized potato starch, as well as live food including *Artemia* sp., rotifers and *Moina* have been used extensively in ornamental fish feeding with a diverse range of nutritional values and productive properties. There are some vitamins are also used in ornamental fishes like, Vitamin-A (1600IU), Vitamin-D3 (100IU), Vitamin-B1 (1mg), Vitamin-B2 (1mg), Vitamin-B6 (0.5mg), Vitamin 12 (0.5mcg), Vitamin-C (2.5mg), Folic Acid (50mcg). The production and trade of ornamental fishes, the nutritional information these fishes are few or even no data is available in contrast with farmed fish, skin pigmentation is a mandatory characteristic in ornamental fish and the use of dietary supplement 's with carotenoids is recommended. The specific nutritional information for these fishes is few or even no data is available. In site we respect and write the review of same article on ornamentals fishes which are indispensable to improve economical and productive capacity of freshwater ornaments fishes.

**Keywords:** Carotenoids, Energy, Lipid, Nutritional Feed for Ornamental Fishes, Vitamins, Protein.

## **APPLICATION OF MACHINE LEARNING AND ARTIFICIAL INTELLIGENCE IN AQUACULTURE AND FISHERIES**

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### **Abstract:**

Aquaculture and fisheries has become one of the fastest growing industries in global food production, provides a source of high-quality protein for humans which contributes around 88% of aquatic production in worldwide. To mitigate protein hunger for world population, global aquaculture production will have to increase triple fold in the next decade. Thus, the pressure of global fisheries will also continue to increase. To address that condition the intensification of aquaculture need to be done in sustainable manner. Blooming of automation and intelligent technology had achieved gradual development of aquaculture towards an intensive and sustainable aquaculture system, which has appreciably improved the efficiency of aquaculture. Intensification of aquaculture has also led to numerous problems, such as fish feeding, disease, and water pollution, etc., which will be committed to solving the problems in fisheries development and improving aquaculture productivity by artificial intelligence and by machine learning as part of the third green revolution. Combined with high performance computers, machine learning technology can mine high-dimensional features and depth information in data, thereby offering a solution for intelligent aquaculture, and introducing the fishery industry into a new era. With the rapid advancement in machine learning and artificial intelligence technologies, there is immense potential for their application in various aspects of aquaculture. This chapter explores the diverse applications of machine learning and AI technologies in aquaculture, highlighting their contributions to improving production efficiency, optimizing resource management, enhancing disease diagnosis and prevention, and supporting decision making processes.

**Keywords:** Machine learning, artificial intelligence, sustainable aquaculture, intensification

## **BRYOPHYTES AS POLLUTION DETECTORS: STUDYING THEIR ROLE IN ASSESSING ENVIRONMENTAL CONTAMINATION**

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### **Abstract:**

Bryophytes are excellent indicators of air pollution due to their adaptability, simple structure, ability to grow quickly, and their capacity to accumulate metals. Their use in pollution studies is valuable. Bryophytes are green land plants that lack a vascular system and are both morphologically and anatomically simple. The growth potential in bryophytes is not as highly polarized as that in vascular plants. Bryophytes can be found growing in a variety of habitats, particularly in moist places, such as on soil, rocks, tree trunks, branches, and fallen logs. Air pollution, primarily caused by gaseous and particulate pollutants, can lead to the decline and absence of bryophyte populations, especially epiphytes. Bryophytes have the remarkable ability to absorb a significant amount of nutrients through their surfaces, yet their role in nutrient cycling often goes overlooked. In certain extreme environments, bryophytes play a crucial role as primary producers. Among them, *Sphagnum moss* stands out with its substantial biomass, potentially serving as a significant carbon reservoir. This Abstract: summarizes the pivotal role of bryophytes in evaluating pollution levels in various ecosystems. Their sensitivity to changes in their surroundings makes them ideal candidates for monitoring environmental health. Research conducted in this field indicates that bryophytes not only act as passive indicators of contamination but also actively respond to stress by displaying physiological and biochemical changes. These changes encompass alterations in their morphology, growth rates, and the accumulation of specific biomarkers, providing valuable insights into the severity and nature of environmental pollution. Bryophyte communities have provided essential data for mapping pollution gradients and identifying potential pollution sources through their spatial distribution across various ecosystems, including urban areas, industrial sites, and remote wilderness. Their ability to accumulate pollutants over time has also proven valuable for historical contamination assessment. Furthermore, we highlight the potential limitations and challenges in bryophyte-based pollution detection, such as species-specific responses and variations in environmental conditions. In conclusion, bryophytes play a crucial role in assessing environmental contamination and enhancing our understanding of its effects on ecosystems and human health. Their unique bioaccumulative capabilities and sensitivity to pollutants position them as indispensable tools in the field of environmental science

**Keyword:** Bryophytes, Pollution detection, Carbon reservoir, Sphagnum moss, Mitigation strategies.

## **ALGAE: BENEFICIAL USES FOR PEOPLE AND ANIMALS**

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### **Abstract:**

Algae, a diverse group of aquatic organisms, are incredibly beneficial for both people and animals. These simple plants play a vital role in our lives in various ways. For humans, algae are a great source of nutrition. They are used in making food supplements and are packed with essential vitamins and minerals. Also, they're used in everyday items like toothpaste, ice cream, and even in some medicines. Algae are incredibly important for our environment too. They help clean the air by absorbing carbon dioxide and producing oxygen, just like trees do. In oceans, they provide food and shelter for many marine creatures, supporting the whole underwater ecosystem. Additionally, algae are used in the production of biofuels, which are an eco-friendly alternative to traditional fuels. For animals, algae play a critical role in the food chain. They're a primary food source for many small marine animals and fish. This means that algae indirectly support larger animals, including the ones we might love, like whales and dolphins. Algae also contribute to maintaining the health of the oceans by creating a balanced and sustainable environment for all aquatic life. Overall, algae are super helpful for humans and animals. They provide essential nutrients, support the environment by producing oxygen, serve as a food source, and even offer alternative fuel options. Their significance in our lives, from nutrition to the health of our planet, is remarkable.

**Keywords:** Algae, Aquatic, Biofuels, Eco-friendly, Sustainable

## **SHORT DURATION NUTRITION RICH BIOFORTIFIED COWPEA VARIETIES FOR HIGH IRON, ZINC AND PROTEIN AND VARIOUS USES OF COWPEA**

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### **Abstract:**

Cowpea is an important food legume and a major source of dietary protein and minerals of the world. Short-duration cowpea is a wonder crop which gives 2-3 crops a year between February and October and fits well in multiple systems. It can be sown singly between the time gap of two main crops or as an intercrop with other crops like wheat-rice and maize-sugarcane, etc. It is a dual-purpose crop whose pods can be used as vegetable and grain as daal or processed in different nutritious products which are rich in zinc, iron and some other nutrients. Vitamin A and C and polyphenols in cowpeas have antioxidant properties, which reduce inflammation and the risk of chronic diseases, such as cardiovascular diseases, diabetes, and certain cancers. They also encourage collagen synthesis, which improves skin repair, reduces age-related signs, and enhances the glow. As malnutrition is spreading day by day at the cost of declining per capita availability of proteins due to well adopted 'wheat-rice' and 'rice-rice' cropping systems and legumes remained as an option for marginal land holders only. So, there is urgency and challenge to agricultural research in India to produce ample amount of legumes which is going to be a rich source of vegetarian's dietary proteins in near future. The only way to make the space of cowpea in the well adopted cropping systems is to develop short duration and high yielding cultivars of cowpea which can occupy the field from March to June *i. e.* after harvesting of wheat and before transplanting of rice. Six photo-insensitive and heat tolerant short duration cowpea varieties were recently developed by Pantnagar University. These varieties are Pant Lobia-1 (white seed), Pant Lobia-2 (red seed), Pant Lobia-3 (brown seed), Pant Lobia-4 (white seed) Pant Lobia-5 (brown seed) and Pant Lobia-7 (black & white). Apart from all the benefits of cowpea, a series of food products have been made by cowpea such as akara, bhujia, dahi bara, laddoo, biscuits, boondi, cake, curry, mathary, sev and papad.

**Keywords:** Antioxidant, Biofortification, Malnutrition, Chronic Disease

## BACTERIA AS BIOCONTROL AGENT FOR THE CONTROL OF PLANT DISEASE SYSTEM

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### Abstract:

Bacteria as biocontrol agents term given by first used by Harry Scott Smith. biocontrol agents are used in both entomology and plants pathology to reduce the growth of microbes, predatory insects, entomopathogenic nematods. Biological control is an effective and sustainable alternative or compliment conventional pesticides for fungal and bacterial plant disease management. Some of the most intensively studied biological control agents are bacteria that can use multiple mechanism implicated in the limitation of plant disease development and several bacteria-based products have been already registered and marked as biopesticides. *Bacillus Thuringiensis* which is often referred to as BT is a microbial biocontrol agent. The Biocontrol agent parasitizes the pathogen by coiling around the hyphae. It is one of the best biocontrol agents as when humans spray them on the plants, the fluid fills the spores of the plants and kills the caterpillars. The biological control strain *Agrobacterium rhizogenes* K84 is an effective agent in the control of *Agrobacterium* pathogens, the causative agents of crown gall disease. A number of factors are thought to play a role in the control process, including production of the specific agrocins 84 and 434, which differ in the spectra of pathogenic strains that they inhibit in vitro. *Bacillus* species are rod-shaped, endospore-forming aerobic or facultatively anaerobic, Grampositive bacteria in some species cultures may turn Gram-negative with age. The many species of the genus exhibit a wide range of physiologic abilities that allow them to live in every natural environment. *Xanthomonas* species produce an edible polysaccharide called xanthan gum that has a wide range of industrial uses, including foods, petroleum products, and cosmetics. Xanthan also plays role in the disease cycle of *Xanthomonas*.

**Keywords:** Bacterial biological Control agent, Bacterial and fungal plant diseases, Screening improvement



**BOTANICAL BOUNTY: EXPLORING THE DIVERSE DIMENSIONS OF MEDICINAL AND AROMATIC PLANTS FOR HUMAN AND ANIMAL HEALTH, CONSERVATION, AND FUTURE PROSPECTS**

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**Abstract:**

Medicinal and aromatic plants (MAPs) have been integral to human civilization for centuries, offering a rich source of therapeutic compounds and aromatic essences. Recent research has unveiled the diverse uses of MAPs in benefiting human health and well-being, as well as their significance in animal welfare. This Abstract: provides an in-depth analysis of the latest findings on the utilization of MAPs, their applications in human and animal health, and the pressing need for conservation as many species face endangerment due to various factors. The multifaceted uses of MAPs in human health constitute a substantial body of research. Their pharmacological properties, often derived from bioactive compounds, have demonstrated potential in treating a spectrum of ailments, ranging from common colds to chronic illnesses. Moreover, the application of MAPs in complementary and alternative medicine has gained traction, exemplifying their significance in holistic healthcare practices. MAPs also contribute to the fragrance and flavor industries, enriching our sensory experiences and catering to various cultural and commercial needs. An aspect less explored, yet increasingly relevant, is the role of MAPs in animal health and welfare. Studies have indicated the effectiveness of certain plants in treating animal diseases and enhancing livestock health. The use of aromatic plants in animal husbandry not only aids in disease prevention but also influences behavior and stress reduction, promoting overall well-being in various species. However, the proliferation of human activities and environmental changes has severely impacted MAPs, leading to habitat loss, overharvesting, and climate alterations that threaten the existence of many species. This abstract highlights the initiatives taken in conservation efforts, emphasizing the importance of preserving biodiversity, protecting traditional knowledge, and promoting cultivation techniques that minimize the strain on wild populations. The prospects of MAPs are intertwined with advancements in biotechnology, agroforestry, and ethnobotanical research. Harnessing technological innovations and interdisciplinary approaches can contribute to the sustainable utilization and conservation of MAPs. Integrating traditional knowledge with modern scientific methods can lead to the discovery of new therapeutic compounds and innovative applications, ensuring the continuity of this invaluable resource. In conclusion, this abstract underscore the critical importance of medicinal and aromatic plants in human and animal health, the necessity for their conservation, and the promising prospects through a blend of traditional wisdom and contemporary scientific advancements. The comprehensive exploration of MAPs provides a foundation for further research, urging concerted efforts towards their preservation and sustainable utilization for the betterment of both human and animal life.

**Keywords:** MAPs, Therapeutic, Pharmacological, Ethnobotanical, Conservation



## **DIABETIC NEUROPATHY: NEW STRATEGIES FOR TREATMENT**

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### **Abstract:**

Diabetes frequently results in diabetic neuropathy (DN), a common complication that is growing more and more concerning as the disease's prevalence rises quickly. Distal symmetrical polyneuropathy, or just DN, is the most common and well-researched type of DN. In addition to being a significant risk factor for Charcot neuropathic osteoarthropathy and diabetic foot ulceration, which are linked to high rates of lower limb amputation and mortality, it can cause a wide range of sensorimotor and psychosocial symptoms. Because of this, DN prevention and management are crucial, and clinical guidelines suggest a number of approaches for these based on the best available data. When treating common diseases like neuropathy, cancer therapy, heart disease, and gene therapy, smart drug delivery systems are highly popular. The most prevalent long-term diabetic complication that is specifically linked to peripheral nerve fiber loss is neuropathy. Diabetic neuropathy is largely influenced by hyperglycemia, insulin insufficiency, and dyslipidemia in its development and progression. Diabetes causes neurodegenerative changes in neural tissue as a result of multiple metabolic disruptions, including altered protein kinase C, elevated polyol pathway activity, oxidative stress, the formation of advanced glycation and lipoxidation end products, and various pro-inflammatory changes. The symptoms of diabetic neuropathy can only partially be relieved by therapeutic interventions targeting these metabolic pathways. The most prevalent illness that causes neuropathy globally is diabetes mellitus (DM). Although our understanding of the clinical manifestations of diabetic neuropathy has increased over the past century, we still don't know enough about the pathophysiology of neuropathy. In the absence of other peripheral neuropathy factors, diabetic neuropathy is defined as a peripheral neuropathy that can develop in the DM ground and manifest at both the clinical and subclinical levels. Although 10% of diabetic patients have neuropathy at the time of diagnosis, this percentage rises to 50% after 20 years. According to certain studies, neuropathy develops nine years after Type 2 diabetes is diagnosed. Signs related to the somatic and/or autonomic components of the peripheral nervous system may be present. The pathogenicity of diabetic neuropathy includes metabolic factors, increased glycosylation end products, oxidative stress, vascular hypotheses, immunological mechanisms, and neuropathic factors. The current therapeutic strategies in diabetic neuropathy include DPP-4 inhibitors (Cannabinoid CB1 receptor antagonist, Natural products).

**Keywords:** Diabetic Neuropathy, pathogenesis, DPP-4, Metabolic pathway.

## **THE VERSATILE USES AND IMPORTANCE OF ESSENTIAL OIL FOR HUMAN AND ANIMALS**

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### **Abstract:**

Essential oils are highly aromatic extracts derived from various plants, including flowers, leaves, stems, roots, and more. Because of their wonderful therapeutic and aromatic capabilities, people have been using them for a variety of purposes. They have been used for thousands of years in various cultures for medicinal and health purposes. Different types of essential oils are Lavender oil, Tea tree oil, Peppermint oil, Rosemary oil, and many more. This Abstract: examines the various applications and significance of essential oils for people and animals. Some of the medicinal health benefits associated with essential oils in this area like aromatherapy, skincare, holistic medicine, immune support, hair care, and dental health. Essential oils can be used by humans are boost mood, improve job performance, improve sleep, kill bacteria, fungi, and viruses, reduce anxiety and pain, reduce inflammation, reduce headaches, treat fungal infections, reduce depression, anxiety, cancer, and wounds. Animal essential oils can be used by animals that repel pests like fleas and ticks, promote healthy skin, and treat dry, itchy skin. Both humans and animals can benefit from the many uses and advantages of essential oils. Their many uses include cleaning, pest management, boosting physical health, and fostering mental and relaxation well-being. Since some essential oils can be poisonous to particular species, it's important to use them with caution and make sure they're safe for the animals you intend to use them on. It is advised to seek the advice of a licensed veterinarian or aromatherapist to maximize their many applications while guaranteeing safety.

**Keywords:** Aromatic, Essential oil, Medicinal, Aromatherapy, Anxiety

**EFFECT OF LATEX OF *Calotropis procera* ON *Brassica campestris* VARIETY  
PUSA MUSTARD-28**

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**Abstract:**

The latex of the *Calotropis procera* plant has many pharmacological properties. *Calotropis* commonly known as 'Madar' is a medicinal plant. It is very famous for the name milkweed as it contains latex in its leaves and stems. Milk comes out from the branches of *Calotropis procera*. That milk acts as a poison. Aak occurs on sandy soil during summer. It dries up when it rains during the rainy season. Natural latex is a milky white liquid from the *Hevea Brasiliensis* tree, also known as the rubber tree. The latex is extracted from the rubber tree's milky sap. The rubber tree is native to South America but was spread worldwide in the 19<sup>th</sup> century. Today, rubber trees are mainly found in the tropics of Southeast Asia and Africa. In nature, latex is a milky fluid, present in 10% of all flowering plants (angiosperms). It is a complex emulsion that coagulates on exposure to air, consisting of proteins, alkaloids, starches, sugars, oils, tannins, resins, and gums. The present experiment Was thus planned in the laboratory to study the effect of latex mixture on the above aspects of seeds of *Brassica campestris*, varieties treated with latex mixture Extracted from latex-yielding plants i. e. *Calotropis procera* were subjected to accelerated aging Conditions of storage for different periods (0 to 100 days) and tested for germination, seedling length and Speed of germination.

**Keywords:** Latex, Rubber tree, Pharmacological, Alkaloids, Gums

## **EMERGING SCIENCE AND TECHNOLOGIES IN FISHERIES SECTOR**

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### **Abstract:**

The fisheries sector plays a crucial role in global food security, providing sustenance and livelihoods for millions of people around the world. However, this industry faces growing challenges, including overfishing, illegal fishing, and the impacts of climate change. To address these issues, a wave of emerging science and technologies is revolutionizing the fisheries sector, offering innovative solutions for sustainable and responsible practices. The adoption of these technologies requires collaboration between governments, scientists, and industry stakeholders to ensure the long-term health of our oceans and the continued availability of seafood resources. Embracing these advancements is essential for a more sustainable and prosperous future for the fisheries sector. It showcases breakthroughs in aquaculture and developments in robotics, autonomous systems, electronic monitoring and reporting, big data analytics, remote sensing, and satellite monitoring. These technologies are revolutionizing how aquaculture practices are optimized, data collected, and operations in fisheries are monitored. This new approach focuses on the technology's potential to improve fisheries' sustainability, effectiveness, and transparency, ultimately opening the path for a time when ethical fishing methods and thriving marine ecosystems coexist.

**Keywords:** Fisheries sector, science and technologies, innovation, sustainable

## **EMERGING ENHANCEMENT TECHNIQUE FOR ENHANCING THE SEED QUALITY AND SEED PRODUCTION**

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### **Abstract:**

Seeds play a crucial role in boosting agricultural productivity as they set the upper limit for crop yields and determine the efficiency of all other agricultural inputs within the farming system. High-quality seeds, possessing strong genetic and physical purity, germination rates, vigor and viability, are essential for realizing the potential of crop production under suitable and favourable agro-climatic conditions. The purity of commercial seeds is contingent on the genetic purity of the parental lines within the nucleus, breeder and foundation seeds in the seed multiplication system. The standardization of seed production technology for new and existing hybrids, taking into account agro-ecology and the most suitable regions for seed production, as well as employing appropriate techniques in seed production, ensures better seed setting, profitable seed yields, and the availability of top-quality seeds in the seed trade. Farmers, serving as vital links in the seed production, distribution, and exchange networks, aim to achieve profitability from their seed production activities. However, due to challenges in seed production related to ecological, agronomic, and genetic constraints, seed setting, yield, and quality are also affected. Without the necessary technological knowledge, the sustained profitability and quality traits are at stake. Therefore, strategies to enhance seed production, quality, and supply should begin by strengthening the public agricultural research and development sector on a long-term, sustainable basis. It is especially important to develop the capacity to transition from generic seed recommendations to the development and dissemination of varieties, the treatment of seed is done to enhance germination, improve seed vigour and to make seed greater resistance to biotic and abiotic stress. It helps in enhancing the seed longevity, establishment of healthy and uniform plant population with lower seed rate. Seed enhancement include physiological, biological and physical treatment to overcome germination restrictions by uniform stand, earlier crop development and better yield. Improved germination rate and seedling vigour are due to reduce emergence time by earlier start of metabolic activities of hydrolytic enzyme and resource mobilisation. Nutrient stability, ion uptake, activation of antioxidant defence system, hormonal regulation etc. Some mechanism huddling biotic and abiotic stress tolerance. In this outline, there is need to minimize the factors associated with reduced vigour during seed production, improve seed storage and handling, develop high-tech seeds by seed industry at appropriate rates and integrate agronomic, physiological and molecular seed research for the effective regulation of high-quality seed delivery over next generations.

**Keywords:** Seed, Seed priming, Seed fortification, Seed pelleting, Seed colouring, Seed coating, Halogenation, Seed priming, Seed infusion, Irradiation

**INTEGRATIVE TAXONOMY OF *PISODONOPHIS BORO* (HAMILTON-BUCHANAN, 1822) OF SUNDARBANS, WEST BENGAL**

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**Abstract:**

Species identification on molecular level through DNA barcoding has been found a standard way of identifying the ichthyofaunal biodiversity globally by using a partial sequence of the mitochondrial ribosomal RNA. Integrative approach by compiling the morphological and molecular method to identify fish species from Sundarbans of West Bengal has been applied. Sundarbans is considered as the one of the biggest deltas, its back water and tidal phenomenon provides a diverse habitat for various species of aquatic, terrestrial and amphibian group. Fishes of the genus *Pisodonophis* (Kaup, 1856) are rare and lives in burrows. These are inhabitants of swampy area and are seldom caught. The present study records one species i. e., *Pisodonophis boro* (Hamilton-Buchanan, 1822) from Sundarbans of West Bengal. Detailed morphology, systematic data was obtained based on 6 samples and DNA barcodes were obtained from a sample of *Pisodonophis boro* collected from Sundarbans central zone 22°02'11"N 88°42'03"E belonging to family Ophichthidae; sub-family Ophichthinae. *Pisodonophis boro* is characterised by tail size longer than head, total length varied between 391 – 482, 135 - 152 vertebrae count, 346 - 330 dorsal fins ray, and 235 - 250 anal fin ray. Morphological Phylogenetic tree was constructed with 1000 bootstraps showing 67% between species. The mean Kimura two-parameter genetic distances between species were 5.3%. This study may be a remedy to the impediment of taxonomic study and will aid in accelerating valid species identification by flagging potential of finding new species and conserving the diversity.

**Keywords:** Integrative, biodiversity, systematic, barcoding and morphology.

## FROM COAL TO CATALYSTS: DEEP LEARNING-ENABLED IDENTIFICATION OF AMIDASE ENZYMES IN COAL METAGENOME

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### Abstract:

The amidase enzymes are crucial in converting the amide group to carboxylic acids, which have diverse applications in the food, flavor, and pharmaceutical industries. The coal metagenomic DNA was extracted and sequenced using the Illumina platform. Analyzing the annotated coal metagenomic data revealed two novel amidase enzymes from the microorganisms of unclassified *Oxalobacteraceae* family and unclassified *Betaproteobacteria* class. These enzymes belong to the amidase signature family (AS signature), identified using the InterProScan database. Using an artificial intelligence program - AlphaFold2, their 3D structures were predicted with high per residue confidence scores of approximately 97.34 and 95.31, and the stability of the models was verified through molecular dynamics simulations over a 100-nanosecond period. The binding scores of the new amidase enzymes with amides were similar to those of existing prokaryotic crystal structures. This study focuses on the identification of novel enzymes from the amidase signature family through in-silico mining of the coal metagenome.

**Keywords:** Amidase, Unclassified organisms, Deep neural networks, Amides, Functional metagenomics, protein pockets



**MARKER ASSISTED BACKCROSS BREEDING FOR DISEASE RESISTANCE IN  
BREAD WHEAT (*TRITICUM AESTIVUM* L.)**

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**Abstract:**

Bread Wheat (*Triticum aestivum*) is one of the most important cereals cultivated worldwide in varying environmental and production conditions. Globally, change in climate plays a very pivotal role on the resurgence of new virulent races/pathotypes of different disease-causing organisms. Wheat production is affected by numerous biotic and abiotic factors. Among biotic factors, fungal diseases mainly rust (*Puccinia spp.*) cause considerable loss to wheat crop and impose reductions in yield under severe epidemic conditions worldwide, including India. The most efficient mode to control yield losses caused by disease is by the implementation of genetic resistance in wheat cultivars. Marker Assisted Selection (MAS) is a potent tool for the indirect selection of complex traits at early stage before production of the next generation, thus speeding up the process of conventional plant breeding and facilitating the enhancement of traits that cannot be improved easily by the conventional methods. MAS have been successfully implemented to introgress the gene through Marker Assisted Backcrossing (MAB) and pyramid major genes/QTL through Marker Assisted Pyramiding (MAP) for different traits in wheat. The Marker Assisted Backcross Breeding (MABB) approach enables accelerated transfer of a specific allele at the target locus from a donor line to a recurrent line with only two to three backcrosses while selecting for donor introgressions at the target region and against donor introgressions at non target regions. MABB has extensively been used in wheat for improvement against several fungal diseases. Thus, the development and deployment of cultivars with host genetic resistance is the most economical, effective and environmentally friendly method to reduce damage and loss caused by diseases.

**Keywords:** Marker Assisted Backcrossing (MAB), Marker Assisted Pyramiding (MAP), Marker Assisted Selection, Pathotypes, QTL, Virulent races.



## EXPLOITING MICROBIAL WARRIORS FOR TARGETED CANCER THERAPY

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### **Abstract:**

Recent strides in cancer treatment explore the potential of genetically modified bacteria, exhibiting enhanced efficacy and fewer side effects compared to conventional therapies. Recombinant DNA technology is employed to engineer bacteria which are adept at delivering toxins to cancer cells through reporter genes. These toxins, including *deaminases* and *nitroreductases*, activate the host's immune system, notably interleukins, aiding in tumour destruction.

Certain bacteria, like Salmonella, exhibit a unique ability to invade hypoxic tumour sites, impeding tumour growth. Notably, bacterial enzymes create membrane holes in solid tumours, inducing tumour cell death. Additionally, bacteria like E. coli produce *cyclomodulins*, specialized in blocking cell division, thereby promoting apoptosis.

Bacteria also prove effective in tumour suppression by consuming essential tumour growth supplements, thriving in deoxygenated tumour environments. Mechanisms of bacterial action in cancer treatment include *bacitracin synthesis*, *biofilm formation*, and *acting as carriers for tumour-killing drugs*. *Bacteria-induced immune responses, involving T lymphocytes, cytokines, and tumour necrosis factor, contribute to tumour eradication.*

Moreover, bacteria discharge substances like bacteriocins and cancer cell-specific toxins, hindering tumour development. Bacteria-based carriers, especially Salmonella, demonstrate antiangiogenic effects, inhibiting tumour growth. Combining bacteria therapy with *oncolytic viruses* enhances the treatment's efficacy, demonstrating promise against various cancers.

In conclusion, bacteria offer a viable and potentially side effect-reduced approach to cancer treatment. Genetic engineering further optimizes bacteria for cancer cell and solid tumour targeting. Combinations with established treatments like radiotherapy and chemotherapy show promise, although further research is essential for this emerging field of solid tumour clearance using bacteria.

**MORPHOMETRIC- ANALYSIS OF FRESH WATER PEARL MUSSEL  
*LAMELLIDENS MARGINALIS* UNDER POND PHASES**

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**Abstract:**

Environmental parameters, such as water temperature, have been shown to be major factors influencing pearl mussel shell growth and biomineralization process. A pearl has structural and chemical properties similar to the pearl nacre of the shell interior. Its shape is determined by the irritant foreign body and its quality by the secretion nature of pearl sac thus the outer epithelium of the mantel tissue is the keynote in the "orchestra" of bio-mineralization of pearl (Simkiss and Wada 1980). The freshwater pearl mussel, *Lamellidens marginalis* commonly found at Betwa river was cultured in the culture pond at Bipin Bihari Degree College, Jhansi in nets bags with bamboo/wire frames for 10 months. Measurements were taken of the length, height and total body weight for morphometric study in different seasons. The present study investigates the length and height in each period of culture showed good growth in the summer season and less in the winter season. It was found that the effect of water temperature, in culture pond impact on pearl quality a linear relationship and the shell length increased, as the temperature increases along with the same linear relationship.

**Keywords:** Temperature, Biomineralization, *Lamellidens marginalis*, Nacre.

## EFFECT OF CAROTENOID EXTRACT ON THE COLOR ENHANCEMENT OF ORNAMENTAL FISH

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### Abstract:

Since ornamental fish have such a vibrant and cheery colour, keeping them in glass tanks or aquariums is a prevalent practice all over the world. One of the most important characteristics of a fish that influences customer acceptability is its pigmentation. The colouring of food fish's muscles and decorative fish's skin colour is caused by carotenoids. It is necessary to add carotenoids to the diet of farmed species since fish cannot produce carotenoids from scratch. In order to provide fish with vibrant pigment, natural carotenoids are highly sought after in aqua feed because manufactured carotenoids are known to have detrimental impacts on the environment. For the purpose of the colour enhancement test, four experimental groups and one control group were maintained for a duration of 60 days. A ratio of 15g per 100g feed was used to construct the experimental diets using four natural sources of carotenoid: China rose petal (*Hibiscus rosasinensis*), rose petal (*Rose chinensis*), marigold petal (*Tagetes erecta*), and carrot (*Daucus carota*). Every fish was given four distinct experimental diets in addition to one control twice a day. The observation concluded that the experimental group had enhanced colour as compared to the control group in concentration concentration-dependent manner. The study's findings suggest that using readily available, inexpensive sources, natural colour enhancer feeds can be made more affordable.

**Keywords:** *Carotenoid, Ornamental fish, Color enhancement, Rose, Marigold, Carrot*

## **NANO-TECHNOLOGICAL APPROACHES: SIGNIFICANCE OF VARIOUS NANOPARTICLES IN AGRICULTURE**

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### **Abstract:**

There have been attempts to use nanotechnology in agriculture as a result of getting a clearer picture that traditional farming methods would not be able to repair ecosystems destroyed by existing technologies to their pre-damaged form or enhance productivity any further. This was particularly true because growing crops using "amazing seeds" in combination with fertilizers, irrigation, and pesticides has been questioned in the scientific community and has to be phased out gradually. The topic of nanoparticles in agriculture has only lately gained traction even though numerous academic fields are connected to agriculture, owing to the considerable support from the government. There is a lot of potential for using nanotechnology in farming if these issues are resolved. Some of these include: strengthening natural fibres; removing contaminants from soil and water; extending the shelf life of vegetables and flowers; using clay-based nano resources for precision water management; reclaiming salt-affected soils; breaking down yield barriers through bio-nanotechnology; monitoring and controlling pests and diseases; developing new pesticides and their carriers; and stabilizing erosion-prone surfaces. Nutrient shortages in food crops are bad for human health, especially for people who live in rural areas. Using nanotechnology to solve this problem could be the most environmentally friendly option. There are several methods to enhance the nutrients in food, such as using medications, changing one's diet, and industrial fortification. However, there is more work to be done in terms of these strategies' affordability and sustainability. Fertilizers provide plants with nutrients to absorb; nevertheless, most conventional fertilizers have low nutrient absorption and utilization efficiency. Nano-fertilizers are made to be target-specific and hard to lose because of this. The effects of adding macro- and nano-nutrients to the soil, as well as plant interaction and absorption capacity, environmental impact, and nutrient content. Most of the findings, which are based on more recent studies, demonstrate how adding nutrients in the form of readily absorbed nano-particulates can increase the quantity of nutrients that are available to plants. Although the use of biologically synthesized nanoparticles in crops raises certain concerns about toxicity, they may be favored for agricultural purposes. One of the most important instruments in modern agriculture is nanotechnology, which is expected to become a major economic force soon. In addition to using new delivery methods and chemical agents to increase crop yield and reduce the need for bulk agrochemicals, nanotechnology may provide more intelligent answers to the issues facing the agricultural industry today.

**Keywords:** Nano-Fertilizers, Contaminants, Nutrients, Environmental, Sustainability

## **NANOTECHNOLOGY IN SUSTAINABLE AQUACULTURE: CHALLENGES AND FUTURE OUTLOOK**

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### **Abstract:**

Aquaculture has made a significant contribution to food security in recent decades by meeting the huge need for animal protein. But, currently, this area is facing various challenges due to environmental pollution and the frequency of diseases. In this regard, nowadays, different types of nanotechnology tools like- nanomaterials, nanosensors, DNA nanovaccines, gene delivery, drug delivery, fluorescent biological labels, probing of DNA structure, bio-detection of pathogens, separation and purification of biological molecules and cells, antioxidant activity, antimicrobial activity cell toxicity, etc., are being used to deal effectively with such challenges. At present nanotechnology is being used in the fish processing sector to enhance and improve flavour, colour, quality, and protective characteristics, as well as detecting fish pathogens in packaging. Among the recent advancements in science, nanotechnology is fast emerging technology platform for the sustainable development of aqua-food systems to improve the conditions of poor people. There are now many indications of possible future uses of this technology in fish health management, water treatment in aquaculture, animal husbandry and harvesting, and post-harvest technology, but further development research is needed to increase the potential use of nanotechnology in aquaculture.

**Keywords:** Nanotechnology, aquaculture, challenges, sustainable development.

## POTENTIAL OF HERBAL PLANT TO CONTROL PLANT DISEASES:

### *ADENOCALYMMA ALLIACEUM*

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#### **Abstract:**

This review focuses on the medicinal plants growing and having history of folk medicine and found effective as anti-free radical damage in animal or human. Garlic creeper is also known as garlic vine. It is native plant of Northern Southern America. It's botanical name is *Adenocarcinoma alliaceum*. It commonly known as 'garlic vine' or 'false garlic'. Garlic vine is belonging to family Bignoniaceae. It is very beneficial to many ways as ancestral value and traditional medicine due to presence of several constituents with important pharmacological properties. There leaves have pungent smell like garlic and flavour also when it crushed but it doesn't smell if plant remain alone. Garlic vine used for ornamental and pot plant due to its attractive flower pattern and inflorescence. Flowers are characterised by a white center that fades to purple shade when it matures. These flowers blooming many times in a year. This plant is characterised by its antioxidant, antibacterial, antifungal, anti-inflammatory, larvicidal, antiplasmodial anticancer and hypocholesterolemic etc. It Is Antifungal Use against *Alternaria brassicae*, *Colletotrichum capsici*. Antibacterial activity against *Staphylococcus*, *Bacillus subtilis* were Reported. It used as traditional medicine in cold, as an aid to fertility, commonly added to baths to treat feverish conditions, flu, body aches, cramps, fatigue, mosquito repellent and snake repellent. Modern scientific research has shown that this plant really contains a number of medically active compounds. These include several of the main sulphur compounds that garlic contains including aliin and allyl sulphides. Nevertheless, in fact, the plant perfectly serves a two in one purpose of air purification and treatments.

**Keywords:** Garlic vine, Ancestral, Traditional, Sulphur Compounds, Medicine.

**IN VITRO ANTIOXIDANT STUDY OF CARRAGEENAN IN COMPARISON WITH  
L-ASCORBIC ACID**

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**Abstract:**

Carrageenan (Lambda, Kappa form) a marine polysaccharide is reported to have various medicinal activities. In the present study, crude carrageenan obtained from Irish moss a marine polysaccharide (in extra pure form) was studied for In-Vitro antioxidant activity by the DPPH method. The antioxidant activity was further confirmed by using the Secondary method. The antioxidant activity of crude carrageenan was studied using standard L-ascorbic acid. Carrageenan has shown good and comparable antioxidant activity in comparison with L-Ascorbic acid. This study supports the use of Carrageenan as an antioxidant in possible cosmetic formulations.

**Keywords:** Antioxidant, Carrageenan, DPPH method, L-ascorbic acid

## **PROSPECTIVE OF PLANT GROWTH-PROMOTING RHIZOBACTERIA (PGPR) IN PLANT DISEASE CONTROL**

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### **Abstract:**

Plant diseases cause the loss of at least 10 percent of global food production, threatening food security. Microbial attacks can be minor infections that only cause plant deformation, or they can cause much more serious damage that, in the worst case, results in plant death. Producers are becoming increasingly dependent on agrochemicals to prevent and control these diseases, especially in recent decades as agricultural production has increased. However, despite the high efficiency and ease of use of these products, their use or abuse has caused problems related to significant contamination of soil and underground water reservoirs, the accumulation of unwanted chemical residues in the food chain, and the emergence of strains resistant to fungicides pathogens, not to mention the health problems of farmers. That is why today's consumers and authorities are increasingly demanding safer, smarter, more sustainable and environmentally friendly strategies. This led not only to stricter regulations on pesticide use, distribution and production, but also to the development of alternative strategies, including genetic modification of crops, changes in agricultural practices and the use of biopesticides. Some microorganisms are able to colonize the soil surrounding plant roots, the rhizosphere, where they come under the influence of plant roots. Plant growth-promoting rhizobacteria (PGPR) generally refer to free-living bacteria in soil and rhizomes that, in a competitive environment, colonize roots and have a beneficial effect on plant growth. The beneficial effects of PGPR on plant growth include the ability to act as phyto-stimulants; biofertilizers PGPR can improve yield through nutrient uptake and plant growth regulators. PGPR can also act as biopesticides by producing antibiotics, triggering induced local or systemic resistance, or preventing the harmful effects of xenobiotics by degrading and acting as rhizome repairers. Sustainable agriculture based on environmentally friendly methods aims to use bacteria as tools. which can otherwise reduce the use of chemicals. This is useful for sustainable agriculture, as the bacteria introduced there can act as both biofertilizers and biopesticides. In this way, PGPR can form a very important group of bacteria.

**Keyword:** Prospective, PGPR, Plant, Disease Control



## **COLOUR ENHANCEMENT OF ORNAMENTAL FISHES**

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### **Abstract:**

One of the fish's key quality characteristics for attracting customers is pigmentation. The skin colour of ornamental fish and the pigmentation of the muscle in food fish are caused by carotenoids. Fish cannot synthesize carotenoids from scratch; hence it is necessary to add them to the diets of farmed species. Natural carotenoids are highly sought after in aqua feed because synthetic carotenoids are known to negatively impact the ecosystem and cause fish to lose their vibrant colour. There is the potential use of naturally occurring carotenoid-rich ingredients like capsicum, marigold, yeast extract (*Phafia rhodozyma*, *Xanthophyllomyces dendrorhous*), microalgal pigments. The main pigment responsible for the colour of fish skin is carotenoids. It is advised to make sure that fish receive a steady intake and sufficient amount of carotenoids in their diet in order to maximize the coloration.

**Keywords:** Carotenoids; Pigmentation; Ornamental Fish; Marigold; Capsicum; Yeast extract

**TERATOGENIC POTENTIAL OF PESTICIDES IN EMBRYOS OF INDIAN  
FRESHWATER FISH, SINGHI**

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**Abstract:**

Crucial morphogenetic developments during the blastogenesis period, which extends from the fertilization to gastrulation stage, can be altered through teratogenic exposure, which results in to structural abnormalities. The present research was to investigate the teratogenic changes caused by chlorpyrifos on juveniles of *Heteropneustes fossilis* (Singhi). For this, the fertilized eggs of *H. fossilis* were transferred in different dilutions of hilban pesticide (1/20<sup>th</sup>, 1/60<sup>th</sup>, 1/500<sup>th</sup>, 1/4000<sup>th</sup>, 1/7000<sup>th</sup> of 96 h LC<sub>50</sub>; 0. 24, 0. 082, 0. 009, 0. 0012, 0. 0007 µl/l) along with control set. The result found a concentration-dependent inhibitory response in embryonic development. Not only it influences the duration of development but it also causes teratogenic changes. The exposed groups of hatchlings were mainly affected by ventral and/ or lateral tail flexure coupled with abnormal spinal bending and edema, and some morphological deformities like irregular head shape and size, loss of eye, reduced barbell, pericardial edema, yolk sac edema, notochordal defect, finfold defect, reduction of brain development and reduction of pigmentation. The result suggested that pesticide may influence normal development of embryo followed by muscular dystrophy and morphological deformities during embryonic development and organogenesis.

**Keywords:** Hilban, Teratogenic Change, Muscular Dystrophy, Morphological Deformities.

**STUDY OF WEED PLANTS OXALIS CORNICULATA AND ANAGALLIS ARVENSIS  
AND THEIR EVALUATION OF THEIR ANTIOXIDANT AND ANTIMICROBIAL  
PROPERTIES**

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**Abstract:**

Weeds have been neglected and their use for medicinal purpose has not been considered on a large scale. Oxalis corniculata and Anagallis arvensis is a very popular herb and it has many medicinal properties. The common name of oxalis Corniculata is Indian sorrel and Anagallis arvensis is scarlet pimpernel. Our investigation is planned to explore the medicinal potential of Oxalis corniculata and Anagallis arvensis. Our study associate with the phytochemical screening of any therapeutic importance, antimicrobial properties and antioxidant properties from these weed plants. The phytochemical analysis of Oxalis corniculata and Anagallis arvensis extract revealed the presence of Proteins, Sterols, Saponins, Alkaloids, Phenolic compounds. Antioxidant and antimicrobial activities of selected weed plants were also evaluated in this study. Plant extract using different solvent methanol, ethanol and chloroform where tested for antimicrobial activity against Staphylococcus Aureus and Pseudomonas Aeruginosa. The methanol extracts of Oxalis corniculata and Anagallis arvensis demonstrated the highest antimicrobial activity against Staphylococcus aureus with ZOI of 1.4mm and 4.9mm, respectively. Methanol extract Anagallis arvensis also exhibited the highest antimicrobial activity against Pseudomonas aeruginosa with a ZOI of 8.2mm, but Oxalis corniculata did not inhibited. Oxalis corniculata and Anagallis arvensis chloroform extract does not exhibit any inhibition against both of the microorganisms. Although ethanol extract of both plant exhibits ZOI of 0.7mm and 2mm against Staphylococcus aureus, and Anagallis arvensis inhibition against Pseudomonas aeruginosa with ZOI of 7.8mm Oxalis does not exhibit any inhibition against it the antioxidant capacity of all the extracts was evaluated by employing DPPH radical scavenging. The methanol fraction of Anagallis arvensis demonstrated the highest antioxidant activity (68%). Both of the chosen weed is widely distributed, therefor their therapeutic characteristics can be utilized for human wellbeing.

## **TOMATO'S THERAPEUTIC TRIUMPH: AN IN-DEPTH EXPLORATION OF MEDICINAL PROPERTIES**

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### **Abstract:**

Tomato (*Solanum lycopersicum*), often regarded as a staple in kitchens around the world, has long been celebrated for its culinary versatility and rich, tangy flavor. However, beyond their gastronomic appeal, tomatoes harbor a plethora of medicinal properties that have been studied and appreciated for centuries. In recent years, scientific research has delved into the various compounds present in tomatoes, revealing their therapeutic triumph in promoting human health and well-being. The main objective of this topic is to review the medicinal properties of tomatoes, in addition to their nutritional and economic value. Tomato contains different bioactive compounds, with lycopene standing out as a key player. Lycopene is a powerful antioxidant, responsible for the vibrant red color of tomatoes. Extensive research has shown that lycopene plays a crucial role in reducing the risk of chronic diseases, including cardiovascular diseases and certain types of cancers. Its antioxidant properties help neutralize harmful free radicals in the body, thereby mitigating oxidative stress and inflammation. Tomatoes are a rich source of vitamins and minerals, such as vitamin C, potassium, and folate. Vitamin C boosts the immune system, promotes healthy skin, and aids in wound healing. Potassium contributes to maintaining healthy blood pressure levels, reducing the risk of strokes and heart attacks. Folate, on the other hand, is essential for DNA synthesis and cell growth, making it particularly important during pregnancy. Tomatoes also contain flavonoids, a group of polyphenolic compounds with potent antioxidant properties. These compounds have been linked to various health benefits, including improved cardiovascular health and reduced risk of neurodegenerative diseases. Quercetin, one of the prominent flavonoids found in tomatoes, has anti-inflammatory and anti-cancer properties, making it a valuable ally in the fight against chronic diseases. Tomatoes also contain natural sugars, fiber, and water, making them an excellent choice for those seeking hydration and a quick energy boost. The fiber content aids in digestion and promotes a feeling of fullness, making tomatoes a valuable addition to weight management diets. Ongoing research into the medicinal properties of tomatoes requires funding and resources. This investment in scientific studies, clinical trials, and innovative research methods stimulates economic activity in the research and development sector. Research findings can lead to new medicinal applications, creating opportunities for commercialization and economic growth. As our understanding of their medicinal, nutritional, and economic potential continues to deepen, integrating tomatoes into a balanced and varied diet can contribute significantly to overall health and well-being.

**Keywords:** Tomato, Lycopene, Flavonoids, Antioxidant, Chronic diseases

## **BENEFICIATION PROCESS OF INDUSTRIAL WASTE FLY ASH IN THOOTHUKUDI POWER PLANT: A SUITABLE MATERIAL FOR WASTE MANAGEMENT**

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### **Abstract:**

The term "beneficiation" refers to the process by which carbon and other toxin materials are removed from fly ash to produce the higher value materials so that industrial plants and other stakeholders can increase their reserve stream by adding the beneficiation step to their handling process. As a result, we experimented with various developed products such as vermicompost, biodiesel, cow dung cake, and Chemical composition and properties of flyash were determined using Fourier transform infrared (FTIR); X-ray diffraction (XRD); X-ray photoelectron spectroscopy (XPS); energy-dispersive X-ray; carbon, hydrogen, nitrogen, and elemental analysis; moisture content; and loss-of-ignition. Particle size was predicted by using dynamic laser scattering, scanning electron microscopy (SEM) and microbial activity. Flyash has the highest carbon content (80%), and SEM shows that the particle size distribution (PSD) of FA microspheres ranges from 60. 53 m to 68. 15 m. Flyash showed the highest microbial growth reduction %, as compared to the control bacterial broth culture without fly ash. The result of the present study showed that flyash waste is a potential waste resource for the sustainable.

**Keywords:** Thermal power plant, Fly ash, Chemical composition, Anti-microbial activity, sustainable development

## **PRACTICES AND OBSTACLES IN FRESHWATER PEARL CULTURE**

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### **Abstract:**

An essential role for cultured pearls is played in international trade. The fishery that targeted pearl oyster shells for their mother-of-pearl (MOP) resulted in the rare and valuable by-product of natural marine pearls. Throughout the 18th century, this fishery expanded globally, and in Australia and the Pacific islands, it experienced a notable upsurge in the 19th century. Techniques for gathering pearl oyster spats, or juveniles, were developed in response to the overfishing of the MOP resource in order to aid in stock replenishment. Pearls are considered one of the highest honors and are mentioned in the Vedas, the Bible, and the Koran. The most popular and traditional type of gems are pearls. They don't require polishing and were the first gemstones used by humans. The smooth, glossy, and multi-coloured deposits (nacre) that surround a grain of sand or other foreign debris in the shells of some freshwater and marine mussels are what make pearls such highly prized biological gem stones. In addition to being ornamental, they have therapeutic properties and are used in toothpastes and cosmetics. In the natural world, pearls are formed when an irritant—such as a sand grain or a parasite—is carried inside a pearl mollusk and becomes embedded. There, it gets covered in microscopic layers of nacre, a glossy material composed primarily of 80–90% aragonite crystals of calcium carbonate. As a result, it is decided to focus on the elements that affect the quality and productivity of cultured pearl production in this paper. Training initiatives have been carried out to provide the marine states and union territories with access to knowledge. The purpose of this paper is to provide beginning pearl farmers with a trustworthy source of fundamental information so they can establish farms and produce pearls of exceptional quality. This study summarizes the practices in pearl culture and highlights the areas in which significant effort is needed to advance the country's technological foundation.

**Keywords:** Pearl culture, practices, freshwater pearl, challenges.

## **PHAGE REMEDY AS A POTENTIAL SOLUTION FOR COVID-19**

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### **Abstract:**

The Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) originated in Wuhan, China in December 2019. Since then, the rapid global spread of the Coronavirus Disease 2019 (COVID-19) has posed a significant challenge worldwide, with no specific vaccine or treatment available. In this context, phage therapy has emerged as a promising approach to address this widespread disease. Several studies strongly support the use of phage therapeutics, particularly in relation to their effectiveness against SARS-CoV-2. These studies have demonstrated the ability of phages to combat both viral and bacterial infections. Furthermore, phage therapy has shown efficacy in inhibiting the activation of NF-kappa B (NF-κB) and producing the antiviral protein phagocin, presenting a potential alternative to antibiotics. Moreover, phages exhibit anti-inflammatory properties, thereby helping to mitigate cytokine storms associated with COVID-19. Additionally, phages have the ability to induce antiviral immunity and enhance the immune response. Advances in synthetic biology and genetic engineering offer opportunities to enhance phages by equipping them with additional therapeutic potential, improved safety profiles, and a wider range of target hosts. This paper explores various strategies for manipulating phages to deliver diverse therapeutic payloads, improve antiviral efficacy, and showcase their versatile applicability in combating viral antigens. Phage therapy, which employs bacteriophages to target and eliminate pathogenic bacteria, holds promise in addressing infectious diseases. By leveraging the specificity and effectiveness of phages, it presents a novel strategy for mitigating the impact of COVID-19. This paper highlights the potential of phage therapy as a viable treatment option for COVID-19 patients, filling the existing void in the absence of a definitive vaccine or treatment.

**Keywords:** phage cure, anti-inflammatory, antibiotics, NF-kb, new phage, SARS-cov-2, COVID-19.



## REPRODUCTION IN ORNAMENTAL FISHES

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### Abstract:

The Purpose of this study was to find out how fish meals supplementation affected the development, survival and reproductive capabilities of poecilia sphenops in rectangular fiberglass aquariums. Fish were fed deep test diets until they were full impact of varying protein levels in feed on black molly growth, survival & reproductive efficiency. First of all we will bring adult fish from the market and keep them in the lab for a week so that they can adapt to the environment and after a week they will be kept in the lab. We will see the length of their weight. When they are about 2 weeks old, we will have to breed them to see which one is reproducing and which one is shedding during reproduction. Both naturally prepared meals and commercial diet fish food are fed to fish. After 50 days the fish were killed, dried in a hot air oven & measured every 10 days for weight, overall length and fork length. It was also determined how much protein, carbohydrate and fat were in the fish. Fish diets made with natural ingredients are produced for ornamental purposes, which makes fish keeping one of the most popular hobbies in the world today. Aquarium fish commerce has increased significantly worldwide as a result of growing interest in aquarium fish. During this period, we can observe how they behave around food, how long they take to eat & how much weight they can manage. Fish will likewise exhibit it; either we observe their movement or they will be kept in the lab for 75 days. The reproductive process in ornamental aquarium fish like mollies typically involves sexual reproduction, with male and female individuals. Mollies are livebearers, meaning females give birth to live young instead of laying eggs. Mating usually occurs through courtship displays, and once fertilized the female develops embryos internally until giving birth to fully-formed fry, maintaining appropriate water conditions, providing hiding spots for fry & ensuring a balanced diet are crucial for successful reproduction in mollies. Once the fry are ready to be born, the female releases them, and they start their life as independent, albeit tiny, fish. It's essential to provide a well-planted aquarium or breeding box for the fry to hide in, as adult mollies might see them as potential prey. Maintaining a balanced and nutritious diet for both adult and juvenile mollies is crucial for their health and successful reproduction in an aquarium setting. From this it can be seen that the mollie fish has sexual reproduction & from its food it can be known that how is its weight, colour and length. We will keep & see their movements.

**Keywords:** Fish Meals Supplementation, Reproductive Capabilities, *Poecilia sphenops*.



## **COGNITIVE NEUROLOGY**

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### **Abstract:**

With an emphasis on the neuronal connections in the brain that are engaged in mental processes, cognitive neuroscience is the branch of science that studies the biological mechanisms and elements that underpin cognition. It tackles the issues of how neural circuits in the brain influence or regulate cognitive processes. Along with fields like behavioral neuroscience, cognitive psychology, physiological psychology, and affective neuroscience, cognitive neuroscience is a subfield of both neuroscience and psychology. Computational modeling, facts from neurobiology, and hypotheses from cognitive science are the foundation of cognitive neuroscience. In this field, certain brain regions are crucial. The most important function is played by neurons since the goal is to build a neurological understanding of cognition, including the various cerebral cortex lobes. Functional neuroimaging, electrophysiology, behavioral genetics, cognitive genomics, psychophysics, and cognitive psychology experiments are among the techniques used in cognitive neuroscience.

An important area of cognitive neuroscience is the study of patients with brain injuries causing cognitive abnormalities. When it comes to healthy, functional brains, the damage in brain lesions offers a similar place to start. The brain's neuronal networks are altered by these injuries, impairing basic cognitive functions including memory and learning. Individuals with learning difficulties and additionally, the discipline of developmental cognitive neuroscience studies and examines cognitive abilities related to brain development. This demonstrates how the brain changes throughout time, examining variations and speculating on potential causes. Research has been going in a number of different ways, including investigating the connections between various brain regions, utilizing a variety of tools and methodologies to comprehend how the brain works, and employing computational methods. The utilization of highly naturalistic stimuli and tasks, such as feature films that portray social interactions, in cognitive neuroscience investigations has also been made possible by advancements in non-invasive functional neuroimaging and related data analysis techniques.

Optogenetics is another relatively new approach in cognitive neuroscience that investigates circuit function and its behavioral effects. There could be a number of variations in cognitive functioning between high and low Stress has a variety of effects on cognition, operating more slowly through glucocorticoids and more quickly through catecholamines. While glucocorticoids biphasically affect synaptic plasticity over hours and also induce longer-term changes in dendritic structure that endure for weeks, catecholamines operate through beta adrenergic receptors and also the availability of glucose. Long-term stress causes neuronal loss, especially in the hippocampal region. While stress-induced catecholamine effects on emotionally charged memories are hypothesized to involve structures like the amygdala, recent evidence suggests that glucocorticoid and stress-related cognitive impairments involving declarative memory are probably related to changes they effect in the hippocampus.

**Keywords:** Neuronal Connection, Computational Modeling, Electrophysiology, Atecholamines, Amygdala.

**STUDIES ON SEED TRAITS IN RICE (*ORYZA SATIVA* L.)**

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**Abstract:**

Rice is one of the most significant cereal crops in the world, rice supplies up to 76% of Southeast Asia's caloric consumption and more than 21% of the world's food output (Fitzgerald *et al.*, 2008; Miura *et al.*, 2011). Previous estimates state that in order to meet the expected demand of the world's expanding population and changing consumer preferences, rice output will need to increase by 40% by 2030 (Khush, 2005, Unnevehr, 1992; Juliano and Villareal 1993; Custodio *et al.*, 2019). As we know rice is a staple food for more than 3.5 billion people around the world, particularly in Asia, Latin America, and parts of Africa scientist believe people first domesticated rice in India or South-east Asia. The present investigation entitles "studies of seed quality parameter in rice (*Oryza sativa* L.) genotypes". Seed quality ensures genetic and physical purity of the crop, gives desired plant population capacity to withstand the adverse condition, ensure uniform growth and maturity, etc. In this experiment genotype 'Jhumki bali' performed best in terms of 1000 seed weight i. e. 29.26 grams while seed germination % was found to be best in is IET-16595 (97%). Genotype 'Akhtahwa-BBK' performed best in terms of seed viability i. e. 95%. The best genotype in terms of seed vigour index I was IET-16595 (2855.26), and best in the case of vigour index II was Shyamghat (9.24) among all the genotypes under observation.

**Keywords:** Seed Quality, Seed Germination, Viability, Vigour

## **SCANNING ELECTRON MICROSCOPIC STUDY OF NEMATODE PARASITES OF GOATS**

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### **Abstract:**

The rural economy, which is made up of landless laborers and small and marginal farmers, depends heavily on the rearing of small ruminants, particularly goats. In terms of human nutrition and socioeconomic development, goats play a dynamic role. Protein, calories, calcium, and vitamins can all be found in milk and meat. Globally, goat productivity is still severely hampered by parasitic diseases, notably gastrointestinal parasitism, which also causes large economic losses. The goal of the study was to find out how common and diverse goat gastrointestinal nematode parasites are. The parasite burden in the host is influenced by a number of variables, including season, age, and gender. Scanning electron microscopy (SEM) was used to analyse the worm's structure in brief. The recovered nematode parasites undergo morphological investigation using scanning electron microscopy, including examination of sucker shape, tegument distortions, ridge appearance, and other features. Data study indicates that females are more infected than males. Adults are more infected than young ones in various age groups, in contrast. Male worm morphology has been studied using several characteristics and structures, including body length, length of the cervical papillae, length of the spicule, length of the gubernaculum, length of the barb distance from tip to hook), and number of cuticular ridges. The primary characteristics used to identify and distinguish between female parasite species are body length, cervical papillae length, number of cuticular ridges, and vulva flap morphology. SEM is a helpful method for assessing alterations in nematode cervical papillae length surface architecture. The study of diverse parasite species has demonstrated the utility of electron microscopy. It gathers a great deal of data about parasites that is beneficial to many areas of pharmacology and biology. It also covers the examination of nematode parasite growth phases, which broadens biologists' understanding of ultrastructure for potential applications. The study shows that the frequency of gastrointestinal nematode infections varies by age group and gender, and also examines goat nematode parasites using scanning electron microscopy.

**Keywords:** Goats, Prevalence, Nematode, Gastrointestinal, Parasite, Scanning electron microscope

## **EXPLORING THE FLAVOUR AND HEALTH BENEFITS OF SPICES**

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### **Abstract:**

Spices ability to enhance the flavor of culinary dishes, but their potential health benefits have increasingly gained attention. This research paper delves into the multi faceted world of spices, examining both their diverse flavor profiles and the associated health advantages they offer. Spices are calorie and cholesterol-free foods. They don't have any sodium, saturated fat, trans fat, or added sugars. Medicinal or herbal spices grow in lush forests in various regions, such as the Eastern Himalayas in India, Bhutan, Nepal, Pakistan, Iran, Afghanistan, some Central Asian countries, the Middle East, USA, Europe, Southeast Asia, Japan, Malaysia, and Indonesia. We can classify these spices into three categories based on where they are grown, their economic value, and popularity: major, minor, and colored tropical spices. In total, there are 24 tropical spices and herbs, including cardamom, black cumin, fennel, poppy, coriander, fenugreek, bay leaves, clove, chili, cassia bark, black pepper, nutmeg, black mustard, turmeric, saffron, staranise, onion, dill, asafoetida, celery, allspice, kokum, greater galangal, and sweet flag. These spices have various health benefits, such as reducing inflammation, fighting infections, weight control, aiding digestion, benefiting the nervous system. Spices not only make food taste great but also offer various health benefits. They are free of calories, cholesterol, sodium, saturated fat, trans fat, and added sugars. Some of the potential health advantages of spices include protecting against heart disease, neurodegenerative conditions, inflammation, cancer, obesity, and type 2 diabetes. Spices are also rich in anti oxidants, have anti microbial properties, and reduce the need for salt in food, which is good for heart health. These health benefits are mainly due to the natural compounds found in spices, like polyphenols and flavonoids. Spices, especially when dried, contain high levels of these beneficial compounds. For example, oregano, rosemary, thyme, and parsley have a lot of polyphenols. Cloves, cinnamon, and turmeric are also packed with these healthy compounds. Compared to some other foods, like dark chocolate, blackcurrants, and broccoli, spices tend to have higher levels of these beneficial substances. Spices also have anti bacterial, anti viral, and anti fungal properties, which is why they are often used to preserve food. Essential oils in spices like thyme, oregano, mint, cinnamon, and cloves are effective against harmful bacteria and fungi, making them valuable in food preservation.

**Keywords:** Culinary dishes, Medicinal Spices, Tropical Spices, Inflammation, Anti Oxidants.

## **FISH NUTRITION**

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### **Abstract:**

Where artificial feed is not the only source of fish nutrition but is to supplement natural food. The other sources of fish nutrition which the artificial feed has to supplement and complement are a result of pond manuring and fertilization which promote generation of natural fish food organisms such as phytoplankton, zooplankton and other biota as well as detritus. whole fish feed is not required, depending on the food of the fish concerned, the natural food present or augmented by manuring and fertilization takes care of some aspects of the required fish nutrition. Fish is a low-fat high-quality protein. Fish is filled with omega-3 fatty acids and vitamins D and B2 (riboflavin). Fish is rich in calcium and phosphorus and a great source of minerals, iron, zinc, iodine, magnesium, and potassium. Dietary nutrients are essential for the construction of living tissues. They also are a source of stored energy for fish digestion, absorption, growth, reproduction, and other life processes. The mode of nutrition of fish is heterotrophic. Artificial fish feeds are species specific that depend, as they ought to, on specific digestive enzymes secreted and microflora and microfauna present in fish gut.

**Keywords:** Fish Nutrition, Vitamin D, Vitamin B2, Omega-3 fatty acids

## QUANTITATIVE AND QUALITATIVE ANALYSIS OF BACTERIAL FLORA ASSOCIATED WITH SHRIMP FARMING SYSTEMS

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### Abstract:

Microbial diseases in shrimp farming system have caused serious financial losses to the shrimp farming communities globally. Vibriosis is a commonly encountered disease in cultured shrimps. The members of bacterial genus *Vibrio* are the natural inhabitants of marine and brackishwater ecosystems where shrimp farming is being carried out. They act as opportunistic pathogens in shrimp farms and shrimp hatcheries. In the present study, farmed shrimp, shrimp farm water, sediment, shrimp larvae and hatchery water samples were collected from Tamilnadu and its neighboring coastal states, Andhra Pradesh and Kerala. Bacterial isolates were collected from these samples and biochemical characterization of these isolates was carried out. Molecular typing to find out their intraspecific variability was done for select three species of vibrios viz. *Vibrio alginolyticus*, *V. harveyi* and *V. vulnificus*. Total plate count (TPC) of bacteria in pond water samples varied between a minimum of  $6.7 \times 10^3$  to a maximum of  $3.0 \times 10^6$  CFU/ml. In case of sediment samples, TPCs varied between a minimum value of  $8.1 \times 10^3$  to a maximum value of  $4.8 \times 10^6$  CFU/g. The presumptive *Vibrio* count (PVC) of farm water samples varied from  $7 \times 10^1$  to  $1.86 \times 10^5$  CFU/ml. The presumptive *Vibrio* count of the pond sediment ranged from  $<10$  to  $1.45 \times 10^6$  CFU/g. The presumptive *Vibrio* count of sediment in shrimp pond increased with the length of time as it was  $5.0 \times 10^2$  CFU/g in pond sediment on 20 DOC whereas it peaked from  $2.2 \times 10^4$  to  $1.45 \times 10^6$  CFU/g at the end of crop as per the observations in this study. The TPC and PVC of sediment recorded were always higher compared to pond water sample. On the other hand, hatchery water harboured higher bacterial load and presumptive *Vibrio* count compared to the shrimp larvae. Totally 3 genera and 12 species of bacteria were identified from the samples. Among the 83 isolates identified, *V. alginolyticus* constituted 42.16%, followed by *V. harveyi* (18.07%), *V. vulnificus* (15.66%), *V. metschnikovii* (7.23%), *V. parahaemolyticus* (3.61%), *V. fischeri*, *V. logei*, *V. mimicus* and *Aeromonas* spp. (2.

41% each), *V. campbellii*, *V. orientalis* and *Plesiomonas shigelloides* (1. 20 % each). *V. alginolyticus* (75. 00%) dominated in shrimp pond sediment while *V. harveyi* (48. 29%) dominant in shrimp pond water. Fourteen out of 15 *V. harveyi* strains were positive for luminescence forming the presence of luminescent *V. harveyi* at 93. 33 %. All *V. alginolyticus*, *V. harveyi*, *V. vulnificus* and *V. parahaemolyticus* were positive for gelatinase enzyme. All the three enzymes analyzed (amylase, gelatinase and lipase) were present in *V. parahaemolyticus* strains (3 nos). Dendrogram analysis of the three species tested was not able to genetically demarcate the virulence factors studied viz. production of amylase, gelatinase and lipase. However, it has been found that all the amylase lacking *V. alginolyticus* strains except one belonged to a single genogroup. Dendrogram analysis also confirmed the source independent genetic variability within the same species of *Vibrio* tested.

**Keywords:** Aquaculture, Shrimp, Bacterial pathogens, *Vibrio*, virulence.



## **INTEGRATED FISH FARMING PRACTICES IN GORAKHPUR DISTRICTS**

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### **Abstract:**

Its type of fish farming in which fish culture with crop or animal. In integrated fish farming approach composite fish culture with compatible combination of poultry and duckery. Under the system of farming, small livestock and farmyard animal viz. poultry and duck are integrated with composite fish culture by sitting animal housing unit on the pond embankment in such a way that the animal wastes and washing are fall fish pond for recycle. There are two type of integrated fish farming: (i) Integrated fish -duck farming, (ii) Integrated fish poultry farming.

**Integrated fish-duck farming:** This is an efficient integrated system based on the principle of waste recycling. A duck house is normally constructed on the pond water of floating platform. When given free range duck feed an aquatic organism such as insect larva. The duck dropping is directly feed by fishes. No other feed is applied on the pond.

Pond is prepared and a stock with fingerling at 6000 per hectare. Fingerling of over 10cm is prefer for stocking. About 200-400 duck are sufficient to adequately fertilize about 1 hectare pond.

**Integrated fish-poultry farming:** Under this system of integration the poultry bird is raised in cage under a shed. The dropping of bird falls on the floor from where this are collected and applied to the pond. The chicken house can also be built directly over the pond water so that excreta may fall in pond water underneath. Usually, 400-600 chicken per hectare of pond water surface are used. no feed or fertilizer are applied in the pond except aquatic vegetation the grass carp. fish production at the rate of 4-5 time per hectare is possible this system.

**Keywords:** Integrated fish farming, Aquaculture

## **ASSESSMENT OF WATER QUALITY AND HEAVY METALS POLLUTION OF SHAHPURA LAKE IN BHOPAL, INDIA**

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### **Abstract:**

A few samples were collected from the three different regions of the selected experimental water body i.e. Shahpura Lake, India. These sites are classified as S1- inlet; S2- Centre region and S3- Outlet region of the water body, from all these sites, samples were collected during the three different seasons viz; summer, monsoon and winter by using the appropriate methodology to assessed the water parameters like pH, TDS, and conductivity of the lake. In the current study researcher also focused on some selected heavy metals such Pb, Cd, Mn and Cu from the different sampling sites. Here we got the highly significant results ( $P < 0.001$ ) from all the regions of the water body. Due to this, from the present experimental study we came to an conclusion that due to the increased concentration of these heavy metals leads to the sever toxicity in the aquatic fauna of the Lake which directly leads to the various hazardous impact on the human population through the various anthropogenic hindrances in the food chain of the humans. Various minimizing measures were also initiated by the concern authorities to overcome this toxicity up to some extent.

## **CHALLENGES DURING BIO-FERTILIZER APPLICATION AND THEIR EFFECTIVENESS**

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### **Abstract:**

Performance unpredictability is one of the major drawbacks while using biofertilizer as an alternative to chemical. Therefore, the acceptance and adaptation of Biofertilizer for normal farming practices is not much attractive. The unpredictability is result of one or many constrains, as each and every soil have their own seasonal microbial population dynamics, based on the crop, edaphic factors, climate and farm practices. It is of vital importance for the consistency of biofertilizers performance to be improved. The performance is dependent on the biofertilizer production technology and soil microbiological activity. The biofertilizer technology is considered as a low-cost and ecofriendly technology; however, several factors limit its application or implementation. Some of major factors such as the technological, infrastructural, financial, environmental, human resources unawareness and quality, practices, Crop pattern, climatic factors, edaphic are influencing the performance. The different factors affect the final efficacy of the technology. Nepal is on the highly blessed country in terms of natural resources, and Organic Farming many change the economics of the country's farmers. Adaptation for Bio compost and biofertilizer is very high among the farmers. In present lecture I will focus on micro and medium level production of Biofertilizer using community cooperation. The lecture will deal with challenges and the better alternative and appropriate techniques and technology. This study will help to the policy makers as farmers to meet their need in closer vicinity.

**Keywords:** Biofertilizer, Community, Organic Farming, Biocomposting, Microbial population dynamics

**DFT FOCUSED INVESTIGATION OF STRUCTURAL, ELECTRONIC, ELASTIC, MECHANICAL AND OPTICAL PROPERTIES OF LEAD-FREE HALIDE BASED DOUBLE PEROVSKITES  $Rb_2GaInX_6$  (X = Cl, Br, I)**

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**Abstract:**

A FP-LAPW study of structural, electronic, elastic, mechanical and optical properties of lead-free halide based double perovskites  $Rb_2GaInX_6$  (X = Cl, Br, I), is performed using density functional theory in Wien2k. The ground state calculations are carried out using PBE-GGA, PBE-GGA + mBJ and LDA as exchange correlation potential. The computed electronic band and density of states plots demonstrate that all the investigated double perovskites exhibit semiconducting nature. The second order elastic constants are also calculated for  $Rb_2GaInX_6$  (X = Cl, Br, I), using the IRelast method as incorporated with Wien2k. The mechanical properties like bulk modulus, anisotropic factor, shear modulus and Poisson's ratio are also computed. The optical properties of the compounds such as dielectric constant, absorption coefficient, refractive index, reflectivity, optical conductivity are also calculated and plotted. Thermoelectric properties such as Seebeck coefficient, electrical conductivity, electronic thermal conductivity, power factor and figure of merit were calculated and plotted for the studied compounds.

**Keywords:** Density Functional Theory; energy dispersion curves; mechanical properties, Elastic properties, optical properties, Thermoelectric properties

**RESEARCH AND ANALYSIS OF NUMEROUS DISPLAY FEATURES OF A ROOM-TEMPERATURE TWISTED NEMATIC DISPLAY MATERIAL 6CHBT THROUGH SINGLE-WALLED CARBON NANOTUBE DOPING**

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**Abstract:**

The current research focuses on the optical, dielectric, and electro-optical characteristics of single-walled carbon nanotubes (SWCNTs) doped in the nematic matrix of the liquid crystalline material 4-(trans-4'-n-hexylcyclohexyl)isothiocyanatobenzene (6CHBT). The nematic liquid crystalline material used in the study is 6CHBT. It has been doped with SWCNTs of diameter ~ 0.8-1.4 nm and length ~100-300 nm. The nematic liquid crystalline material 6CHBT is an ideal base material for displays because of its low viscosity and nematic phase temperature range of 12.5 - 43.0 °C. SWCNTs have been doped in 6CHBT in two different concentrations i.e., 0.01 and 0.02% (weight ratio). For higher concentrations, CNTs were observed to be bundled at different locations. For this reason, higher concentrations were not studied. Using electro-optical and dielectric spectroscopy, the effects of SWCNTs doping on a number of display characteristics, including threshold voltage, dielectric anisotropy, and splay elastic constant, have been investigated. SWCNTs alignment parallel to the nematic direction is supported by the nematic phase. Yet, the SWCNTs enhance the local orientational arrangement of the molecules in the nematic phase. As a result, the inclusion of the SWCNTs significantly lowers the threshold voltage necessary to convert the molecules from planar (bright state) to homeotropic (dark state) shape.

**Keywords:** SWCNTs, Nematic Displays, 6CHBT, <sup>1</sup>H-NMR, <sup>13</sup>C-NMR and Display Parameters.

**DEVELOPMENT OF NOVEL WOVEN JUTE FIBRE REINFORCED COMPOSITE  
PANEL USING BAMBOO FIBER FILLED PBAT AS THE MATRIX**

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**Abstract:**

Ecofriendly and recyclability are the solutions that govern the future for sustainability. In order to deal with environmental issues, the present research is focused on the development of Jute polymer composite (JPC) panels from layered woven jute fiber reinforced with bamboo filled PBAT thermoplastic matrix. The woven jute fabric in 3 and 5 layers were laid with the matrix material between layers and hot pressed to form laminated panels. The effect of varying bamboo fiber loading in matrix on physical and mechanical properties of the panels was studied. Increasing bamboo content in the matrix exhibited positive trend in density, flexural strength and flexural modulus. Tensile strength tends to decline at 50% bamboo content. However, presence of bamboo fiber also resulted in higher water absorption and thickness swelling in the composite panels. TGA, DMA and SEM studies indicated the effect of bamboo fibers in the matrix on the characteristic of panels.

**Keywords:** Bamboo-PBAT composites, composite, Jute, PBAT,

## **COMPACT MICROSTRIP PATCH ANTENNA FOR MICROWAVE IMAGING IN EARLY BREAST CANCER DETECTION: DESIGN, ANALYSIS, AND TUMOR LOCALIZATION**

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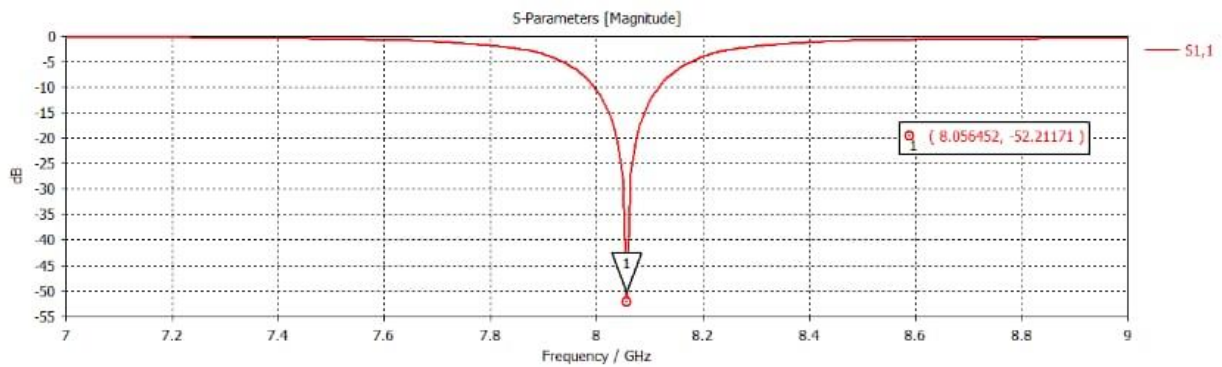
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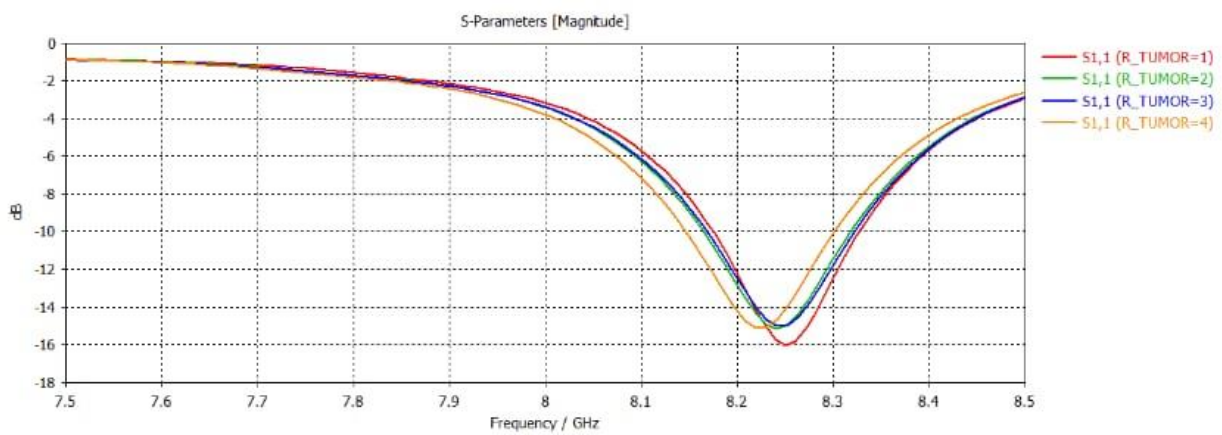
### **Abstract:**

Microwave Imaging has emerged as a promising tool for early-stage breast cancer detection. In this study, a compact microstrip inset fed rectangular patch antenna, measuring 17.75 x 15.16 x 1.21 mm<sup>3</sup>, was developed with the utilization of an RT 6202 substrate (0.51 mm thick, dielectric constant of 2.94). Additionally, a novel Breast organ model was crafted using the CST Studio Suite, enhancing the accuracy of the correlation between the results and realistic breast tissues. The research aimed to investigate the antenna's efficacy in detecting tumors within breast tissues. Results were analyzed through the assessment of  $S_{11}$  values and frequency shifts. The base case, representing a tumor-free scenario, exhibited an  $S_{11}$  minimum of -16.65301 and a frequency of 8.2753 GHz. Deviations in  $S_{11}$  values and frequency shifts relative to this base case demonstrated the antenna's capability to identify the presence of tumors. Varying the tumor's location, specifically increasing the distance from the patch and positioning it closer to denser glandular tissue, produced observable changes in return loss. Notably, the designed antenna showcased the ability to detect breast models even in the presence of the smallest 2mm-sized tumor. The system achieved a compact size, low-cost fabrication, and excellent performance metrics, including a remarkable insertion loss of -52 dB, high gain, and directivity. This innovative design and comprehensive analysis pave the way for a highly sensitive and specific microwave imaging system for early breast cancer detection. The integration of a compact-sized, cost-effective antenna offers a practical solution with remarkable performance metrics. The findings underscore the potential for future advancements in medical imaging technologies, improving the accuracy and early detection of breast cancer.

The outcomes of this study provide a promising foundation for the development of more effective and accessible diagnostic tools for early breast cancer detection, contributing significantly to the advancement of medical technology in combating this prevalent health concern.



**Fig 1: S<sub>11</sub>(dB) response of patch antenna**



**Fig. 2: Size variation study of tumors with corresponding change in antenna response.**

**Where R is radius of tumor in mm.**

**Keywords:** Breast cancer, Patch antenna, Frequency, Return loss and Directivity



## **NANOENGINEERED METAL DOPED POROUS CARBONACEOUS MATERIAL AS AIR CATHODE HOST FOR ALUMINUM-AIR BATTERY**

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### **Abstract:**

Energy demand and its immediate solution are, in fact, primordial needs in the modern world. However, until now, the Li-ion battery has been a viable and appealing option. However, the measure component of Li-ion batteries is problematic since lithium metal is scarce and has a high risk of bursting. The most advantageous substitute for Li-ion batteries is an aluminum battery, whose anode is made of less hazardous and less expensive aluminum. The air cathode host material, electrolytic solution, and design of the Al-Air battery all have a significant impact on its electrochemical efficiency. For the air cathode host material, the synthesis and nanoengineering of metal doped porous carbonaceous materials that provide easy oxygen passage to react with Al by virtue of different textural properties is primary focus. The metal doped porous carbon aerogel's surface area, pore size and catalytic effect make it a strong contender for an air cathode host material. The electrochemical measurement of a developed synthetic porous material and a conventional carbon cloth used as a current collector have been compared. The specific capacity in case of carbon aerogel coated on carbon cloth (CA@CC) has significant difference than specific capacity of commercially purchased carbon cloth specific capacity. As compared to a carbon cloth case, the resulting capacity is larger due to catalytic behavior of enhanced surface area in case of CA@CC. Electronic devices have been tested with the almost 1.2 V flat voltage that persisted throughout the discharge. Using a series combination of the proposed battery, several LEDs with varying power ratings have been used to evaluate the application portion of the Al-Air battery.

**Keywords:** Metal Air Battery, Engineered Porous Carbon material, Renewable Energy, and Al-Air Battery.

**ANALYSIS OF FORBUSH DECREASES WITH GEOMAGNETIC STORMS AND  
SOLAR WIND VELOCITY DURING INTERPLANETARY DISTURBANCES ON 18  
FEBRUARY 2011**

**Arvind Dhurve\*<sup>1</sup>, Anil Kumar Saxena<sup>2</sup>, Sri Krishn<sup>1</sup>,  
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**Abstract:**

The main purpose of this research paper is to analysis of the association of the Forbush Decreases with Geomagnetic Storms, Solar Wind Velocity & the IMF during FD on 18 February 2011. Result of the present analysis shows that SWv is geoeffective parameter but its impact varies in accordance with different Neutron monitors station situated in various rigidity. The correlation coefficient between SWv and CRI (SOPO) found to be -0. 6 for solar cycle 24. The correlation coefficient between Dst and CRI (SOPO) found to be 0. 7 for FD event. The correlation between magnitudes of cosmic ray Forbush decreases and magnitude of geomagnetic storms are found positive and high during FD events.

**Keywords:** Forbush decreases, Geomagnetic storms, interplanetary magnetic field, Solar wind speed, interplanetary disturbances.

## **USE OF MACH-ZEHNDER INTERFERENCE DEVICE LOGIC GATES IN PHOTONIC INTEGRATED CIRCUITS FOR OPTICAL COMPUTING**

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### **Abstract:**

The Mach–Zehnder interferometer (MZI) structures working on the principle of electro-optical effect shows the powerful ability to switch the optical signal from one output port to another output port. Hence, it is possible to construct some complex optical combinational digital circuits using the electro-optic effect based MZI structure as a basic building block in a Photonic Integrated Circuit (PIC). The implementation of electrical binary to optical gray code converters and even parity checkers can improve the performance of the digital logic circuits. The paper provides the elementary theory about the electro-optic effects and describes efficient techniques to implement the electrical binary to optical gray code converters and even parity checkers using appropriate configuration of electro-optic based MZIs as basic building blocks in PIC for use in Optical Computers (OC) working with photons instead of the normally used electrons in conventional Electronic Computers (EC). The OC hold special attraction for several of their advantages over EC like freedom from electromagnetic interference, much higher speed, enormously greater bandwidth, Bosonic nature of photon against fermionic nature of electron (giving it superior quantum mechanical advantage), lower power consumption and use of holographic memory advantages. The paper includes the detailed mathematical derivation and corresponding MATLAB simulation result related to the optical switching phenomena of MZI structure. The paper describes the efficient techniques to implement the electrical binary to optical gray code converters and even parity checkers with the suitable mathematical expression and relevant MATLAB results. The proposed devices are verified with the appropriate optiBPM software. Finally, the paper shows the detailed analysis to check the appropriate device parameters such as Thickness, switching voltages in order to obtain the optimum performance parameters such as cross-talk, extinction ratio and losses through the linear and curved waveguide section.

**Keywords:** Photonic Integrated Circuit, Code converter, MZI, Switching phenomena, Optical Computing

## **STELLAR EVOLUTION: THE BIRTH AND DEMISE OF A STAR**

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### **Abstract:**

We have ever wondered how stars are born, evolve, and eventually meet their demise? The stages of stellar evolution take us on an awe-inspiring journey through the birth, life, and death of stars. From the humble beginnings as a protostar to the explosive demise of a supernova, stars undergo a magnificent dance that shapes the fabric of the universe. Understanding stellar evolution allows us to comprehend the fundamental processes that give rise to the majestic objects that light up our night sky. These celestial bodies have fascinated humans for centuries, and their existence is deeply intertwined with the history of the universe itself. The present paper aims to provide insights into the stages of stellar evolution, history and future of the universe and unraveling the mysteries of these celestial giants that captivate our imagination. Moreover, the paper presents mechanisms that trigger star formation within vast molecular clouds, highlighting the role of gravity, temperature, and interstellar medium in shaping these nascent celestial bodies. This review paper will be helpful for the beginners in the field of stellar evolution.

**Keywords:** Stellar Evolution; Celestial Giants; Comic Metamorphosis; Planetary Nebulae

## ZINC OXIDE BASED PERFECT ABSORBER METAMATERIAL FOR INFRARED SPECTRAL BAND

Harshita and Vishnu Prasad Shrivastava\*

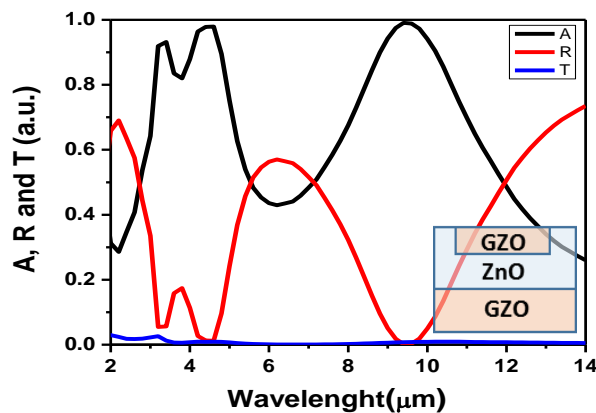
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### Abstract:

A Zinc Oxide (ZnO) based metamaterial perfect absorber (MPA) is developed to absorb both the long and mid-wavelength infrared light while allowing visible light (0.3-0.8  $\mu\text{m}$ ) to pass through. The MPA is made of three distinct layers: the top layer is a circular disk of Gallium doped ZnO (GZO), the second layer is a thin film of pure ZnO and the bottom layer is again a thin film of GZO. This MPA has a near perfect absorption of 98-99% at 4  $\mu\text{m}$  and 10  $\mu\text{m}$  wavelengths, with a bandwidth of 2.0  $\mu\text{m}$  and 3.5  $\mu\text{m}$  respectively. Plus, the MPA has a transmission of 75% in the visible region. The absorption properties of the MPA is further optimized by varying the size of circular disk, thickness of spacer layer and angle of incidence of electromagnetic light to improve the absorber's performance. The proposed MPA is expected to have the applications in infrared sensors for stealth technology, thermal coolers/ emitters etc.



**Fig. 1: Absorption, reflection and Transmission spectra of Zinc oxide based perfect absorber with its design**

## **A NOVEL SYNTHESIS PEROVSKITE LANTHANUM FERRITE FOR LPG SENSING APPLICATION**

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### **Abstract:**

In past few decades, the researchers and scientists have focused their attention on perovskite type metal oxide ceramic materials due to their significant applications in microelectronic circuits, fuel cells, sensors, catalysts, optoelectronic devices and coatings for the passivation of surfaces with rust. In addition, the properties of perovskite materials can be easily changed by suitable addition of dopants. A lot of research literature was available on ferrite oxide for sensing applications. Ferric oxide can be further modified by several additions to make composite in ferrite structure and modified structure have better properties than pure ferric oxide. In recent years, our research group have used the rare earth oxide for modification of properties of ferric oxide. Rare earth oxides are well known to display a fast oxygen ion mobility, high surface basicity and interesting catalytic properties. Thus, the composite of ferric oxide and rare earth oxide (lanthanum oxide), the perovskite  $\text{LaFeO}_3$ , was also found to be a very promising candidate for sensing. It shows a p-type semiconducting nature due to oxygen deficiency.

In present investigation, lanthanum ferrite was successfully synthesized by citrate-nitrate auto-combustion route. The synthesized samples are characterized using X-ray diffraction, Scanning electron microscopy, UV-vis absorption spectroscopy and Differential Scanning Calorimetry. The study of X-ray diffraction confirmed the formation of lanthanum ferrite nanocomposite whose average minimum crystallite size was 40 nm.

### **Acknowledgement:**

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**A STUDY BASED ON DENSITY FUNCTIONAL THEORY ON THE  
NANOSTRUCTURED THERMAL DONORS IN CZOCHRALSKI (CZ) SILICON  
WAFERS**

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**Abstract:**

CZ-Silicon with different dopants such as hydrogen, nitrogen, boron, argon have been successfully used with better efficiency in many devices and one can certainly hope for relatively better prospects in near future. As silicon is mostly used material in Integrated Chips and Solar panels manufacturing. Now a days, the development of highly efficient, non-carbon based and environment friendly energy sources are required such as solar panels. Therefore, this study is not only important but essential for the future technologies. Oxygen, the most common impurity with its concentration exceeding  $\sim 10^{18}$  atoms/cm<sup>3</sup>, is being introduced from the crucible during the early stages of growth of the crystal. These oxygen atoms in interstitial sites are electrically inactive but they create, upon low temperature annealing, high concentrations of electrically active centers called Thermal Double Donors or Thermal Donors (TDDs). The Its behavior is different under lower and higher temperatures annealing. Anneals at high temperature lead to the formation of amorphous SiO<sub>2</sub> precipitates that act as traps for fast diffusing metallic contaminants, such as Fe, Cu etc. High temperature ( $T > 700^{\circ}\text{C}$ ) anneals are now well understood. Details of lower temperature processes are still a matter of debate: measurements of oxygen diffusion into or out of the Si surface and O<sub>i</sub> atom aggregation have implied enhanced diffusion that has a variously been attributed to interactions of O<sub>i</sub> atoms with lattice vacancies, self-interstitials, metallic elements, carbon, hydrogen impurities etc. The Models of oxygen related nanostructured thermal donor defects in the CZ-Silicon are proposed and examined through Gaussian software. We have calculated the FTIR frequencies for these defect structures with different DFT methods along with different basis sets. For DFT calculations, various energy functionals as LSDA, BPV86, B3LYP, etc are utilized for computation of different properties of proposed defect structures. With each method and energy functional, some basic sets as STO-3G, 3-21G, 6-31G, 6-311G, etc are also can be used alongwith polarized or unpolarised states. Dimers and Trimers do play an important role in the formation of donors. Trimers in no y-lid, one y-lid and two y-lid configurations have been examined.

**Keywords:** CZ-Silicon, Thermal Double Donors, DFT, Oxygen Interstitial etc.

**EFFECT OF MgO AND DIELECTRIC RELAXATION PROPERTIES OF  
PEO–Mg(CF<sub>3</sub>SO<sub>3</sub>)<sub>2</sub> POLYMER ELECTROLYTE FOR MAGNESIUM BATTERIES**

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**Abstract:**

In this paper, we report the effect of MgO Polymer electrolyte based on polyethylene oxide (PEO)-Magnesium triflate (Mg(CF<sub>3</sub>SO<sub>3</sub>)<sub>2</sub>) with different concentrations of MgO using standard solution casting method. The electrical properties have been carried out using electrochemical impedance spectroscopy (EIS). The dielectric constant and tangent loss were measured in the frequency range from 100 Hz to 32 MHz at different temperatures from 303 K to 333 K. The highest conductivity of  $8.48 \times 10^{-4} \text{ Scm}^{-1}$  has been observed for 1 wt.% of MgO polymer electrolyte system. The polymer electrolyte conduction within polyethylene oxide (PEO)-Magnesium triflate (Mg(CF<sub>3</sub>SO<sub>3</sub>)<sub>2</sub>) is established using CV study and electrochemical stability window of ~ 4.0 V is determined using linear sweep voltammetry. Perhaps these ionic liquid based polymer electrolytes are suitable for application in electrochemical device, especially in magnesium-based batteries.

**Keywords:** PEO; MgO; Magnesium ion conduction; CV; AFM; SEM; Dielectric and battery studies



**A 'SINGLE' AND 'COMBINATORIAL' DRUG-NANOCOMPOSITE EMBEDDED CONTACT LENS FOR THE MANAGEMENT OF GLAUCOMA IN RESPONSE TO OCULAR ENZYME**

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**Introduction:** Glaucoma is a neurodegenerative disorder that results in the damage of retinal ganglion cells due to elevated Intraocular Pressure (IOP). To manage, several ocular suspensions and eye drops are available in the market, however, it lacks poor bioavailability.

**Aim & Objective:** The present works describe the fabrication of 'single' and 'combinatorial' drugs that is Latanoprost (LP) and Latanoprost-Timolol (LP-TM) deliverable Contact Lens (CLs) in response to lysozyme, abundantly available in the lacrimal fluid of human being. To achieve the said innovation, the fabrication of 'single' and 'combinatorial' drug-deliverable pHEMA CLs will be performed followed by optical and surface morphological studies, mechanical properties, and drug delivery experiments in the presence of lysozyme. Further, cytotoxicity and safety analysis of CLs by in vitro, in vivo, and ex vivo studies.

**Methodology:** The fabrication of lysozyme-responsive CL was performed by the free radical copolymerization of pHEMA, drug-loaded nanocomposite in the presence of UV-curing initiators. The surface morphological and mechanical properties were analyzed by FE-SEM, XPS, FT-IR, AFM, tensile strength, compression, and DSC-TGA studies. The fabricated 'LP-CL' and 'LP-TM-CL' was explored for drug release in response to naturally secreting enzyme for 72 h followed by in vitro cell culture and in vivo safety studies.

**Results and discussion:** The surface morphological studies revealed the presence of the drug in the CLs. The swelling, water contact angle, refractive index, tensile strength, and compression studies are on-par with the commercially available pHEMA CLs. The drug delivery experiments show 95.86 % (LP), 83.87 % (LP), and 86.70 % (TM) of drug release from LP-CL and LP-TM-CL in the presence of 1.5 mg/mL of lysozyme in 72 h of the study. In vitro, ex vivo, and in vivo ocular safety evaluation studies confirm the non-toxicity of the prepared CLs. Indian patent application number (202241071997).

**Conclusion:** The described 'single' and 'combinatorial' drug-loaded CLs could open a new avenue to manage glaucoma by maintaining mean diurnal IOP for a longer time in response to naturally secreting enzyme in eyes.

**Keywords:** Contact lens, Lysozyme, Chitosan, Latanoprost, Timolol

**ROLE OF INTERNATIONAL SOLAR ALLIANCE FOR SUSTAINABLE  
DEVELOPMENT**

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**Abstract:**

The International Solar Alliance (ISA) is known as action-oriented and mobilized efforts among various countries. It develops the cost-effective and transformational solar energy solutions. As ISA is a member-driven and collaborative platform, there are more than 120 countries working under its agreement. India is one of the member countries. The ISA working under structured framework for governance followed by a Director General, secretariat as administrative arm, an assembly as apex decision-making body and a steering committee for strategic guidance. Due to demand for sustainable development in the field of solar energy, ISA is framed with One Sun, One World, One Grid (OSOWOG) programme. In this contest the scheme named as Indian Technical and Economic Cooperation (ITEC) has been launched by India. These schemes are related to achieve the thousands billion of investments in solar energy solutions along with sustainable development.

**Keywords:** International Solar Alliance, sustainable development, solar energy

## **AN OPTICAL FILTER DEVICE BASED ON PHOTONIC CRYSTAL WITH DOUBLE DEFECT**

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### **Abstract:**

This paper presents a theoretical analysis of a one-dimensional photonic crystal (1D PC) featuring a double defect structure, with a focus on its potential application as an optical filter. Employing the transfer matrix method, we compute the transmission spectrum and discern two distinct peaks situated within the photonic band gap. Each peak corresponds to one of the defects present in the structure. Additionally, we investigate the influence of altering the number of unit cells between these defects. The outcomes of our study indicate that the 1D PC with a double defect structure holds promise as an efficiently tuned dual-channel optical filter.

**Keywords:** photonic crystal, transfer matrix method, transmission spectra etc.

## **HOW TO CONTRIBUTE IN ACHIEVING THE SUSTAINABLE DEVELOPMENT GOALS**

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### **Abstract:**

The satisfaction of human needs and aspirations is the major objective of development. The essential needs of vast numbers of people in developing countries for food, clothing, shelter, jobs - are not being met, and beyond their basic needs these people have legitimate aspirations for an improved quality of life. A world in which poverty and inequity are endemic will always be prone to ecological and other crises. Sustainable development requires meeting the basic needs of all and extending to all the opportunity to satisfy their aspirations for a better life. Living standards that go beyond the basic minimum are sustainable only if consumption standards everywhere have regard for long term sustainability. Yet many of us live beyond the world's ecological means, for instance in our patterns of energy use. Perceived needs are socially and culturally determined, and sustainable development requires the promotion of values that encourage consumption standards that are within the bounds of the ecological possible and to which all can reasonably aspire. Meeting essential needs depends in part on achieving full growth potential, and sustainable development clearly requires economic growth in places where such needs are not being met. Elsewhere, it can be consistent with economic growth, provided the content of growth reflects the broad principles of sustainability and non-exploitation of others. But growth by itself is not enough. High levels of productive activity and widespread poverty can coexist, and can endanger the environment. Hence sustainable development requires that societies meet human needs both by increasing productive potential and by ensuring equitable opportunities for all. Increase in population increases the pressure on resources and slows the rise in living standards in areas where deprivation is widespread. Though the issue is not merely one of population size but of the distribution of resources, sustainable development can only be pursued if demographic developments are in harmony with the changing productive potential of the ecosystem. The direction of technological developments may solve some immediate problems but lead to even greater ones. Settled agriculture, the diversion of watercourses, the extraction of minerals, the emission of heat and noxious gases into the atmosphere, commercial forests, and genetic manipulation are all examples of human intervention in natural systems during the course of development. Today's interventions are more drastic in scale and impact, and more threatening to life-support systems both locally and globally. Growth has no set limits in terms of population or resource use beyond which lies ecological disaster. In this presentation few pathways are incorporated to contribute in achieving the targets of sustainable development goals by following life style for environment.

**Keywords:** Sustainable, Development, Life Style, Climate Change, Mission

## **STUDY OF DEHYDRATION MECHANISM OF TOMATO LEAF USING TERAHERTZ SPECTROSCOPY TECHNIQUE**

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### **Abstract:**

This study focuses on employing terahertz (THz) analysis as a non-invasive and non-ionizing technique to investigate the dehydration mechanism in tomato leaves. The primary objective is to elucidate the relationship between water content in the leaf and terahertz transmission while comparing the results obtained through this method with gravimetry for validation purposes. Using an 0.11 THz continuous wave IMPATT diode terahertz source and a microbolometer-based terahertz detector, the intensity of the transmitted signal while dehydrating tomato leaves at room temperature over time was recorded. Simultaneously, gravimetric analysis was performed, manually measuring leaf weight and thickness using a microbalance and vernier calipers, respectively, to comprehend the dehydration process.

The gravimetry analysis revealed an exponential decay pattern with a fitting parameter of 99%, accurately depicting the recorded data and illustrating the dehydration process within the leaf. This strong correlation, depicting the percentage change in leaf water mass over time during dehydration, highlights the precise capture of water loss kinetics within the leaf structure through gravimetry. Simultaneously, the terahertz technique exhibited a similar trend in the measured absorption coefficient throughout the leaf dehydration process. The concurrence observed between gravimetry, and terahertz analyses underscores the sensitivity and reliability of both methodologies in detecting changes in water content within the leaf. Independently, both gravimetry and terahertz analysis have showcased the dehydration process in tomato leaves following an exponential decay pattern. It is important to highlight that gravimetry, while time-consuming and invasive, was utilized in this study solely for result comparison purposes. The key advantage of the terahertz technique approach lies in its non-invasive nature, providing real-time insights into plant hydration dynamics without damaging the sample. Moreover, the ability to estimate chlorophyll concentration using terahertz analysis presents an additional dimension for comprehensive plant health assessment without the need for invasive procedures.

This research establishes a promising pathway for employing terahertz-based methods in precision agriculture, offering a non-destructive, rapid, and comprehensive means of assessing plant hydration levels and chlorophyll concentration crucial for understanding plant health.

**Keywords:** Tomato Leaves, Water Concentration, Dehydration Mechanism, Terahertz Analysis, Gravimetry.

## **INTERFACIAL CHARGE TRANSFER IN 2D/3D SEMICONDUCTING HETEROSTRUCTURE FOR EFFICIENT THz GENERATION**

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### **Abstract:**

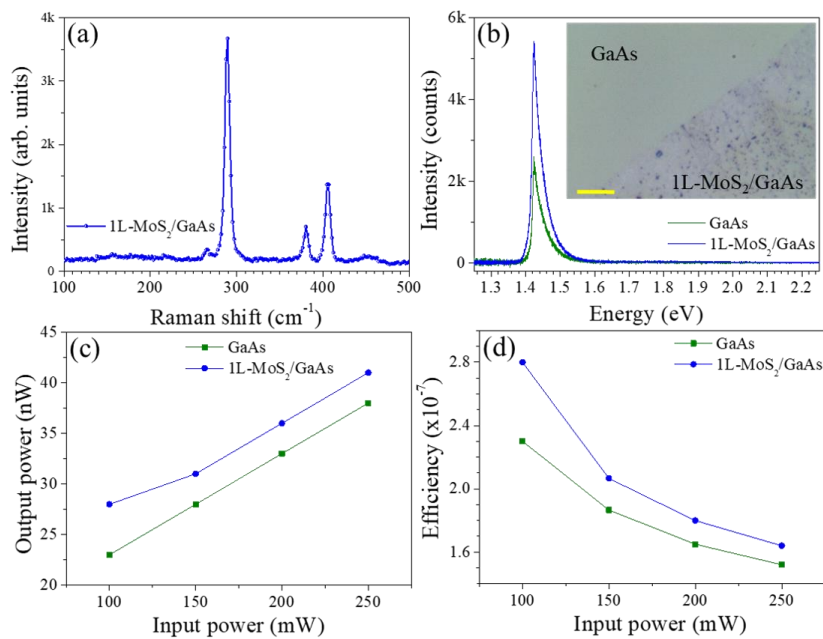
Monolayer molybdenum disulfide (1L-MoS<sub>2</sub>) is a two-dimensional (2D) material that has gained significant attention in the field of nanotechnology due to its remarkable electronic, and optical properties such as direct band gap in the visible range (1.84 eV), band tunability, exhibit ultrafast process under femtosecond laser pulse and terahertz (THz) generation due to second harmonic generation (SHG) [1,2]. Similarly, gallium arsenide (GaAs) is a known three-dimensional (3D) direct band gap (1.42 eV) semiconductor with relatively higher electron mobility (8000 cm<sup>2</sup>V<sup>-1</sup>s<sup>-1</sup> at RT) which makes it suitable for designing optoelectronic devices and various linear integrated circuits [3]. One of the primary mechanisms for THz generation in GaAs is optical rectification.

THz radiation falls in the electromagnetic spectrum between microwave and infrared frequencies, typically ranging from 0.1 to 10 THz. The heterostructure formed by combining monolayer 1L-MoS<sub>2</sub> and GaAs can be designed innovatively, to leverage the unique properties of each material for THz generation. The interaction between constituent materials in a heterostructure can lead to novel effects and enhanced performance. The THz generation might occur in a 1L-MoS<sub>2</sub>/GaAs heterostructure due to nonlinear optical processes at heterojunction interface, interband and intraband transitions, synergy of chemical properties, control over band alignment and optical rectification and second harmonic generation is preferred.

With this aim, we fabricated the heterostructure by transferring chemical vapour deposition (CVD)-grown 1L-MoS<sub>2</sub> from SiO<sub>2</sub>/Si substrates onto GaAs substrates by wet polymeric transfer method [4]. The optical microscopic analysis depicts the successful 1L-MoS<sub>2</sub> film transfer (Fig. 1b). The Raman analysis confirms the phase of heterostructure with signature Raman modes of GaAs with TO (265 cm<sup>-1</sup>), LO (290 cm<sup>-1</sup>), and 1L-MoS<sub>2</sub> with E<sup>1</sup><sub>2g</sub> (385 cm<sup>-1</sup>), A<sub>1g</sub> (404 cm<sup>-1</sup>) (Fig.1a) [5]. Generally, photoluminescence (PL) was carried out to measure the band alignment and charge-transfer. The PL result shows the intensity enhancement, around ~2

times at emission energy of GaAs (1.42 eV). Interestingly, the 1L-MoS<sub>2</sub> emission energy (1.84 eV) is found to be absent in heterostructure (Fig.1b). The observed result is attributed to the electron transfer from 1L-MoS<sub>2</sub> film to GaAs substrate. As a result, radiative carrier combinations occur with energy, 1.42 eV. As 1L-MoS<sub>2</sub> has a high absorption coefficient for visible light, which results in the absorption of continuous laser (532 nm) and generated carriers transfer to GaAs. Further, THz generation is carried out for heterostructure to observe the carriers under femtosecond laser [6]. The output power is found to be higher in heterostructure than GaAs for all input femtosecond laser powers: 100, 150, 200 and 250 mW (Fig. 1c). The THz signal efficiency was calculated and found to be increased for heterostructure than individual GaAs substrate (Fig. 1d). The results can be attributed to the dominance of optical rectification process over SHG. Moreover, optical rectification is further enhanced by SHG. Our further studies such as THz spectroscopy can reveal much information about heterostructure and other non-linear processes. In summary, 1L-MoS<sub>2</sub>/GaAs heterostructure offers exciting opportunities to create compact and efficient terahertz devices with tunable properties for various applications.

**Keywords:** Photoluminescence, Thz Generation, 2D Material, Heterostructure.



**Fig. 1: (a) Raman analysis of 1L-MoS<sub>2</sub>/GaAs heterostructure, showing characteristic peaks of both 1L-MoS<sub>2</sub> and GaAs. (b) PL analysis of both 1L-MoS<sub>2</sub> and GaAs showing the enhancement of peak intensity. Scale bar: 10 μm. Plot of (c) THz power and (d) Efficiency versus incident laser power versus for both GaAs and 1L-MoS<sub>2</sub>/GaAs heterostructure**



**ZnO NANOSTRUCTURED MATERIALS FOR APPLICATIONS IN SOLAR CELLS:  
A REVIEW**

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**Abstract:**

ZnO is a material of interest for use in photonics, acoustics, electronics, and sensing applications. When it comes to optical emitters, ZnO's high exciton binding energy (60 meV) puts it ahead of other semiconductors. However, achieving consistent and dependable p-type doping in ZnO is still the primary barrier to the realization of bipolar devices. The alteration of ZnO properties through the addition of dopants or impurities has become a newly discovered topic. Doping ZnO, or using ZnO as a host material, is a phenomenon that scientists will create by altering its electronic structure to modify its optical, structural, electrical, and magnetic properties. Doping results lead to improvements in a variety of applications, including antibacterial, photocatalytic, optoelectronic, spintronic, and electronic. These enhancements in various application domains can be attributed to its direct band gap energy, luminescence, elevated electron mobility, and controversial room-temperature ferromagnetic behavior in various configurations such as single crystals, thin films, powders, and nanostructures. The present review is intended to report the latest advancements in the use of ZnO nanostructured materials in excitonic solar cells, which include organic, hybrid, and dye-sensitized solar cells. Particular attention is given to ZnO semiconductor oxide's one-dimensional (1D), vertically oriented nanostructures as well as the substantial research efforts undertaken recently to explore its potential as an electron acceptor material for solar cells.

**Keywords:** Solar cells, ZnO, Nanostructures, Photovoltaic.

## **CHARACTERIZATION TECHNIQUE AND RESEARCH IMPACT ON BLUE-PHASE LIQUID CRYSTALS FOR APPLICATION IN ADVANCED DISPLAY DEVICES**

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### **Abstract:**

Liquid crystals (LCs) are very remarkable soft condensed materials for application in engineering and biomedical technology such as display and biomolecule diagnosis. Herein, we studied the characterization and properties of the Blue phase liquid crystals (BPLCs) used in three dimensional (3D) Photonics crystals for advanced applications in a wide range of fields including self-assembling tunable photonic crystals and fast-response displays. BPLCs exhibit a sub-millisecond response time, 3D cubic structure, macroscopic optical anisotropy, and high contrast ratio. The present paper has focused on the latest impact and characterization techniques for the dielectric and electro-optical properties of BPLCs with function of frequency, temperature, and applied electric field. The characterization techniques of BPLCs have been highlighted the applications of BPLCs in bio-medical engineering and technology.

**Keywords:** Blue phase Liquid crystal, Dielectric properties, Response time, Photonics devices.

**LUMINESCENCE STUDY OF THE RARE EARTH IONS (Nd<sup>3+</sup>) DOPED IN  
Sr<sub>3</sub>Bi(PO<sub>4</sub>)<sub>3</sub>**

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**Abstract:**

The host Sr<sub>3</sub>Bi(PO<sub>4</sub>)<sub>3</sub> and series of the rare earth ions (Nd<sup>3+</sup>) doped phosphors were prepared by using high temperature solid-state method at 1100 C in air. To the best of our knowledge, no paper has been published on the preparation of (Nd<sup>3+</sup>) doped Sr<sub>3</sub>Bi(PO<sub>4</sub>)<sub>3</sub> phosphor. The phase identification and the morphological nature were studied by Powder XRD and SEM characterization tools respectively. The UV – NIR and the energy transfer (ET) mechanism of (Nd<sup>3+</sup>) doped phosphors were studied. The emission and excitation spectra were measured. The luminescence intensity was enhanced with increasing (Nd<sup>3+</sup>) content and the emission reached the maximum intensity at x=0.05 in Sr<sub>3</sub>Bi(PO<sub>4</sub>)<sub>3</sub>:x (Nd<sup>3+</sup>). Moreover, the concentration quenching effect of (Nd<sup>3+</sup>) in Sr<sub>3</sub>Bi(PO<sub>4</sub>)<sub>3</sub> can be observed. The energy transfer behaviour in the phosphors discussed. Reitveld refinement of the above sample was studied.

A promising host material for easy-synthesis, cheap price, high efficiency and chemical/chemical-stabilities over a quite wide range of temperature are Phosphates, hence we prepared above sample which can be beneficial in a variety of industries

**Keywords:** Photoluminescence, Phosphates, Rare earth ion, Morphological nature

**DESIGNING SECURITY PROTOCOL USING IMAGE ENCRYPTION FOR P300-  
BASED BCI**

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**Abstract:**

The brain-computer interface (BCI) operates as a communication pathway connecting the brain to an external device. BCI builds a connection between the human brain and a computer. P300-based BCIs enable users to operate external devices using their thoughts. P300-BCIs rely on the P300 wave, a form of event-related potential (ERP) triggered by an uncommon or unexpected event. This paper introduces an innovative security protocol for P300-based BCIs, aiming to enhance the confidentiality and integrity of transmitted information through image encryption techniques. We explore security attributes / threats and simulate image encryption within the context of P300-based BCIs. This paper suggests a transform-based image encoding algorithm which transforms an original image into an encoded one. Experimental observations demonstrate that the proposed method can deliver a significant level of security.

**Keywords:** Brain computer interface (BCI), P300-based BCI, Cyber-attacks, Image Encryption.

## **SOME RESULTS ON THE (NEUTRIX) CONVOLUTION OF GENERALIZED FUNCTIONS**

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### **Abstract:**

This work is built upon the (neutrix) convolution product defined on some generalized functions. We define the functions  $\sin_+^R x^k$ ,  $\sin_-^R x^k$ ,  $S_{k+}^R(x)$  and  $S_{k-}^R(x)$  associated with generalized Fresnel sin integral by using the ramp function  $R(x)$ . We then discuss its convolution product and neutrix convolution product with  $x^r$ ,  $x_+^r$  and  $x_-^r$ .

**ISOLATION AND CHARACTERIZATION OF NOVEL METHYL RED DEGRADING,  
*BIFIDOBACTERIUM BREVE* (HKMR03) FOR THE REMEDIATION OF TEXTILE  
INDUSTRY WASTEWATER**

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**Abstract:**

Azo dyes are recalcitrant and refractory pollutants that constitute a significant burden on the environment. Among azo dyes, methyl red dye is mutagenic and its persistence causes serious impacts on the environment and human health. The report here is focused on the decolorization treatment of water-soluble azo dye Methyl Red (MR). *Bifidobacterium breve* was isolated from the effluent treatment plant of a textile and dyeing industry. Further, the isolated bacterial strain *Bifidobacterium breve* was characterized on the basis of several morphological and biochemical tests as well as molecular sequencing (16S rRNA gene) analysis. Based on the results, the bacterial isolate was deposited at NCBI GenBank under accession numbers OR708513 (*Bifidobacterium breve* strain HKMR03). The ability of the bacterial strain to produce MR was screened by SIM (Sulphur Indole and Motility) test, Catalase test, Citrate test. At shaking condition this strain showed 99.63% decolorization of a toxic azo dye MR (90 ppm) within 24 h in a Mineral Salt Medium (MSM) at 37°C and pH 6.5. The degradation of MR was possible through a broad pH (3–11) and temperature (5–40°C) range. The scientific relevance of the paper: the azo dye MR (90 ppm) was decolorized by *Bifidobacterium breve* within 24h at shaking condition in MSM. This organism could decolorize MR at wide pH and temperature ranges.

**Keywords:** Decolorization, Degradation, Azo-Dye.

**SYNTHESIS OF MESOPOROUS CoOAlSiO<sub>4</sub> AND THEIR CATALYTIC  
IMPLEMENTATION OF CO<sub>2</sub> DECOMPOSITION**

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**Abstract:**

Global temperatures have risen due to the sudden increase in carbon dioxide levels in the atmosphere. Burning fossil fuels, deforestation and many other human-caused activities release carbon dioxide gas into the atmosphere, which destroys ecosystems, warms the planet, and raises ocean levels. One of the most important processes for reducing the global temperature is the breakdown of carbon dioxide. In this study, iminodiacetic acid is used as a template to synthesize mesoporous CoOAlSiO<sub>4</sub> by sol-gel method at room temperature. The subsequent characterizations, including XRD and BET validated that the synthesized material has crystallinity and mesoporous nature. Carbon dioxide is broken down in a catalytic reactor that has a U shape. Temperature and flow rate are two experimental parameters that are optimized for optimum conversion and oxygen selectivity.

**Keywords:** Mesoporous, Iminodiacetic Acid, CO<sub>2</sub> Decomposition.

## **SELECTIVE SENSING OF FREE BILIRUBIN USING COPPER METAL ORGANIC FRAMEWORK**

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### **Abstract:**

From a clinical point of view, excessive bilirubin (BR) level in the human body can cause diseases such as jaundice, liver failure, and mental disorders. Reaction diffusion frameworks are MOFs synthesized at room temperature via precipitation of MOFs as crystals by slow diffusion. A concentration gradient is created down the reaction tube when the initially separated reactants diffuse into one another. As a result of this gradient, smaller crystals form closer to the interface between metal ions and the agar that contains organic linkers as opposed to the dominant crystal growth regime, which is characterized by larger crystals down the tube because of the relatively lower supersaturation. There is a three dimensional growth of crystals since the crystal nuclei is trapped by the gel network and prevents sedimentation of crystals. In this work, a simple, easy, sensitive and selective material was developed for the non-enzymatic detection of bilirubin. A copper based metal organic framework was synthesized by diffusion controlled self-assembly of copper ions with citric acid and L-glutamic acid as linkers called reaction diffusion frameworks. The structure and stability of the material was characterized by UV-visible, photoluminescence, FT-IR, XPS, XRD, optical microscope, FESEM and TGA. The interaction between the copper reaction diffusion frameworks and bilirubin resulted in an observable color change from yellow to green facilitating visual detection of bilirubin at biological pH (7-7.6) with a detection limit down to 10  $\mu$ M. This material can very well be applied to detect hyperbilirubinemia in newborn or adults. This study is an initiative of designing material which is low cost, easy, sensitive and selective towards bilirubin and quick detection of the analyte even in the presence of other biomolecules which can be used as a point of care testing method.

**Keywords:** Jaundice, bilirubin, diffusion controlled, photoluminescence



**PHOTOCATALYTIC DEGRADATION OF METHYLENE BLUE DYE USING *Pedaliium murex* L. MUCILAGE MEDIATED NANO EGG SHAPED ZnO NPs**

**Sivasubbu Mangalanagasundari\*<sup>1</sup>, Karuppiah Muthu<sup>2</sup> and Kasi Murugan<sup>3</sup>**

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**Abstract:**

Industrial wastewater treatment and conversion into drinking are crucial for the environment and humanity as a whole since it reduces the ecosystem's burden and offers a fresh, less-explored supply of potable water for regions in need. As they don't use hazardous chemicals or solvents, the biological method is demonstrated as the most environmentally conscious and economically viable method of producing potent nanoparticles. Zinc oxide nanoparticles (ZnONPs) are widely utilized in electrochemical, antibacterial, sunscreen creams and lotions, cosmetics, and industrial applications. They are thought to be a much safer nanomaterial for the environment and living beings than other metallic nanoparticles. Since the dyes used in industry are hazardous and non-biodegradable, they pollute water sources and impede the light that passes through them, having a detrimental impact on the biological balance of the aquatic ecosystem, the mortality of aquatic life, and in some instances, people's wellbeing. Green synthesized ZnONPs are suggested as a safe and more efficient treatment option for industrial wastewater and the removal of toxic chemicals and colors. In the present study, egg-shaped ZnO NPs were co-precipitated in a single step by a green synthesis procedure using mucilage extract of *Pedaliium murex* L., commonly known as Bada Gokru, an annual weed, and herb traditionally used to alleviate kidney-related problems. The obtained UV-Vis spectrum's single strong peak at 350 nm confirmed the synthesized ZnO NP's spherical shape as predicted by Mie's theory. The SEM images also supported the egg shape of ZnO NPs. According to JCPDS CARD NO. 75-0576, the synthesized ZnO NPs were found to have a hexagonal wurtzite structure based on XRD results. The synthesized egg-shaped ZnO NP is discovered to be substantially more effective in photocatalysis and demonstrates 93.50% of methylene blue dye degradation in 150 minutes.

**Conclusion:** The ZnO NP nanocatalyst produced by *P. murex* mucilage enabled rapid dye degradation, opening the door for the widespread commercialization of wastewater treatment.

**Keywords:** Nano egg ZnO NPs, Methylene blue dye, *Pedaliium murex*, mucilage, green synthesis.

**SYNTHESIS, CHARACTERIZATION AND ANTIMICROBIAL STUDIES OF  
DIVALENT Cu (II), Co (II) COMPLEXES OF NEW AMINOPYRIMIDINE  
SCHIFF BASES**

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**Abstract:**

The novel schiff base has been synthesized by the condensation of 2-hydroxyl-1-naphthaldehyde with 2, 4 diamino 6- chloropyrimidine. The metal complexes of the Schiff base were prepared by the reaction of the Schiff base and Copper nitrate in ethanol solution. The complexes isolated, washed and dried. The Schiff base is pale yellow, while Cobalt complexes is light yellow. The synthesized compounds have been characterized by FT-IR, <sup>1</sup>H-NMR and UV-Vis techniques for the ligands and FT-IR, UV-Vis, all reactions monitored by TLC, molar conductivity and magnetic susceptibility measurements for the corresponding complexes. General formula of complexes are [M(L)<sub>2</sub>(H<sub>2</sub>O)<sub>2</sub>]. The complexe is paramagnetic. The results of the molar conductivity measurements indicated that all complexes are non-electrolytes in (DMSO). An octahedral geometry for all the complexes of. The ligands are bidentate, (L<sub>1</sub>) through phenolic (OH) and azomethine nitrogen. The ligand and its complexes were screened for their antifungal and antibacterial activity against *Aspergillus niger*, *Penicillium chrysogenum*, *Fusarium moneliforme*, *Aspergillus flavus* and *Escherichia coli*, *Salmonella typhi*, *Staphylococcus aureus*, *B. subtilis*. The result indicated that the complexes exhibited good antifungal and antibacterial activities.

**Keywords:** Heterocyclic Schiff bases, 2-hydroxyl-1-naphthaldehyde with 2, 4 diamino 6-chloropyrimidine, Antimicrobial Activity.

**DESIGN AND DEVELOPMENT OF AN INTEGRATED ELECTRODE SYSTEM FOR  
PRINTED ELECTROCHEMICAL MULTIPLE ANALYTES SENSORS FOR THE  
REAL-TIME MONITORING OF TOXIC HEAVY METAL IONS, BIOMOLECULES,  
AND CARCINOGENS IN FOODS**

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**Abstract:**

Electrochemistry, the chapter of chemistry that deals with the relations between electrical and chemical phenomena, has an ever-increasing impact on everybody's daily life. Out of the myriad applications of electrochemistry, considerable attention has been devoted to the fields of electrochemical (EC) sensing in recent decades. The emergence of nanotechnology as an indispensable tool for great advancement in science and technology has generated great capability of controlling materials at the nanometer scale and has enabled exciting opportunities to design materials with desirable electronic, ionic, photonic, and mechanical properties. In recent years, this development has also contributed to developing and fabricating new structures and devices for EC sensing applications. In this scenario, this work aims to address the challenges in the fields of EC sensing by the rational design of nano-functional materials using graphene quantum dots (GQD) and metal nanoclusters (MNC). The on-site monitoring of various analyte species in the diversity of fields by EC sensor requires considerable improvements in sensitivity, selectivity, and accuracy along with its inherently fast, compact, portable, and cost-effective properties. Herein, we are trying to meet the aforementioned needs by developing various nano-functional materials based on GQD and MNC. The various steps involved in the study are preparing different types of GQD and MNC-based materials, their characterization, developing modified electrodes using the prepared materials, studying their EC sensing properties, and examining the reasons/mechanisms behind the effective sensing behaviors. Thus, we successfully developed GQD and MNC-based materials and further explored the electrochemical sensing technique for detecting the toxic heavy metal ions in water bodies and biologically relevant molecules, including dopamine, serotonin, and glycine. Further, the studies were extended toward developing an integrated electrochemical screen-printed sensor electrode for real-time monitoring. Then, we are designing and developing novel ink materials for working, counter, and reference electrodes in the integrated electrochemical sensor for the selective and simultaneous sensing of the analytes. The studies will extend further to develop a multiple analytes sensor, simplifying the technology. The use of various templates such as paper, plastic-coated paper, and plastic materials for the sensor films must also be explored to get cost-effective and flexible sensors for versatile real-time applicability. Further, we are trying to utilize the above-mentioned electrochemical sensors for the detection of the main carcinogens present in processed food, such as acrolein, acrylamide, furans, aromatic azo dyes, and also the major adulterants used in foods for the development of integrated electrochemical sensor electrode for the real-time monitoring.

**Keywords:** Electrochemistry, Sensing, Graphene quantum dots, Metal nanoclusters

## SOLVENT-FREE GLYCEROL ETHERIFICATION CATALYZED VIA ALUMINOPHOSPHATE

Krishnaveni M. and Chellapandian Kannan\*

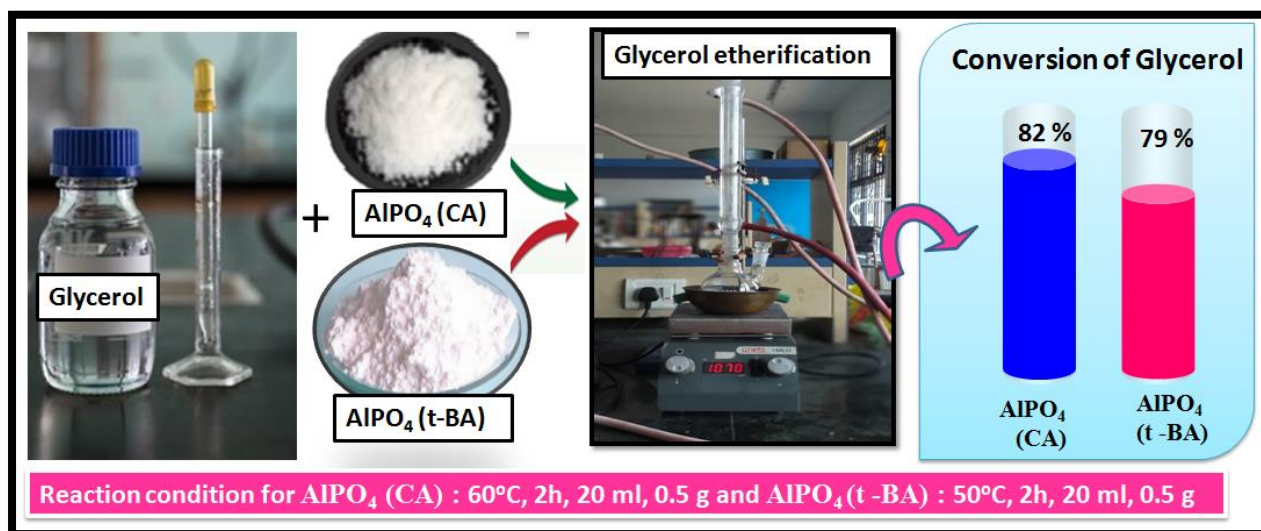
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### Abstract:

Biodiesel was produced as a feasible energy source in earlier decades. But throughout the manufacturing process, significant amounts of glycerol frequently occur as a byproduct. This paper investigates catalytic glycerol etherification without solvent over cyclohexylamine and tertiary butylamine templated  $\text{AlPO}_4$  catalysts. In perspective of glycerol conversion,  $\text{AlPO}_4$  (CA) showed the best results. Its large pore size and acidity were attributed for this outcome. The experimental conditions like temperature, time, monomer dosage and catalyst dosage are optimized for maximum conversion of glycerol into glycerol ether. An increase in catalyst amount enhanced the glycerol conversion. The optimized value for glycerol conversion was 82 and 71 % of  $\text{AlPO}_4$  (CA) and  $\text{AlPO}_4$  (t-BA) respectively.

**Keywords:** Cyclohexylamine (CA), tertiary butylamine (t-BA), aluminophosphate ( $\text{AlPO}_4$ ), glycerol, Etherification



## **A NOVEL CONCEPT OF PILLARED CATALYSIS FOR CO<sub>2</sub> DECOMPOSITION OVER INTERCROSSING FRAMEWORK OF MGO AND ALPO<sub>4</sub> CATALYST**

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### **Abstract:**

Multiple catalytic sites are important for pillared catalysis. To create multiple catalytic sites such as superoxide ion, oxyanion, octahedral Al<sup>3+</sup> and Mg<sup>2+</sup>, the template role is important. The template creates two separate frameworks of AlPO<sub>4</sub> and MgO. These two frameworks are intercrossing by the direction of template. These multiple active sites and intercrossing framework are exhibits as a single material. Such kind of material is not yet reported. The active sites and intercrossed framework are confirmed in the crystal structure drawn by XRD data. The BET analysis is proved the double mesopores formation, it may be due to the intercrossing of the two frameworks. The surface area is 60m<sup>2</sup>/g and pore volume is 2.9cm<sup>3</sup>/g. The TGA and TEM analysis are the supportive evidence for the intercrossing of the two frameworks. Though the surface area and pore volume is low, it is an effective catalyst for CO<sub>2</sub> decomposition at lower temperature compared to the conventional methods. The effective catalytic activity at lower temperature may be due to the cooperative effect of such active sites. The co-operative effect leads to the pillared assembling of CO<sub>2</sub> molecules and each oxygen has positive charge which are repel to each other through space and to reduce the activation energy. Moreover, two excess negative charges are appeared on each carbon of the pillar which is ready to shift the C-O bond towards oxygen. Thus the pillared mechanism reduces the activation energy of CO<sub>2</sub> decomposition (63%). To confirm the pillared assembling, a new equation is introduced in this article.

**Keywords:** Intercrossed Framework, Multiple Acidic Sites, Pillared Catalysis, CO<sub>2</sub> Decomposition

**SYNTHESIS OF HYBRID H1 TYPE MESOPOROUS MOLECULARSEIVES OF  
METAL ALUMINUMPHOSPHATE AND ITS APPLICATION AS CATALYTIC  
CRACKING OF WASTE POLYPROPYLENE TO FUEL THAT RESEMBLE DIESEL**

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**Abstract:**

Plastics have given rise to a multitude of environmental concerns owing to their extensive disposal, with a substantial portion finding its way into landfills and oceans. To address these challenges and mitigate resource depletion, the focus of this study is on generating a liquid substance through the catalytic cracking of discarded polypropylene (PP) plastics. To achieve this goal, Mesoporous metal Aluminum Phosphate is produced via a straightforward one-pot sol-gel approach. Subsequently, it undergoes characterization through FT-IR, BET, and WAXRD analyses. The X-ray diffraction (XRD) data provide evidence of two crystal systems: one being orthorhombic, representing aluminum phosphate, and the other trigonal, associated with  $\text{Co}^{2+}$ . These two systems give rise to a novel and intercrossed crystal structure. The BET analysis has disclosed the development of mesopores characterized as H1 type within the material. The oil samples display an astonishingly close match in terms of their physical and chemical properties, encompassing pH, density, viscosity, moisture content, ash content, and cetane index, in comparison to those of commercial diesel. The fuel produced exhibits a conversion rate of 100%, an exceptionally high selectivity for liquid fuel, and minimal carbon production. Notably, this study is unique in that it shows no wax production occurring at any stage of the process, distinguishing it from previous research.

**Keywords:** Waste PP, Novel Crystal Structure, Catalytic Cracking, Fuel Synthesis, No Wax



**TRACE LEVEL DETECTION AND ULTRA-RAPID REMOVAL OF TOXIC METAL IONS BY A NANO-MOS<sub>2</sub> DECORATED GRAPHENE AIDED BY THE UNIQUE COMBINATION OF AFFINITY AND ELECTROCHEMISTRY**

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**Abstract:**

Material science has always played a vital role in the evolution of provisions for humans. The emergence of nanoscience has made considerable improvements in materials applications. Amongst the nanomaterials, layered nanomaterials have gained a significant role since their discovery, and huge activity has been generated in most areas of science due to their exceptionally unique electrical, thermal, catalytic, optical, and mechanical properties. Particularly, graphene, the thinnest known and the strongest ever measured material in the universe has emerged as a rapidly rising star in the field of material science. Likewise, Molybdenum disulfide (MoS<sub>2</sub>), a graphite analogue, has gained the research community's attraction and attention due to its intriguing electrical and optical properties on the nanoscale. Henceforth, we have demonstrated the synthesis and the ultrafast Pb (II) removal capability of a partially reduced graphene oxide (prGO)-MoS<sub>2</sub>. The prGO-MoS<sub>2</sub> exhibited thin sheets of prGO covered more or less uniformly with nano MoS<sub>2</sub>, and the open architecture gave enhanced accessibility to the S<sup>2-</sup> and oxygen moieties present in prGO-MoS<sub>2</sub>. A single treatment of contaminated water samples with prGO-MoS<sub>2</sub> rapidly decreased the concentration of Pb (II) from 10,000 ppb to 0.8642 ppb within  $\leq 3$  minutes with an efficiency of  $\geq 99.99\%$  at a V/m ratio of 2000 mL/mg. Here, we delineated the high removal performance of Pb (II) by prGO-MoS<sub>2</sub> based on affinity between Pb (II) and S<sup>2-</sup> and oxygen moieties and electrochemistry and the unique structural characteristics. As we observed an ultra-rapid and selective Pb (II) removal by prGO-MoS<sub>2</sub> because of the synergetic effect of affinity and electrochemical (EC) mechanism, in this work, we utilized pGr-MoS<sub>2</sub> for the EC sensing of other metal ions, including Pb (II). As expected, prGO-MoS<sub>2</sub> exhibited a current response to Pb (II) and Cd (II) ions. The prGO-MoS<sub>2</sub> modified GCE exhibited a 200- and 100-fold increase in the current response, respectively, for Pb (II) and Cd (II) compared to the unmodified glassy carbon electrode (GCE). It showed selectivity towards Pb (II) and Cd (II), in the presence of metal ions such as Hg (II), Ag (I), Fe (II), Co (II), Ni (II), Zn (II), Sn (II), Cu (II), and Cr (VI) and exhibited the limit of detection (LOD) values of 20 ppt and 0.01 ppb for Pb (II) and Cd (II), respectively, and the LOD values satisfactorily meet the sensitivity requirement by US-EPA for detecting Pb (II) and Cd (II) in real environmental samples. The sensing performance of prGO-MoS<sub>2</sub>/GCE was tested using real environmental water samples spiked with Pb (II) and Cd (II), such as ground-, tap-, and wastewater, and was found to perform efficiently.

**Keywords:** Layered nanomaterials; Partially reduced graphene oxide; Molybdenum disulphide; Toxic metal ions; Electrochemistry.

## **INDUSTRIAL APPLICATION OF THz TIME-DOMAIN SPECTROSCOPY IN QUALITY ASSESSMENT OF RUBBER POLYMERS OF DIFFERENT BLENDS**

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### **Abstract:**

We report the use of THz time-domain spectroscopy for the measurements of the refractive index and absorption coefficients of different blends of butadiene and styrene-butadiene rubbers along with pure rubber polymers. The measurements were carried out between 0.6 to 2.6 THz range using THz time-domain spectroscopy in the reflection mode. In addition, we have also recorded the 2D images of the pure and the blended rubbers at 0.5, 1.0, 1.5, and 2.0 THz range to understand the diffusion mechanism of fillers and in the rubber matrix. The maximum absorption peaks were observed at 1.91 and 2.4 THz. Rubber is one of the principal materials used in our daily life which have multiple applications ranging from baby products to defence applications. The industrial production of rubber has revolutionized the use of different blends of rubber. The quality assessment of these blends in the production stage helps to deliver a fine product mainly in the tires of the different vehicles. THz time-domain spectroscopy is one of the few non-invasive spectroscopic techniques. The additional advantage is non-ionizable property. The experiment was carried out using TERAFLASH in Time Domain setup in reflection mode. The system is isolated using a pumping system to remove humidity and water absorption. The samples of different compositions of dimension 2.5cm\*2.5cm were subjected to THz source at a distance of 0.5 mm from the head. The data of the reflected electric field from the sample was recorded w.r.t to reference signal. The data collection was carried out using the Hanning window-based Fast Fourier Transform. The ratio of electric field amplitudes and phase difference including the phase corrections were calculated using Origin. The information was fed into the home-written Python code to extract the Refractive Index and Absorption coefficients of the samples. The calculated values are plotted w.r.t frequency. In the SBR/BR composites the refractive index of pure BR and SBR/BR-30/70 possess similar refractive index between 0.7 to 1.3 THz frequency range. We have observed many coinciding points in the SBR+BR composites in the given THz frequency range and have approximate same values of refractive index in the entire frequency range. The SBR/BR-70/30 have the highest absorption coefficient value in the given frequency range. All the composites have an absorption peak at the frequency of 2.43 THz.

In conclusion, we can use the THz time-domain spectroscopy technique to verify the exact composition of rubber polymer blends in the production stage by observing the position and intensity of the absorption peaks and the refractive index value. A single frequency 1.91 THz source can be used to assess the quality of the rubber polymer.

**Keywords:** Butadiene Rubber, Styrene-butadiene Rubber, THz TDS, Quality, Refractive Index



## **EXPLORING THE STRUCTURE-ACTIVITY RELATIONSHIP OF ESTRAGOLE AND ASCORBIC ACID: IMPLICATIONS FOR BIOACTIVITY AND THERAPEUTIC POTENTIAL**

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### **Abstract:**

This paper investigates the structure-activity relationship (SAR) of two naturally occurring compounds, estragole and ascorbic acid, with a focus on understanding their biological activities and therapeutic potential. Both compounds have been extensively studied for their diverse pharmacological effects, ranging from antimicrobial and antioxidant properties to potential anticancer activities. The SAR analysis aims to unravel the molecular features that contribute to their bioactivity based on the chemical structures. The molecular structures of the compounds under study are simulated using density functional theory. Thermochemical calculations (frequency) is carried out under room temperature with 1 atmospheric pressure using correlation functional B3LYP and triple zeta minimum value basis set 6-311G (d,p) is adopted. The molecular structures of the two flavonoids are optimized to attain their corresponding ground state energy with estragole as -436.5952176 hartrees, and ascorbic acid as -1676.8523 hartrees. Frontier molecular orbitals analysis revealed that for both estragole and ascorbic acid the lowest unoccupied molecular orbitals are to be spread over the electronegative oxygen atom, 1,2-dihydroxyethyl and 4-prop-2-enyl group, whereas the occupied molecular orbitals is spread over the benzene ring and 3,4-dihydroxy-2H-furan-5-one of the compounds which makes sense that they possess highest electron density and the highest reactive sites. Molecular descriptor analysis displays that electron removal ability for estragole is slightly higher when compared with ascorbic acid with an energy difference of 1.15 eV. Electron affinity of both compounds seems to be larger, i.e., for ascorbic acid denoting that there will be energy change during removal of atom from the compound with a difference of 3.5 eV. The hardness of estragole is slightly higher when compared to that of Ascorbic acid with the difference of 1.21 eV and softness of difference 0.2eV indicating higher degree of flexibility in terms of reaction for ascorbic acid. Both compounds have electronegativity with the difference of 2 eV, projecting the idea that they easily attract the invading radicals and scavenge them. Electrophilicity index of two compounds has major energy difference of about 8 eV indicating estragole to be less electrophilic making it to be better electron donor. target prediction analysis was done via Swiss Adme online database which selected numerous targets for both the compounds where top 10 targets are selected here for interpretation. Estragole prefers 10/10 targets whereas ascorbic acid prefers 5/5 targets. Insights gained from this SAR exploration may pave the way for the rational design of novel compounds with enhanced bioactivity and improved therapeutic profiles.

**Keywords:** SAR, Estragole, Ascorbic acid, DFT, Molecular descriptors

**TRANS-ESTERIFICATION OF USED COOKING OIL WITH TRIPLE-PORED  
COBALT ALUMINOPHOSPHATE FOR BIODIESEL PRODUCTION**

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**Abstract:**

Bio-diesel is a low-emission diesel alternative fuel made from naturally occurring renewable resources. It is a promising sustainable energy source. The manufacturing of biodiesel is thought to benefit from the use of used cooking oil as a feedstock. The trans-esterification reaction converts used cooking oil into biodiesel. For the production of biodiesel, cobalt substituted aluminophosphate is employed as a catalyst. Diethylenetriamine is utilised as a structure-directing agent in the synthesis of  $\text{CoAlPO}_4$ . The synthesised Cobalt aluminophosphate catalyst is characterized by using WAXRD, BET and FT-IR. The trans-esterification reaction has been carried out under conditions like temperature and molar ratio that are tuned for optimum conversion and selectivity. Biodiesel yield is 97% over Cobalt aluminophosphate. The resulting biodiesel is subjected to analysis through HPLC and further characterized through FT-IR. The FT-IR analysis confirms the occurrence of the transesterification reaction. Successful catalyst regeneration allows for up to 10 cycles of reuse. Reusability studies have demonstrated the catalyst efficiency for a maximum of 10 cycles.

**Keywords:** Cobalt aluminophosphate, Diethylenetriamine, Triple pore, Transesterification, Biodiesel.

**DESIGN, SYNTHESIS, CHARACTERIZATION AND BIOLOGICAL ACTIVITIES OF  
SOME DI-SUBSTITUTED QUINAZOLINES**

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**Abstract:**

A new series of N- [(2- hydroxynaphthalen- 1- yl) aryl- methyl] - N- (2- oxo- 4- aryl- 1, 2, 3, 4- tetrahydroquinazolin- 6- yl)- benzamides were synthesized. The reactions occurred under comparatively mild environment and afforded the desired product in fine yields. Molecular structures of the synthesized compounds were established by IR, 1H-NMR, 13C-NMR, MS spectra, and elemental analyses. In addition, all the concluding products were screened for in-vitro antibacterial activity against three Gram-positive and three Gram-negative bacteria and also tested for their inhibitory action against three strains of fungi employing the tube dilution or broth dilution technique as recommended by the NCCLS. Compound 4g showed some activity against all the bacterial (except *S. typhimurium*) and 4f against *Sporothrix schenkkii*.

**Keywords:** Quinazolines, tetrahydroquinazolines, antibacterial.

## **SYNTHESIS AND CHARACTERIZATION OF PECTIN STABILISED TIN OXIDE NANOCOMPOSITES**

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### **Abstract:**

The utilization of SnO<sub>2</sub> nanoparticles in gas sensors and magnetic data storage applications has gained significant attention. Pectin is a natural polymer with excellent stabilizing properties. The synergistic effect of pectin and SnO<sub>2</sub> in the nanocomposites can be employed for various applications. The aim of the present study is to synthesize pectin/tin oxide nanocomposites employing pectin as a stabilizing agent extracted from waste orange peels. Tin oxide is prepared using tin chloride as the precursor. The extracted pectin and synthesized SnO<sub>2</sub> were characterized using UV-vis absorption spectroscopy, FT-IR spectroscopy and X-Ray Diffraction technique. The degree of esterification for the extracted pectin was found to be 45.77%. FT-IR studies revealed the presence of hydroxyl and ester functional groups in pectin. XRD confirms the presence of tetragonal structure of SnO<sub>2</sub>. Pectin/SnO<sub>2</sub> nanocomposites were prepared at pH 3, 7 and 10. The pectin/SnO<sub>2</sub> nanocomposites obtained were characterized using different techniques to confirm their presence. UV absorption spectrum of pectin/SnO<sub>2</sub> nanocomposites synthesized at pH10 revealed the SPR band at 350 nm corresponding to SnO<sub>2</sub> nanoparticles. The intensity of OH peak and CO peak of ester and acid was reduced in pectin/SnO<sub>2</sub> nanocomposites when compared to pure pectin indicating the chemical interaction between pectin and SnO<sub>2</sub>. The peaks obtained for SnO<sub>2</sub>(29θ, 35θ and 51θ) were also present in pectin/SnO<sub>2</sub> nanocomposites. However, the noticeable shift in peak position is caused by the changes in the lattice structure of SnO<sub>2</sub> due to the incorporation of SnO<sub>2</sub> into the pectin matrix. AFM and FE-SEM images revealed that at pH 10 smaller tin oxide nanoparticles of nearly 37 nm were obtained. XPS study revealed that tin is present in +2 oxidation state inside the pectin matrix. In XPS study, the O1s peak of CO and COO<sup>-</sup> are shifted in pectin/SnO<sub>2</sub> nanocomposites, confirming the chemical interaction between SnO<sub>2</sub> nanoparticles and pectin.

**Keywords:** Pectin, Tin Oxide Nanoparticles, Green Synthesis

## DIASTEREOSELECTIVE SYNTHESIS POLYHYDROXY- $\alpha$ -AMINO ACIDS

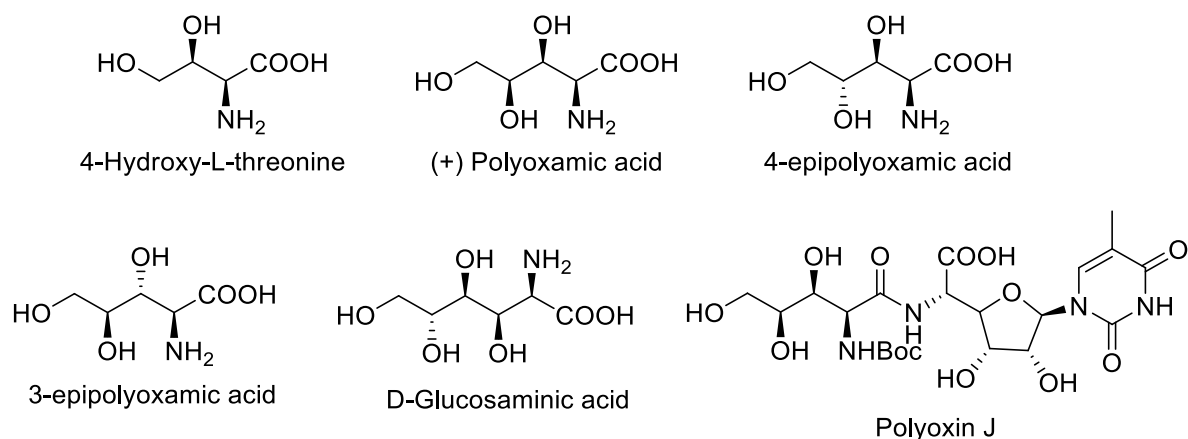
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### Abstract:

Polyhydroxy amino acids are constituents of a wide variety of natural products and are therefore very interesting synthetic targets. An efficient method for the synthesis of di-, tri- and tetrahydroxy  $\alpha$ -amino acid derivatives using asymmetric organocatalysis is reported. These amino acid derivatives and serine are incorporated in a tetrapeptide as the N-terminal residue to form peptides having 1 to 4 hydroxyl groups in the side-chain of the N-terminal residue. It is found that peptides having these hydroxyl residues can form organogels and the gelation properties are controlled by the number of hydroxyl groups present on the peptide. AFM analysis revealed that the nature of fibrillar structures formed by the peptides on a silicon surface varied in a predictable manner depending on the number of hydroxyl groups. The results indicate that the properties of peptide-based organogels can be tuned by incorporating amino acids containing varying numbers of hydroxyl groups in the side-chain. The results show that the incorporation of polyhydroxy amino acids is an effective method to vary the hydrophilicity of a given peptide without altering its net charge.



**Keywords:** Polyhydroxy amino acids, aminoxylation, peptides, organogels

## DIASTEREOSELECTIVE REDUCTION OF AMINO KETONES USING LUCHE REAGENT TOWARD THE SYNTHESIS OF HPA-12 AND ITS ANALOGUES

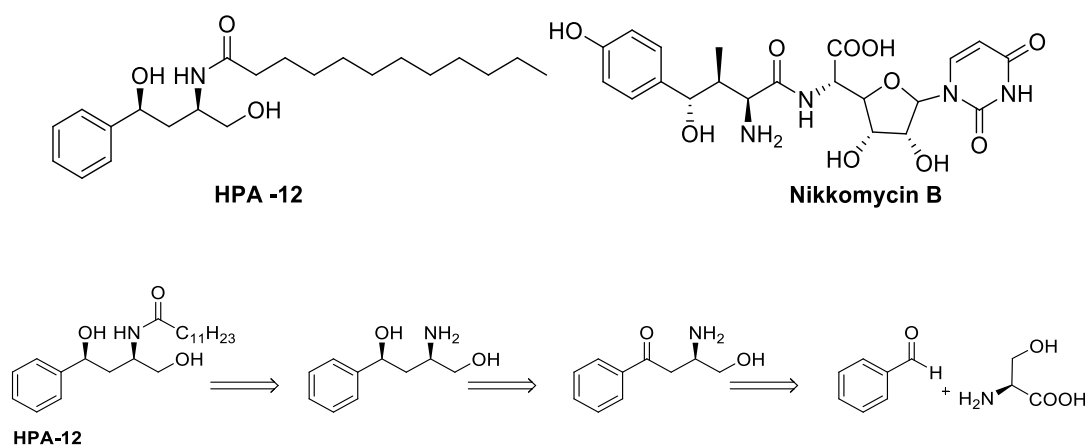
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### Abstract:

Diastereoselective reduction of N-protected  $\beta$ -amino ketones does not proceed effectively under the conditions used for chelation-controlled reductions of N-alkyl  $\beta$ -amino ketones. A thorough analysis of various conditions required for the stereoselective reduction of  $\alpha$ -aryl- $\alpha$ -oxo- $\beta$ -amino alcohols is reported. The products of the syn-selective reduction are used for the preparation of a ceramide trafficking inhibitor HPA-12 and analogue.



**Keywords:** Luche Reagent, Amino alcohol, HPA 12, Amino Acids.

**TREND ANALYSIS OF PM 2.5 CONCENTRATION IN DELHI CITY  
FOR PAST FIVE YEARS (2018-2022)**

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**Abstract:**

Air pollution poses a grave challenge in Delhi, the capital of India, particularly during winter months. This study delves into the analysis of PM 2.5 concentration trends from 2018 to 2022, providing insights into the yearly fluctuations in air quality. In 2018, PM 2.5 levels peaked at 425.75  $\mu\text{g}/\text{m}^3$  on 08-11-2018, reaching a minimum of 21.08  $\mu\text{g}/\text{m}^3$  on 25-08-2018, resulting in an annual average of 114.72  $\mu\text{g}/\text{m}^3$ . The subsequent years witnessed varying concentrations, with 2019 hitting a high of 544.71  $\mu\text{g}/\text{m}^3$  on 03-11-2019, and 2020 experiencing a peak of 521.68  $\mu\text{g}/\text{m}^3$  on 09-11-2020. Notably, 2021 recorded a reduced maximum of 403.58  $\mu\text{g}/\text{m}^3$  on 05-11-2021, and 2022 maintained this downward trend with a maximum of 405.38  $\mu\text{g}/\text{m}^3$  on 03-11-2022. The dataset offers a detailed view of PM 2.5 levels, capturing nuanced trends and fluctuations in air quality over these years, excluding 2017 data. This dataset reveals a discernible trend in pollution levels, shedding light on PM 2.5 concentration fluctuations. In 2018, a notable peak of 425.75  $\mu\text{g}/\text{m}^3$  signaled environmental concern. The following year, 2019, witnessed an even higher concentration of 544.71  $\mu\text{g}/\text{m}^3$ , indicating an escalation in air pollution. However, in 2020, there was a slight decrease in the maximum concentration to 521.68  $\mu\text{g}/\text{m}^3$ , suggesting a potential shift or mitigation efforts. This trend continued in 2021, with a further decrease to 403.58  $\mu\text{g}/\text{m}^3$ , indicating a positive direction in controlling pollution. Interestingly, 2022 maintained this downward trend, recording a maximum concentration of 405.38  $\mu\text{g}/\text{m}^3$ . The minimum concentrations also displayed a fluctuating pattern, possibly reflecting seasonal variations or external factors. Overall, the data paints a dynamic narrative of pollution trends, underscoring the importance of ongoing efforts to monitor and address air quality concerns.

**Keywords:** PM 2.5, Air quality, Pollution Trend

**A COMPARATIVE STUDY ON MICROWAVE-ASSISTED AND DRY HEATING  
TREATMENT METHODS ON PHYSICOCHEMICAL AND STRUCTURAL  
CHARACTERIZATION OF POTATO STARCH-XANTHAN**

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**Abstract:**

The effects of microwave-assisted heating treatment (MAHT) on pasting, rheological, gelatinization properties, functional, morphology and structural. Potato starch (PS) with xanthan gum (X) (1% based on starch) is heated via microwave-assisted heating treatment (MAHT) 600W for 0, 4, 8 and 12 min (PSX-0, PSX-4, PSX-8 and PSX-12), respectively in comparison with dry heating treatment (DHT) at 130°C for 240 min (PSX-240 min). The results revealed the pasting properties for PSX-8 min increase peak viscosities that increased 77% compared with untreated PSX-0. Rheological results suggested the formation of strong composite network structures and water-holding ability in PSX-8 min. The gelatinization temperature and enthalpy significantly as microwave heating time increase. PSX-8 min showed a sharp absorption peak of ester bond between potato starch- xanthan blend in Fourier transform infrared spectroscopy (FTIR). After MAHT, the particle morphology of PSX-8 min exhibited strong and smooth laminar structure. X-ray diffraction pattern showed PSX-8 min maintain the crystalline pattern remained B-type.



## EXPOSURE TO MICROPLASTICS FROM CONSUMER PRODUCTS

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### Abstract:

Plastics have been a mainstay of human lifestyle for decades and their global output is expected to reach 500 million tons by 2025. Plastics are difficult to degrade and mostly find their way to the environment, through improper disposal practices, including oceans, rivers, groundwater, etc. Plastics from different sources break down into smaller particles that are less than 5 mm in length due to weathering and other environmental processes called microplastics (MPs). MPs are ubiquitous and have been detected in different sizes, concentrations, and chemical compositions in food items, water, living beings, soil, and air; are globally distributed and are increasingly being identified as a threat to the ecosystem. MPs have been reported in tap water, bottled water, sugar, salt, seafood, beer and honey. Other than food products, there are various sources of MP pollution such as personal care and cosmetic products (PCCPs), textiles, disposable cups, and containers. The spectroscopic techniques used to identify and characterize MPs are Fourier transform *infrared spectroscopy* (FTIR), Raman spectroscopy, and scanning electron microscopy (SEM). The MPs that are washed down the drains from PCCPs are 37 billion microbeads/year and enter the environment. The fabrics used made of polymers like nylon, polyester, and acrylic sheds 48.6–307.6 mg/kg microfiber with every wash. The quantities of released MPs are in the range of 675-5984, 781-4951, and 838-5215 particles/L for polyethylene (PE)-coated paper cups, polypropylene (PP), and polystyrene (PS) cups. The concentrations of MPs found in sea salt and sugar were  $151.3 \pm 61.8$  and  $226 \pm 99.5$  particles/kg respectively. In recent years, MP contamination in food products and beverages has gained attention. Human exposure to MPs takes place through different routes: ingestion (water or food), inhalation (indoor and outdoor air), and dermal contact (personal care products, fabrics, and mobile phone cases). MPs can easily be ingested by various marine organisms, entering the food chain at its lowest levels. When these contaminated organisms in the form of seafood are consumed by humans, there is a risk of MPs being transferred to human bodies. The use of consumer products such as face creams, facial cleansers, and toothpaste contains MP, which damages skin due to local inflammation and cytotoxicity. Owing to their small size, they can be easily inhaled and may accumulate in the lungs, resulting in respiratory issues such as throat irritation, shortness of breath, chest pain, coughing, etc. Exposure to MPs can cause oxidative stress, metabolic dysfunction, immunological responses, neurotoxicity, and impacts on developing and reproductive systems. These consumer products release a significant amount of MPs into the environment and have adverse health effects on humans. Nonetheless, knowledge of MP toxicity is still limited and largely influenced by the concentration of exposure, particle properties, and adsorbed contaminants, requiring more research.

**Keywords:** Microplastics; environment; food; spectroscopy; health-effects.

## **GROWTH AND PROPERTIES OF ELECTRODEPOSITED CuAlSe<sub>2</sub>**

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### **Abstract:**

In the present work we investigate the growth and studies of electrodeposited CuAlSe<sub>2</sub> thin films on fluorine doped tin oxide (FTO) coated glass substrate. Thin films of CuAlSe<sub>2</sub> were co-deposited from an aqueous solution containing CuCl<sub>2</sub>, AlCl<sub>3</sub> and SeO<sub>2</sub> adjusted to pH near 2. CuAlSe<sub>2</sub> thin films were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and Energy dispersive analysis of X-rays (EDAX) which indicate the good and reliable quality of the films.

**Keywords:** Thin films, Electrodeposition, XRD and SEM/EDAX

## **EFFECT OF EMERGING CONTAMINANTS AND THEIR TREATMENT TECHNOLOGIES**

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### **Abstract:**

Emerging contaminants (ECs) represent a new class of chemical contaminants that potentially threaten the environment and human health due to their xenobiotic nature and incomplete understanding of chemical/biochemical reaction pathways. Such chemicals are a day-to-day part of our lives and are found in different environmental spheres, including water. Conventional sewage treatment processes are insufficient for EC removal and disposal of treated wastewater from such processes/plants resulting in EC release in various domains of the environment. This paper introduces emerging contaminants and categorizes them. Along with that the effect of emerging contaminants on soil, water and humans is discussed in detail. Various technologies for treatment for the removal of ECs are also discussed. These technologies include conventional treatment processes, membrane treatment, adsorption, and advanced oxidation methods. This comprehensive, state-of-the-art review is expected to increase our understanding of these contaminants and pave the way for a more cautious approach towards their rampant adoption and ultimately advancements in technologies that will remove them from our environment.



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## About Editors



Dr. Sneha Verma did her doctorate degree from the School of Life Sciences, Babasaheb Bhimrao Ambedkar Central University, Lucknow. She has been awarded gold medals, a Certificate of Research Merit given by Hon'ble Governor Shri B. L. Joshi, a Young Scientist award and 1st and 2nd prize for presentation at conferences. Currently, she is engaged as an Assistant Professor at the Department of Zoology, School of Science, Maharishi University of Information Technology, Lucknow. Dr. Verma has 6.5 years of teaching experience and 13 years of research experience in reproductive biology, fish breeding, and toxicology. She has published more than 10 peer-reviewed scientific papers in various journals, two patents, one internationally published book and 5 book chapters.



Dr. Neeraj Jain is currently serving in the capacity of Prof. and Dean, Maharishi School of Science and Humanities at Maharishi University of Information Technology, Lucknow. She has also held various other positions at the University in the past like Dean Research, Incharge- B. Sc. (Ag) etc. Dr. Jain, an alumnus of University of Lucknow (Lucknow), has completed her Ph. D. in Botany with her research work carried out at CSIR-CIMAP. She has several papers and book chapters to her credit. She has more than 15 years of teaching and research experience. She has specialization in plant biotechnology, genomics, DNA fingerprinting, & tissue culture. She has completed several projects funded by DBT, CSIR, GSBTM as PI/Co-PI. She is registered as mentor for SRFP sponsored by three national Science Academies.



Dr. Kanchan Awasthi did her doctorate degree from the School of Science (Botany Department), Lucknow University, Lucknow. She also did the ICAR Ad-hoc project on Heavy Metal Toxicity in Plants. Currently, she is engaged as an Associate Professor at the Department of Botany, School of Science, Maharishi University of Information Technology, Lucknow. Dr. Awasthi has 13.5 years of teaching experience in toxicology of plants. She has published more than 16 scientific papers in various journals, one internationally published book and 14 book chapters.



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