अनुसंधान नेशनल रिसर्च फाउंडेशन
Anusandhan National Research Foundation

ICTACSR 2025
Collaborate. Innovate. Integrate

Climate Cell, ASTEC
Government of Assam

ANRF & ASTEC Sponsored

International Conference on Transdisciplinary Approaches in Contemporary Scientific Research

ICTACSR 2025

(Hybrid Mode)

06-08 November 2025

BOOK OF ABSTRACTS

Organised by
Internal Quality Assurance Cell (IQAC)
Cachar College, Silchar
Assam, India

Supported by
Climate Cell
Assam Science Technology and Environment Council
Science and Technology Department, Govt. of Assam
&
KKHSOU Study Centre
Cachar College, Silchar
Assam, India

www.ictacsr.com ictacsr2025@gmail.com www.cacharcollege.ac.in

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About the Conference

The *International Conference on Transdisciplinary Approaches in Contemporary Scientific Research (ICTACSR 2025)* is being organized by the Internal Quality Assurance Cell (IQAC), Cachar College, Silchar, Assam, India, under the aegis of the Anusandhan National Research Foundation (ANRF), Department of Science & Technology (DST), Govt. of India and Climate Cell, Assam Science Technology and Environmental Council (ASTEC), Science and Technology Department, Govt. of Assam. The conference aims to explore the transformative role of transdisciplinary approaches in advancing both academic and applied research.

In an era marked by rapid scientific progress and complex global challenges such as climate change, public health crises, artificial intelligence, and social inequality, the conventional boundaries of academic disciplines are being continually redefined. This conference endeavors to bring together scholars, researchers, industry professionals, and policy-makers from diverse fields to foster meaningful dialogue, collaboration, and innovation that transcend disciplinary limits.

Reflecting its truly international scope, ICTACSR 2025 will feature Keynote Addresses, Plenary Lectures, and Invited Talks by distinguished experts from India, France, Israel, the USA, South Korea, and Thailand. In addition, it will include research presentations by students, scholars, and faculty members from across India and abroad, in both offline and online modes.

The conference will host 156 oral presentations and 37 poster presentations distributed across seven thematic sessions, providing ample opportunity for researchers to share their work and engage with an expert audience. Further, more than 160 students are expected to participate, interacting with researchers and professionals from varied disciplines to broaden their scientific understanding and cultivate a spirit of inquiry.

To further encourage research excellence, ICTACSR 2025 will present several awards, including Best Presentation and Best Poster Awards, recognizing outstanding contributions by participants.

Thematic Sessions

TS1: Innovations at the Interface of Life Science and Technology
TS2: Innovations in Physical Sciences and Emerging Technologies
TS 3: Mathematics, Computing and Artificial Intelligence (AI) as Scientific Catalysts
TS4: Human-Nature Interactions and Biodiversity in a Changing World
TS5: Sustainable Development Goals (SDGs)
TS6: Health, Wellness and Traditional Knowledge Systems (TKS)
TS7: Social Science and Humanities in Scientific Innovation & Policy-making

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सिलचर 788011, असम, भारत
Assam University
(A Central University)
Silchar 788011, Assam, India

Message

It is indeed a matter of pride that Cachar College, one of the esteemed affiliated colleges of Assam University Silchar, is organising the *International Conference on Transdisciplinary Approaches in Contemporary Scientific Research (ICTACSR 2025)* from 6-8 November, 2025.

Scientific conferences such as ICTACSR 2025 play a crucial role in nurturing academic collaboration, promoting innovative research, and providing a vibrant platform for scholars, researchers, and students to share their findings and ideas. The initiative taken by IQAC, Cachar College to host an event of this magnitude reflects its growing academic environment and commitment to research and innovation.

I am confident that the deliberations and interactions during the conference will inspire new perspectives and contribute significantly to the advancement of transdisciplinary research. The publication of this Abstract Book will also serve as a valuable academic resource for future reference.

I extend my heartfelt congratulations to the Principal, Organising Secretary and all the members of Organizing Committee, ICTACSR 2025 for their dedication and efforts in making ICTACSR 2025 a grand success. I wish the conference all success in achieving its objectives and contributing meaningfully to the scientific community.

Date : 04.11.2025

Vice-Chancellor

Phone : +91 3842 270801 (Office) Fax : +91 3842 270802 (Office), Cell +91 94350 73676, Email : vc@aus.ac.in

Message from Padma Shri Dr Ravi Kannan R

I am delighted to know that the Internal Quality Assurance Cell (IQAC), Cachar College, Silchar, is organising the *International Conference on Transdisciplinary Approaches in Contemporary Scientific Research (ICTACSR 2025)*. This conference represents a dynamic confluence of ideas, where diverse domains of knowledge engage in meaningful dialogue to address the evolving needs of our society.

In an era defined by complexity, the most impactful solutions emerge when disciplines intersect and collaborate. The thematic foci of this conference—ranging from life sciences, physical sciences, and advanced technologies to mathematics, computing, and artificial intelligence—capture the essence of this reality. These areas are driving a new wave of scientific breakthroughs that have the potential to reshape industries, transform human capabilities, and elevate global standards of living.

May this conference stand as a beacon of transdisciplinary excellence and continue to inspire knowledge creation that transcends boundaries.

With warm wishes for a fruitful and successful conference.

Dr. Ravi Kannan R
Director, Cachar Cancer Hospital and Research Centre (CCHRC)
Silchar, Assam, India

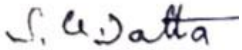
Message from Former Vice Chancellor
Visva-Bharati, Santiniketan, West Bengal, India

It gives me immense pleasure to extend my warm greetings and best wishes to the organizers, participants, and delegates of the *International Conference on Transdisciplinary Approaches in Contemporary Scientific Research (ICTACSR 2025)*, being held from 6th to 8th November 2025, organized by the Internal Quality Assurance Cell (IQAC), Cachar College, Silchar, Assam.

In today's era of interconnected knowledge, no single discipline can independently address the multifaceted challenges confronting science and society. The theme of this conference is both relevant and progressive, underscoring the importance of transdisciplinary collaboration in promoting innovation, sustainability and inclusive development.

I am pleased to note the publication of abstract book of ICTACSR 2025, which reflects the collective academic contributions of scholars and researchers. It stands as a testament to the institution's growing research culture and will undoubtedly serve as a valuable resource for future academic and scientific endeavors.

I take this opportunity to congratulate the Principal, Organizing Secretary, and all members of the Organizing Committee of ICTACSR 2025 for their dedication, vision, and meticulous planning in hosting this international event. I extend my best wishes for the grand success of the conference.



Prof Swapan Kumar Datta
NASI Distinguished Professor (H),
Swami Vivekananda University, Kolkata
Founder Vice-Chancellor,
Biswa Bangla Biswabidyalay, Bolpur, West Bengal
Former Vice Chancellor,
Visva-Bharati, Santiniketan, West Bengal, India

Message from the Director, ASTEC

It is with great pleasure and a deep sense of responsibility that I extend my greetings to all participants of the *International Conference on Transdisciplinary Approaches in Contemporary Scientific Research (ICTACSR 2025).* This event, organized by IQAC, Cachar College and supported by the Climate Cell, Assam Science Technology and Environment Council (ASTEC), Science and Technology Department, Government of Assam, provides a vibrant platform for the convergence of diverse scientific disciplines and innovative minds.

The technical sessions truly reflect the spirit of integrating ideas and exploring knowledge in a holistic manner that defines modern research. Such transdisciplinary engagement is vital for advancing science and tackling today's complex societal challenges.

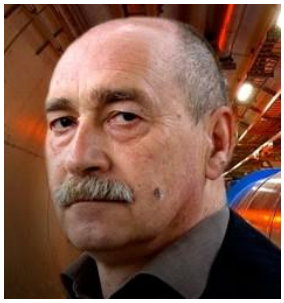
ASTEC is honoured to be associated with this initiative. As a supporting agency committed to fostering scientific progress and climate-conscious research in Assam, we believe that the ideas, discoveries, and exchanges presented at *ICTACSR 2025* will strengthen collaborative efforts and contribute significantly to the advancement of both the region and the nation.

I extend my heartfelt congratulations to the organizers, contributors, and every participant whose scholarly work enriches these proceedings. May this Abstract Book stand as a testament to the quality of research and the spirit of collaboration nurtured through ICTACSR 2025. Let us continue to innovate, collaborate, and integrate for the greater good of science and society.

With my best wishes for the success of the conference and the realization of its visionary objectives.

Dr Jaideep Baruah
Director, ASTEC
Assam Science Technology and Environment Council
Science and Technology Department
Government of Assam

Message from the Director
Virtual Institute of Astroparticle physics, France



Dear Colleagues

It gives me immense pleasure to extend my warm greetings to all participants, organizers, and delegates of the International Conference on Transdisciplinary Approaches in Contemporary Scientific Research (ICTACSR 2025), organized by the Internal Quality Assurance Cell (IQAC) of Cachar College, Silchar, Assam.

In today's era of rapid scientific advancement and global interconnectivity, transdisciplinary research stands as the cornerstone for innovation and sustainable development. The challenges faced by modern science and humanity — from understanding the universe to addressing environmental and technological issues — demand the integration of diverse fields of knowledge. Conferences such as ICTACSR 2025 provide a vital platform for fostering this integration and for nurturing collaboration among scientists, educators, and innovators across disciplines and borders.

I am pleased to note the dedication and vision of the organizers in bringing together distinguished researchers, academicians, and young scholars from around the world. Such initiatives inspire new perspectives, stimulate creative ideas, and strengthen the global network of scientific inquiry and cooperation.

I congratulate the Principal, the Organizing Secretary, and all members of the Organizing Committee for their sincere efforts in hosting this prestigious event. I am confident that the discussions and deliberations of ICTACSR 2025 will contribute meaningfully to the advancement of contemporary scientific research and to the creation of knowledge for a better and sustainable future.

I extend my best wishes for the grand success of this international conference.

Professor Dr. Maxim Yu. Khlopov
Director of Virtual Institute of Astroparticle physics 75018, Paris, France

Message from the Patron, ICTACSR 2025

It is an honour to host International Conference on Transdisciplinary Approaches in Contemporary Scientific Research (ICTACSR 2025), organised by Internal Quality Assurance Cell (IQAC), Cachar College. This conference stands as a testament to our enduring commitment to academic rigor, interdisciplinary scholarship, and the pursuit of knowledge that serves both local and global communities. The themes outlined for this conference, ranging from life sciences and emerging technologies to sustainability, health, traditional knowledge, and social sciences, emphasize the value of integration, innovation, and informed dialogue in addressing contemporary scientific challenges.

I recognize the dedication of our organizing team, contributors, and sponsoring agencies, especially Anusandhan National Research Foundation (ANRF), Department of Science & Technology (DST), Govt. of India and Climate Cell, ASTEC, Science and Technology Department, Govt. of Assam, whose support has been invaluable to this endeavour. I am confident that the presentations and discussions compiled in this abstract book will help foster meaningful connections and inspire thoughtful approaches to research and education.

Let this compilation of abstracts serve as a valuable reference and a spark for future scholarly exploration and collaboration, reflecting our collective commitment to advancing knowledge. On behalf of the Governing Body of Cachar College, I extend my best wishes for a successful and impactful conference.

Prof Parthankar Choudhury
President, Governing Body, Cachar College, Silchar
Professor, Department of Ecology and Environmental Science
Assam University Silchar, Assam, India

Message from the Chairperson, ICTACSR 2025

Dear Esteemed Delegates, Colleagues, and Guests,

It is a matter of great pride and pleasure to welcome you all to Cachar College for the International Conference on Transdisciplinary Approaches in Contemporary Scientific Research (ICTACSR 2025). As the host institution, we are privileged to facilitate an event that brings together some of the brightest minds from across disciplines, fostering an environment of scholarly collaboration and intellectual curiosity.

Founded in 1960 with the vision of promoting higher learning and socio-economic upliftment, Cachar College stands today as a beacon of educational excellence and inclusivity in South Assam. Our vibrant campus and dedicated faculty strive each day to uphold values of critical inquiry, innovation, and community service, inspired by our motto: “Let there be light of wisdom, removing the darkness of ignorance.”

The theme of this conference, emphasizing collaborative exploration across diverse scientific domains, is both timely and vital. In an era marked by rapid advancements and complex global challenges, fostering transdisciplinary research is imperative for holistic and impactful solutions. This conference provides an exceptional platform for academicians, researchers, policymakers, and young scholars to exchange insights, forge meaningful partnerships, and contribute constructively to the advancement of knowledge.

Thank you for joining us. Wishing you a memorable and productive conference experience in the heart of Silchar.

Warm regards,

Dr. Apratim Nag
Principal
Cachar College, Silchar, Assam

Message from the Convenor, ICTACSR 2025

Dear Esteemed Delegates, Guests, and Colleagues,

It is a privilege and a moment of immense pride to extend a warm welcome to all participants of the *International Conference on Transdisciplinary Approaches in Contemporary Scientific Research (ICTACSR 2025)*, organized by the Internal Quality Assurance Cell (IQAC), Cachar College, Silchar, Assam. Hosting this global academic event is an honour that reflects our unwavering dedication to scholarly excellence, collaboration, and the advancement of knowledge that transcends disciplinary boundaries.

In today's world of rapid scientific advancement and global challenges—from climate change to public health and AI—the lines between disciplines are increasingly blurred. This conference aims to unite scholars, researchers, professionals, and policymakers to foster collaboration and innovation beyond traditional boundaries.

This conference brings together leading experts, researchers, and academicians from India and abroad, including distinguished speakers from *France, Israel, the USA, South Korea, and Thailand*. With *156 oral presentations* and *37 poster presentations* spanning seven thematic sessions, ICTACSR 2025 offers a vibrant platform for interaction, exchange of ideas, and the exploration of emerging research trends in life sciences, technology, sustainability, traditional knowledge, health, and social sciences.

We are deeply grateful to our sponsoring and supporting organizations—*Anusandhan National Research Foundation (ANRF), Department of Science and Technology (DST), Government of India*, and *Climate Cell, Assam Science Technology and Environment Council (ASTEC), Government of Assam*—for their invaluable support.

On behalf of the Organizing Committee of ICTACSR 2025, I extend my best wishes for a fruitful and enriching conference experience. May ICTACSR 2025 serve as a catalyst for new partnerships, enduring connections, and transformative insights that advance the frontiers of knowledge.

Dr Mukul Kumar Baruah
Coordinator, IQAC, Cachar College, Silchar, Assam
Associate Professor and Head, Dept. of Botany, Cachar College, Silchar

Message from the Organising Secretary, ICTACSR 2025

It gives me immense pleasure to welcome all participants, delegates, and distinguished guests to the International Conference on Transdisciplinary Approaches in Contemporary Scientific Research (ICTACSR 2025)—a dynamic platform uniting academicians, scholars, researchers, industry experts, health care professionals, and policy-makers from across the globe.

ICTACSR 2025, initiated in 2025, is envisioned to grow stronger each year as a continuing platform for transdisciplinary dialogue and discovery. It aims to foster collaboration, innovation, and knowledge exchange in diverse fields spanning computing technologies, sustainable practices, and cutting-edge research. This Abstract Book is a reflection of the wide spectrum of research contributions being presented during the conference. It stands as a testament to the dedication, creativity, and scholarly spirit of the authors who have shared their work with the scientific community.

I extend my heartfelt appreciation to the advisors, members of the organising committee, chairs of various committees and technical sessions, reviewers, sponsors, and volunteers for their unwavering efforts in making this conference a reality. My sincere thanks also go to all the participants whose enthusiasm and contributions have enriched this event.

I would like to extend my heartfelt thanks to our sponsoring bodies — Anusandhan National Research Foundation (ANRF), Department of Science and Technology (DST), Govt. of India, Climate Cell, Assam Science Technology and Environment Council (ASTEC), Science and Technology Department, Govt. of Assam. I also extend our heartfelt gratitude to the KKHSOU Study Centre, Cachar College and all the corporate associates — for their support and encouragement.

I wish all delegates a highly engaging and intellectually stimulating experience at ICTACSR 2025 and hope that the discussions and collaborations initiated here will pave the way for future innovations and partnerships.

With warm regards,

Dr Joyobrato Nath
Assistant Professor, Department of Zoology
Cachar College, Silchar, Assam, India

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Keynote Addresses

Abstract ID: ICTACSR 2025/KN 01

Impact of Biotech Innovations to address the sustainability of Ecosystem, climate and Food security

Swapan Datta
NASI Distinguished Professor (H), Swami Vivekananda University, Barrackpur, West Bengal, India,
*Correspondence: dattaswapan1953@gmail.com

Abstract

Genome is the complete set of genes and genetic materials present in cell, tissue and organism. Evidence suggests that the genome is expanding through evolutionary processes. Current genomic science reveals the discovery of genome sequencing of biological species. Now the world is concerned with human migration but it helped earlier with biodiversity as the people moved from one place to another with diversified crops, animals etc resulting in today's modern ecosystem. However, climate change has started disrupting the entire biological system, which needs serious attention. Gene discovery from wild species and its association with traits have been characterized. Hence designer crops with desirable traits are now possible. Genetic engineering and genome editing have now produced a large number of improved crops with desirable traits and climate independent flowering and fruits are now possible. Genome editing with CRISPR-Cas9 technology has proved producing precision breeding which is much faster than the speed breeding. Nutritional Genomics can provide critical tools, both for classical breeding and for transgenic methodologies, that will enable the most efficient and rapid development of nutritionally improved food crops. Rice, a staple food crop feeds more than 3 billion populations and the number is ever increasing. Any improvement of this crop particularly nutrition-traits such as Iron, Zinc or other minerals and protein with higher productivity will help in reducing malnutrition. I will elaborate on this subject with biodiversity, and modern trends of crop improvement with all possible tools including AI in the context of food security and further opportunity of generation of revenues.

Abstract ID: ICTACSR 2025/KN 02

Cosmoparticle Physics: Crossdisciplinary Studies in Cosmology and Particle Physics

Maxim Khlopov[1,*], Timur E. Bikbaev[2,3], Maxim A. Krasnov[2,3] and Danila O. Sopin[2,3]
[1]Director of Virtual Institute of Astroparticle physics, Paris, France
[2]Institute of Physics, Southern Federal University, Stachki 194 Rostov on Don 344090, Russia
[3]National Research Nuclear University MEPhI, 115409 Moscow, Russia
[*]Correspondence: khlopov@apc.in2p3.fr

Abstract

Complementarity of microscopic and macroscopic description of Nature can be traced at each step of scientific development. It reached new level of fundamental relationship in formation of cosmoparticle physics as a specific new field of fundamental research. The now Standard cosmology of inflationary Universe with baryosynthesis and dark matter/energy involves physics beyond the Standard models (BSM) of fundamental interactions, which in turn involves cosmology to probe its basis. Cosmoparticle physics offers the way our of thie vicious circle of problems (illustrated by mystical Ouroboros) in cross disciplinary studies of physical, cosmological and astrophysical signatures of fundamental relationship of macro- and micro- worlds. Methods of cosmoparticle physics are discussed, with special emphasis on specific model dependent predictions of BSM physics, leading to deviations from Standard cosmology in primordial black holes and nonhomogeneities of dark matter, macroscopic antimatter in baryon asymmetrical Universe, stable multiple charged particles as constituents of dark atoms of dark matter and time dependent dark energy and dark matter.

Keywords: Cosmoparticle physics, Primordial nohomogeneities and black holes, Dark matter, Dark atoms

Plenary Lectures

Abstract ID: ICTACSR 2025/PL 01

One Health Genomics: A Convergent Framework for Indian Biodiversity and Precision Medicine

Sankar Kumar Ghosh PhD, FNASc
Professor, Biotechnology, Assam University, Silchar
Distinguished Professor, Ramakrishna Mission Vivekananda Educational and Research Institute
Former Vice Chancellor, University of Kalyani, West Bengal

*Correspondence: drsankarghosh@gmail.com

Abstract

One Health Genomics uses genomic data from humans, animals, and the environment to solve health issues. DNA barcoding, finding germs early, tracking antibiotic resistance, and watching for diseases that can spread It promotes precision public health, epidemic preparedness, and ecosystem-based global health security and resilience by linking disciplines. This talk examines DNA barcoding strategies in ecological and biomedical fields, focusing on Indian biodiversity hotspots and population health. DNA barcoding, which uses short, standardised gene sequences (e.g., mitochondrial *COI*), allows rapid, reliable species identification. The monitored species in Northeast include Fishes, Turtles, Medicinal Plants, among others; the illegal wildlife trade; the detection of invasive species; and the authentication of food. These efforts are especially effective in Northeast India, an area with many indigenous species and ecological vulnerabilities. GenomeIndia and other precision medicine projects are mapping genetic diversity and disease risk in Indian populations using whole-genome sequencing and SNP-based classification. Oral cancer case studies in tobacco-exposed cohorts show how focused resequencing and polygenic risk scores can guide early detection and treatment. DNA barcoding in zoonotic pathogen surveillance and antibiotic resistance tracking further links environmental genomics and human health. This study reveals that citizen science, digital platforms such as BOLD and GenBank, and AI-powered analytics democratise genetic literacy and accelerate translational research. Educational modules and genomic cards developed under InBOL link biological findings to community health outcomes through public involvement and clinical knowledge. The lecture finishes by proposing a One Health framework for biodiversity genomics, environmental monitoring, and precision public health. The lecture emphasises the importance of ethical data governance, genetic technology access, and interdisciplinary collaboration among academics, clinicians, and policy makers.

Keywords: DNA barcoding, One Health, biodiversity, Food adulterations, precision medicine, GenomeIndia, InBOL, zoonosis, SNP, oral cancer.

Abstract ID: ICTACSR 2025/PL 02

Outflow Of Gas from Galaxies

Biman Nath*
Visiting Professor, IISER Mohali, Punjab, India
Former Senior Professor at Raman Research Institute (RRI), Bengaluru, India
*Correspondence: nath.biman@gmail.com

Abstract

Galaxies often throw out gas in a violent manner. These powerful 'galactic winds' are detected in different wavebands, from radio to optical to X-rays. This phenomenon is intimately connected to a regulatory process by which stars form in galaxies. In the absence of these outflows, stars would have formed in galaxies more abundantly, which would have quickly depleted the gas reserve in the universe, and the universe would have become full of passive and dim galaxies by now. I will talk about how observations, theoretical calculations and simulations have helped us to understand the gaseous outflows, and in turn, how galaxies evolve.

Abstract ID: ICTACSR 2025/PL 03

Graphs and Groups- A Survey

Mark L. Lewis*
Department of Mathematical Sciences, Kent State University, Kent, USA
*Correspondence: lewis@math.kent.edu

Abstract

We will survey some of the graphs associated with groups. In particular, we consider the Gruenberg-Kegel graph, the commuting graph, the power graph, the enhanced power graph (also known as the cyclic graph), the solvable graph, the nilpotent graph, among others. We will mention some graphs associated with character degrees and conjugacy class sizes. We will give an overview of some important results. We will introduce the centralizer graph.

Keywords: finite groups, simple graphs, diameter, connected, universal elements

Abstract ID: ICTACSR 2025/PL 04

From Fragments to Function: Human–Nature Interactions, Biodiversity, and Health in a Changing World

Ramesh Boonratana*
IUCN SSC Primate Specialist Group
*Correspondence: rboonratana@outlook.com

Abstract

Human–nature relationships are being redrawn by rapid land-use change, urban growth, and compounding climatic and socioeconomic shocks. This plenary synthesizes evidence from ecology, conservation biology, and anthropology to demonstrate how feedbacks between people and ecosystems influence biodiversity trajectories and human well-being. I connect deforestation, agricultural frontiers, and expanding cities to altered community assembly, disrupted movement corridors, and intensified human–wildlife interactions and conflict. I also examine nature tourism and urban nature as double-edged tools that can either erode or enhance ecological function depending on governance, incentives, and cultural context. Drawing on restoration ecology and One Health, I present a practical framework that couples spatial planning with incentive-aligned interventions: co-management and secure tenure, equitable tourism, conflict mitigation, and behaviorally informed demand reduction. The approach integrates ecological metrics with social indicators, explicitly addressing equity, uncertainty, and time lags. The lecture advances four decision pathways for governments, funders, and practitioners: (1) prevent avoidable loss through deforestation-free supply chains and compact, greened urban expansion; (2) repair function via assisted natural regeneration and climate-smart restoration; (3) reconnect landscapes with multi-species corridors across working lands and cities; and (4) realign rules and finance so rewards track long-term outcomes rather than short-term outputs.

Keywords: human–wildlife conflict; land-use change; restoration ecology; One Health

Abstract ID: ICTACSR 2025/PL 05

Door-to-Door Cancer Screening of 31,428 Villagers (2020-2024) in BCH adopted villages, and 250,000+ Outreach Initiatives Across Urban and Rural India since 2017: A Sustainable grassroots Model by Breast Cancer Hub (BCH), bridging healthcare disparities

Lopamudra Das Roy
Founder and President of Breast Cancer Hub (BCH),
Former Research Professor, University of North Carolina at Charlotte (UNCC), Charlotte, North Carolina, USA
*Correspondence: lopa2006@gmail.com

Abstract

Background: Cancer survival rates are markedly lower in developing countries due to stigma, lack of awareness, and socioeconomic and environmental barriers limiting access to timely care. This study analyzes door-to-door screening of 31,428 villagers and outreach to 250,000+ people since 2017, revealing late detection disparities and the impact of Breast Cancer Hub's sustainable grassroots model.
Method: Between February 2020 and April 2024, BCH, a nonprofit providing 100% free services, conducted door-to-door screening, adopting 62 remote villages across Cachar (Assam), Nadia (West Bengal), and Ganjam (Odisha), reaching 31,428 residents. Data was collected using BCH-designed questionnaires assessing cancer awareness, screening practices, symptoms, lifestyle, family history, and socio-economic factors, and analyzed using descriptive statistics. Additionally, through awareness programs, screening camps, community outreaches, seminars, workshops, and webinars, Dr. Lopa and her team reached ~250,000 individuals across urban and rural India since 2017, facilitating early detection, report analysis, and guidance toward affordable healthcare, with Dr. Lopa personally accessible via WhatsApp for accountability and ongoing support.
Results and Discussions: This pioneering grassroots solution positions BCH as the first organization to conduct door-to-door breast and other cancer screenings in remote villages, offering comprehensive, end-to-end care. Before this initiative, screening rates were nearly zero, and hospital visits occurred only at advanced stages or were avoided due to financial constraints to travel to hospitals, daily wage priorities, or lack of awareness about government healthcare benefits. BCH's sustainable, patient-centered model ensures household visits and support throughout every step of the healthcare journey, including awareness and screening, identifying and accompanying suspicious

cases to hospitals, arranging transport and documentation, covering critical expenses, providing food, emotional counseling, post-treatment guidance, and case-by-case follow-up for complete continuity of care with holistic approach.

In addition, from our outreach initiatives across urban and rural India, we observed that early detection screening was rarely conducted before our interventions. After each session, resources were shared, and accountability was maintained: Dr. Lopa provided her contact so suspicious cases could reach out, have reports reviewed, receive one-on-one treatment guidance, and join the BCH Support Group, a private, anonymous WhatsApp group, ensuring comprehensive, end-to-end care while fully protecting patient privacy.

Conclusion: BCH pioneers cancer screening in untapped regions, saving lives with the belief that saving one life saves a family

Abstract ID: ICTACSR 2025/PL 06

Going Beyond Disciplinarity: Transdisciplinarity as an Approach to Address the Problem of Epistemic Exclusion

Subhra Nag*
Dept of Philosophy, Assam University, Silchar
*Correspondence: nag.subhra@gmail.com

Abstract

The rising prominence of *Transdisciplinarity* as a coinage in the academia is defining the need of the hour. Enormous use of it in the multiple disciplinary fields is leading to the gradual evolution of the conceptual usage implicating in a specific pattern of research and analysis directed towards the process of knowledge construction, formation or production and mapping its impact upon the community of the stakeholders. To speak it otherwise, the conceptual frameworks to address discipline specific themes, which were adopted by the scientists, the social scientists and the philosophers, right from the period of antiquity down the period of modernity are somehow showcasing their inapt structure to address various social injustices and cultural exclusions/oppressions or discriminations. In view of which it has generated an urgency to make use of the transciplinary approach to address the same and correct the malice or the ill-practices in the lives of the people led or sustained by the biased theoretic ventures of the main-stream thinkers.

As an exemplification of whatever is stated above this plenary address is intended to ponder over some of the select problems of epistemic exclusion grounded on caste, class, sex and/or gender from a transdisciplinary perspective.

Invited Lectures

Abstract ID: ICTACSR 2025/IL 01

Unravelling the Hidden Conversations Inside Our Cells

Rituparna Das*
Junior Scientific Officer, Assam Science Technology and Environment Council (ASTEC)
Science and Technology Dept., Govt. of Assam
*Correspondence: rituparna.astec@gmail.com

Abstract

Every cell in our body operates as a highly coordinated system, where numerous molecular players work together to interpret and express the genetic code. Among these fundamental processes, transcription- the synthesis of RNA from DNA stands as a central step in gene expression. During transcription, a unique three-stranded nucleic acid structure known as an R-loop may form, consisting of an RNA:DNA hybrid and a displaced single-stranded DNA. While R-loops perform important regulatory roles in transcription and gene activity, their uncontrolled accumulation can compromise genomic stability, contributing to diseases such as cancer and neurodegeneration.

RNase H1 acts as the cell's quality-control enzyme, degrading the RNA component of R-loops to maintain genomic integrity. FUS, an RNA-binding protein implicated in transcription and splicing, functions as a molecular coordinator that ensures accurate RNA processing. This study focuses on the molecular dialogue between FUS and RNase H1, which together maintain harmony during R-loop regulation and gene expression. We identified a cooperative interaction wherein FUS facilitates the recruitment and activation of RNase H1 at transcriptionally active regions. This partnership ensures efficient R-loop resolution and proper RNA splicing fidelity. Interestingly, both FUS and RNase H1 form liquid-like condensates within the nucleus, generating dynamic micro-environments that spatially organize and regulate biochemical reactions without the need for membranes.

Through this work, we uncover how molecular assemblies like FUS and RNase H1 coordinate the complex choreography of transcription and splicing processes vital for preserving genome stability and cellular homeostasis. Understanding these interactions not only deepens our insight into the principles of nuclear organization but also provides a framework for exploring how their dysregulation contributes to human disease.

Abstract ID: ICTACSR 2025/IL 02

Precision therapy in Oncology: Emerging ideas in cancer treatments

Rajarshi Choudhury*
Director. Human Biology, Oncology Functional Genomics, Target Discovery, GSK
*Correspondence: rajarchoudhury@gmail.com

Abstract

Cancer remains one of the leading causes of mortality worldwide. Although significant progress has been made in the recent past in treatment and maintenance of the disease, more research and investments are needed, especially in relapsed and refractory settings. Precision therapy in cancer care includes biomarker driven stratification of patients and includes immune therapy as well as synthetic lethal approaches to target tumors. Immune therapy especially checkpoint inhibitors like anti PD-1 and anti CTLA-4 as single agent or in combination with other drugs provides novel avenues to test several advance disease indications. Another modality that is in use is antibody drug conjugate (ADC) which specifically targets tumor based on cell surface expression of neo-antigens or cell surface receptors. I will discuss these novel approaches in my presentation and discuss historical perspectives

Abstract ID: ICTACSR 2025/IL 03

Astrophysical Quantum Plasmas: Overview, Stability Theory, And Application

Pralay Kumar Karmakar*
Department of Physics, Tezpur University, Napaam-784028, Tezpur, Sonitpur, Assam, India
*Correspondence: pkk@tezu.ernet.in

Abstract

It is well known that "Plasma" is a unique and wonderful state of matter comprising a statistically large number of Coulombic particles exhibiting a plethora of collective degrees of freedom. Its collective dynamics are realized in various forms of behavior, such as thermodynamic, thermosstatistic, electromagnetic, etc. There are two distinct types of plasmas naturally: (a) Classical plasma (with supercritical Debye number and subcritical de Broglie number), and (b) Quantum plasma (with subcritical Debye number and supercritical de Broglie number). The propagatory dynamics of normal acoustic modes in degenerate quantum plasmas on the astrocosmic spatiotemporal scales are reasonably distinct from the corresponding non-degenerate classical counterparts. The former is extremely relevant to compact astrophysical objects [1-2], such as the white dwarf family, unlike the latter in ordinary classical stars. This presentation offers an orderly overview of astrophysical quantum plasmas and their normal acoustic mode analyses. The considered realistic plasma model consists of classically treated non-degenerate light nuclear species, heavy nuclear species, and quantum-mechanically treated degenerate lighter electronic species. The hydrodynamic model closure is ensured herein through the gravito-electrostatic (Poisson) coupling actions [2]. A modified spherical mode study derives a generalized linear dispersion law of the acoustic modes (degree-6). It portrays the nucleus-originated modal multiparametric dependency without a quasi-classical approximation compared to traditional ones [3-5]. The relative nuclear charge-mass coupling parameter, interestingly, plays a destabilizing factor on the mode. The ratio of the charge density of heavy-to-light nuclear species acts as a stabilizing agent in both the non- relativistic (NR) and ultra-relativistic (UR) regimes. The rotational force hosts a destabilizing impact throughout. A comparative assessment is executed with the existing stability reports [1-2]. The asteroseismic applicability of such acoustic modal portrayals, jointly with essential quantum corrections in diverse real circumstances, is finally revealed.

Keywords: Quantum plasma, Acoustic stability theory, Compact astrophysical objects

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Abstract ID: ICTACSR 2025/IL 04

Novel Treatment and Detection of Heavy Metals and Toxic Organic Waste

Ariela Burg*
Department of Chemical Engineering
Sami Shamoon College of Engineering, Be'er-Sheva 8410802, Israel
*Correspondence: arielab@sce.ac.il

Abstract

The world's population is growing at an accelerating rate, and as a result, the consumption of essential resources for survival, such as energy, food, and water, is also increasing. This trend is accompanied by a significant rise in the pollution of water sources, with two of the main pollutants being heavy metals and toxic organic compounds that are soluble in water. Consequently, there is a crucial need to develop efficient, accessible, and low-cost methods to treat these pollutants. Accordingly, the research focused on developing electron-exchange columns and cation-exchange columns using the sol-gel method to treat toxic organic compounds and heavy metals in aqueous wastewater. In addition, electrochemical sensors were developed to detect heavy metals using DPN (Dip-Pen Nanolithography) technology.

Keywords: Water pollution, sol-gel method, heavy metals, wastewater, DPN

Abstract ID: ICTACSR 2025/IL 05

The Universe's Baby Photos: From Hubble's Glimpse to JWST's Revolution

Himadri S. Das*
Department of Physics, Assam University, Silchar-788011, India
* Correspondence: himadri.sekhar.das@aus.ac.in

Abstract

Imagine taking a photo of the universe when it was just a toddler - less than 1% of its current age. That's what the James Webb Space Telescope (JWST) has done. This talk brings those cosmic baby pictures to life for everyone --- no science background needed.

For three decades, the Hubble Space Telescope revolutionized our view of the early universe. But in 2021, JWST arrived with a game-changing advantage: it sees in infrared light, like a heat camera for the sky, piercing through dust clouds that block visible light. While Hubble showed us galaxies from roughly 400 million years after the Big Bang, JWST has now peered even deeper—spotting massive, bright galaxies just 300 million years after the Big Bang. What JWST revealed shocked scientists: these "impossible" galaxies existed far earlier than anyone predicted, forcing us to completely rethink how the universe grew up.

But JWST does more than outperform its legendary predecessor. It has spotted carbon dioxide on alien worlds, discovered oceans under ice on Jupiter's moon, and detected the building blocks of life floating in space clouds where stars are born. Using gorgeous images, simple stories (like "the universe's kindergarten class"), and live sky demos, this talk shows how one telescope connects astronomy to climate, chemistry, AI, and even philosophy.

You'll leave knowing why JWST isn't just a machine—it's a time machine, a planet hunter, and a mirror for humanity's biggest questions: Where did we come from? Are we alone? And how can space science help solve problems here on Earth?

Come see the universe like never before—in full color, full wonder, and full story.

Keywords: JWST, Hubble Space Telescope, Early Universe, Astronomy for All, Cosmic Origins

Abstract ID: ICTACSR 2025/IL 06

Efficient Catalytic Activity in the Nanochannels of a Metal-Organic Framework

Prakash Kanoo,[a] Sarita Kumari[b] and Anindita Chakraborty[a]
[a]Special Centre for Nanoscience, Jawaharlal Nehru University, New Delhi 110067
[b]Department of Chemistry, Central University of Haryana, Mahendergarh, Haryana
[*]Correspondence: prakashkanoo@mail.jnu.ac.in

Abstract

Atom economy, use of catalyst, use of safe or no solvents are some of the principles of green chemistry that are attractive to chemists to perform any synthesis as it tries to minimize the negative impact on human health and environment. Here we present a greener synthesis of cyclic carbonates from epoxides, and cyanohydrins and benzylidenemalononitriles from various aldehydes under solventless conditions. These reactions are catalysed in the nanochannels of a metal-organic framework (MOF), $\{Mn_2(1,4\text{-bdc})_2(DMF)_2\}_n$ (**MOF 1**) assembled from simple constituents, Mn(II) and 1,4-benzenedicarboxylic acid, making the catalyst economical (Figure 1) [1-3]. In all these transformations, complete conversions, 99.9% was achieved. The MOF catalyst is highly robust and our investigations reveal complete conversions can be achieved in Knoevenagel condensation up to 24 cycles. Theoretical calculations suggest the pore structure of the desolvated MOF opens up after removal of coordinated DMF molecule with an increase in 18.2% unit cell volume, which, probably allows facile diffusion of small molecules into the nanochannels leading to their activation by unsaturated Mn(II) sites (UMS).

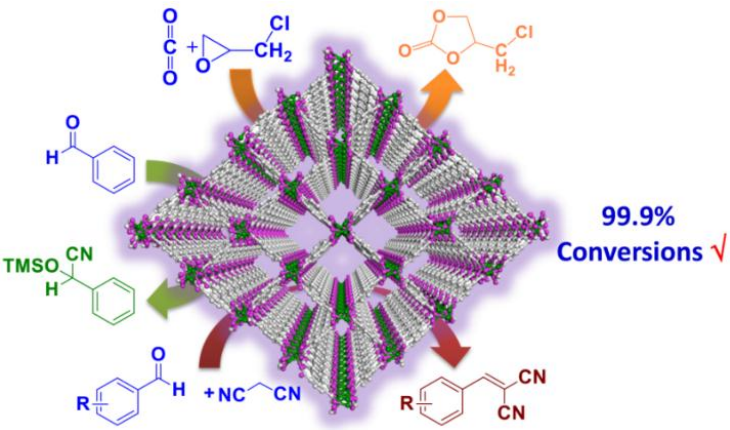

Figure 1: An economical, scalable, robust MOF catalyst for greener organic transformations.

Keywords: Heterogenous catalysis, atom economy, open metal site, metal-organic frameworks

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Abstract ID: ICTACSR 2025/IL 07

Symbiosis Between Opening Pairs in Limited Overs Cricket: An Application of Copula Function

Dibyojyoti Bhattacharjee*
Department of Statistics, Assam University, Silchar, Assam - 788011, India
*Correspondence: djb.stat@gmail.com

Abstract

This study investigates the application of copula functions to model the dependence structure of opening batting partnerships in Twenty20 (T20) cricket. Here, one can see the capability of copula-based modelling to capture diverse dependence structures in batting partnerships, offering a flexible statistical framework for performance evaluation and strategic planning in limited-overs cricket. Using the tail dependence analysis, one can examine scoring relationships between selected pairs of international openers to identify appropriate copula families. The analysis finds that pairs Rohit Sharma–KL Rahul, Babar Azam–Mohammad Rizwan, and Hazratullah Zazai–Rahmanullah Gurbaz exhibit moderate lower tail dependence, indicating a tendency for joint low scores. These pairs are effectively modelled using the Clayton copula. The pair Mohammad Naim–Soumya Sarkar displays pronounced upper tail dependence, suggesting concurrent high-scoring performances, best captured by the Gumbel copula. Finally, Ibrahim Zadran–Rahmanullah Gurbaz and Pathum Nissanka–Kusal Mendis demonstrate negligible tail dependence and linear correlation, aligning with the Gaussian copula. In all the cases, the model adequacy is validated through the Kolmogorov–Smirnov goodness-of-fit test.

Keywords: Sports Data Mining, Cricket Analytics, Interdependence

Abstract ID: ICTACSR 2025/IL 08

Molecules, Models, and Mutants: An AI-Driven Search for TNBC Therapeutics

Hridoy Jyoti Mahanta*
CSIR North East Institute of Science and Technology, Jorhat, Assam, India
*Correspondence: hridoy.neist@csir.res.in

Abstract

Among all the breast cancer subtypes, Triple-negative breast cancer (TNBC) is considered to be most aggressive with limited therapeutic options. This study is an attempt to develop and compare two computational pipelines - classical machine learning (ML) and graph-based deep learning to identify potential inhibitors against TNBC. The traditional ML pipeline utilized a large dataset of bioactive compounds from ChEMBL targeting eight TNBC cell lines. Using molecular descriptors and fingerprints as features, 16 models were developed using four boosting algorithms that includes AdaBoost, CatBoost, XGBoost, and Explainable Boosting Machine. Among these, CatBoost and XGBoost with MACCS keys achieved the highest performance. While screening, phytochemicals from medicinal plants of Northeast India, these models could predict five leads with strong binding to TNBC targets. In parallel, a graph-based pipeline was developed using smaller mutant-type dataset of compounds from three TNBC cell lines. Among four graph neural network models, the Message Passing Neural Network (MPNN) showed the best performance after optimization. Model interpretability techniques revealed structural features linked to activity, and external validation using FDA-approved drugs yielded prediction accuracies up to 97%. Overall, traditional ML models offered high accuracy with engineered features, while graph-based models provided structural interpretability and competitive performance, highlighting their complementary strengths in TNBC drug discovery.

Keywords: Triple-negative breast cancer, Virtual screening, Machine learning, Graph neural networks, Medicinal plants, Bioactive compounds

Abstract ID: ICTACSR 2025/IL 09

Carbon Capture, Utilization, and Storage (CCUS): Innovative Pathways toward Climate-Resilient and Sustainable Industrial Growth

Bishnupada Mandal*
Department of Chemical Engineering, Indian Institute of Technology Guwahati, Guwahati 781039, Assam, INDIA
*Correspondence: bpmandal@iitg.ac.in

Abstract

The rapid escalation of carbon dioxide (CO_2) emissions poses a major challenge to achieving global sustainability targets, particularly those linked to the United Nations Sustainable Development Goals (SDGs). Without immediate intervention, CO_2 emissions are projected to double by 2050, threatening both climate stability and sustainable industrial growth. Decarbonizing energy-intensive sectors such as power, steel, cement, and fertilizer production is therefore critical to realizing SDG 7 (Affordable and Clean Energy), SDG 9 (Industry, Innovation and Infrastructure), and SDG 13 (Climate Action). This lecture will highlight recent advances in carbon capture, utilization, and storage (CCUS) technologies, with a particular focus on innovative materials and processes that enable efficient and sustainable CO_2 mitigation. A significant portion of the talk will emphasize the development of novel solvents for CO_2 absorption [1], advanced adsorbent materials for CO_2 capture, and CO_2-selective polymeric and facilitated transport membranes for post-combustion CO_2 separation [2-7]. Our group has developed several next generation biopolymer-based materials with enhanced permeability, selectivity, and thermal stability, including chitosan- and silk fibroin-based hybrid membranes reinforced with graphene nanostructures, which enable superior gas transport and long-term operational resilience [6,7] These materials address key limitations of conventional amine-based absorption systems, such as high regeneration energy, corrosion, and solvent degradation. In addition to capture, the lecture will explore CO_2 conversion into value-added fuels and chemicals, linking carbon mitigation to the circular carbon economy. By integrating CO_2 capture, utilization, and renewable energy systems, such innovations contribute directly to climate-resilient industrial transformation and sustainable development, bridging scientific innovation with environmental stewardship.

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Abstract ID: ICTACSR 2025/IL 10

Biomolecules to Biomes: A unified vision for biodiversity conservation and planetary health

Shantanu Kundu*
Ocean and Fisheries Development International Cooperation Institute & International Graduate Program of Fisheries Science, College of Fisheries Science, Pukyong National University (Daeyeon Campus), Busan 48513, South Korea
* Correspondence: shantanu1984@pknu.ac.kr, shantanu1984@gmail.com

Abstract

Biodiversity Research is critical for maintaining the ecological foundations that underpin human survival, support sustainable economic development, and ensure ecosystem health. Since the Darwinian era, the quest to explore and understand both extant and extinct species has been central to unraveling evolutionary mechanisms, adaptation, and ecological balance. Contemporary biodiversity studies increasingly integrate classical taxonomy, molecular biology, ecological monitoring, and artificial intelligence-driven approaches, offering critical insights for conservation, sustainable resource management, and predicting species responses to environmental change. Over the past 15 years, my research has generated more than 3,000 DNA sequences, contributed to over 100 peer-reviewed publications, and led to the discovery of a new mammal and a new crab species, in collaboration with researchers from 15 countries. Major initiatives included large-scale taxonomy and DNA barcoding of agriculturally significant insects, ecologically critical invertebrates, pollinators, economically important freshwater fishes, and highly threatened freshwater turtles. Further, the mitogenomic initiative has elucidated matrilineal evolutionary histories in some of the oldest living Testudines and diverse marine taxa. In addition, the ecological investigations have provided crucial insights into habitat use and population dynamics of flagship and keystone species, including big four snakes, gharials, adjutants, raptors, grass-babblers, hispid hares, flying squirrels, binturong, red goral, hog badgers, and clouded leopards, particularly under rapid climate change scenarios. Recent advances in landscape genetics have facilitated the development of predictive models that guide proactive conservation strategies for threatened species. This integrative approach not only safeguards biodiversity but also deepens our understanding of species evolution, adaptation, and ecosystem resilience in Asia and beyond. By combining molecular, ecological, and computational perspectives, it is possible to design effective conservation interventions that preserve both species and the evolutionary processes that sustain life on Earth.

Keywords: Biogeography, Phylogeny, Landscape Genetics, Climate Change, Conservation

Abstract ID: ICTACSR 2025/IL 11

The Link Between Obesity and Cancer: Etiology to Therapeutics

Yashmin Choudhury[1*], Kasturi Bhattacharjee[1], Moumita Nath[1], Angom Ranjana Devi[1], Barnali Sinha[1], Kumarjit Deb[1]
[1]Department of Biotechnology, Assam University, Silchar-788011, India
[*]Correspondence: yashminchoudhury@gmail.com, yashmin.choudhury@aus.ac.in

Abstract

Obesity is a growing public health concern whose prevalence has multiplied several-fold in recent years, and is associated with a significant rise in the risk for various non-communicable diseases such as Metabolic Syndrome, type-2 diabetes mellitus, cardiovascular diseases and cancer. Aberrations in lipid metabolism constitute a common link between obesity and cancer, and a large body of evidence indicate that hyperlipidemia fuels cancer growth. Our studies in murine models of cancer reveal that two common etiological factors for cancer development, *viz.* betel-nut and smokeless tobacco to produce hyperlipidemia, a high ratio of palmitic acid to oleic acid, and alterations in the signaling pathways of lipid metabolism which intersect with oncogenic signaling through pAkt/pmTOR, p53-mediated tumor suppression and regulators of cellular proliferation and apoptosis to drive carcinogenesis. Therapeutic strategies including the administration of lipid synthesis inhibitor drugs constitute an important alternative approach for amelioration of carcinogenesis, and improving chemosensitivity as well as lowering toxicity of the established chemotherapeutic agent, cisplatin.

Abstract ID: ICTACSR 2025/IL 12

Combating Antibiotic Resistance in Gram-Negative Bacteria: Strategies for Effective Control

Pankaj Chetia*
Molecular Plant Taxonomy and Bioinformatics Research Laboratory
Department of Life Sciences, Dibrugarh University, Dibrugarh-786004, Assam
*Correspondence: chetiapankaj@dibru.ac.in

Abstract

The rapid rise of antibiotic resistance in Gram-negative bacteria poses a major threat to global public health. Excessive and inappropriate use of antibiotics across healthcare, agriculture, and other sectors has accelerated resistance development, leading to a worldwide antibiotic crisis. To assess resistance patterns in Gram-negative bacteria from clinical and food sources, such as broiler meat in the upper Assam region, comprehensive research is underway at Dibrugarh University.

In one of our studies, 653 Enterobacteriaceae isolates were collected from healthcare facilities across Upper Assam under the DBT-NER Twinning project (BT/PR16669/NER/95/239/2015; ethical clearance no. DU/Dib/ECBHR(Human)/2021-22/02). Resistance profiling revealed a high prevalence of multidrug-resistant (MDR) strains in the region. Similarly, broiler chicken meat samples showed significant MDR presence, with resistance rates of 79.34% to polymyxin B, 65.57% to doxycycline, and 59.78% to ampicillin.

Parallel investigations into the molecular mechanisms of MDR *Klebsiella* spp. and *Acinetobacter baumannii* aimed to discover new drug targets and inhibitors. Through virtual high-throughput screening, two plant-derived compounds, Dihydrocapsaicin and Garcinexanthone-A emerged as promising candidates against AcrAB-TolC efflux pumps in *Shigella* spp. These findings offer valuable insights into MDR resistance mechanisms and may aide the development of targeted strategies to curb the threat of antimicrobial resistance.

Keywords: Antibiotic resistance, AcrAB-TolC, Drug target, Enterobacteriaceae, MDR isolates

Abstract ID: ICTACSR 2025/IL 13

Application of Ancient Indian Knowledge & Science in Making of Viksit Bharat

Kalpana Bora*
Department of Physics, Gauhati University, Department of Physics, Guwahati, Assam, India
*Correspondence: kalpana@gauhati.ac.in

Abstract

Bharatiya (Indian) civilisation has been a highly developed one since several thousands of years, before it got inflicted by series of invasions starting with invasion by Persian Cyrus in 550 BCE. We cherish a legacy of development in the field of science, mathematics, sustainable economic development, medical science, navigation, architecture to mention some. The series of invasions ended with India's independence from the British in 1947, which developed colonial mentality amongst us. We tended to look towards West for science and all technological advancements. In this paper, we would highlight upon some dimensions of scientific knowledge in the field of Astronomy, Physics, Algebra, Trigonometry, Vedic Mathematics, Metallurgy, Chemistry, Medical sciences and Architecture etc that illuminated Bharat during ancient times. This aspect has been given thrust in NEP2020 also, and should inspire our younger generation not only to take pride in our scientific legacy, but to motivate them to apply our ancient knowledge in solving problems and challenges for futuristic progress and development of the Nation and making of Viksit Bharat.

Keywords: Indian Knowledge System, NEP 2020, Ancient Bharatiya Science, Viksit Bharat

Abstract ID: ICTACSR 2025/IL 14

Mindful Eating Coupled with Nutrition for Health and Wellbeing

Dipesh Debnath*
ICAR-National Academy of Agricultural Research Management Rajendranagar, Hyderabad, India
*Correspondence: dipesh.debnath@gmail.com, dipesh.debnath@naarm.org.in

Abstract

Mindful eating is a holistic approach to health and wellness that emphasizes awareness, intentionality and balance in dietary practices. Unlike restrictive diets that focus on "what" to eat, mindful eating shifts attention to "how" to eat, encouraging individuals to be fully present, engage their senses and recognize internal hunger and satiety cues. I explore here the principles of mindful eating – eating slowly, savoring food, tuning into body signals, acknowledging emotions and choosing nourishing foods – and contrasts them with mindless eating, which often leads to overeating, stress and poor health outcomes. Scientific evidence highlights its physiological benefits through improved gut-brain communication, hormonal balance (leptin and ghrelin regulation), and stress reduction alongside psychological advantages such as reduced emotional eating, enhanced food satisfaction and improved body image. Practical techniques, including sensory engagement, structured mealtime rituals and gratitude practices help overcome modern challenges like fast-paced lifestyles, multitasking, digital distractions and social pressures.

Integrating mindful eating with nutrition science underscores the importance of energy balance, hydration, macronutrient quality and micronutrient sufficiency. It emphasizes the brain's high energy demand, the hormonal orchestration of hunger and fullness and the vital role of restorative rest and intuitive physical activity in sustaining wellness. Global (FAO, 2022) and national (NFHS, 2019–21) data on obesity, malnutrition, stunting and anemia contextualize the pressing need for sustainable eating practices that are both mindful and nutritionally sound. Ultimately, mindful eating emerges as a sustainable, evidence-based strategy to address the dual burden of undernutrition and overnutrition while promoting physical health, psychological resilience and social well-being. By combining mindfulness with nutritional awareness, we can cultivate a healthier and more balanced relationship with food, leading to long-term wellness.

Keywords: how to eat, what to eat, obesity, balanced nutrition.

Abstract ID: ICTACSR 2025/IL 15

Studies on the unique Epidemiological, Entomological and Parasitological Features of NE India Malaria: Targeted and tailor-made intervention cocktail for accelerated Malaria control

Ipsita Pal Bhowmick
Scientist D & Nodal Officer MRHRU Tripura
*Correspondence: ipsita.icmr@gmail.com

Abstract

India's malaria elimination goal by 2030 requires identifying and mitigating region-specific gaps, particularly in persistent endemic foci. Tripura, a small state in Northeast (NE) India, contributes disproportionately high malaria cases, with outbreaks concentrated in remote tribal pockets. To delineate the determinants of sustained transmission, high-resolution satellite imagery was used to map ecological and land-use features, including Jhum cultivation, agriculture, and plantations. Through rigorous model selection, a significant positive correlation was found between the proportion of block area under Jhum cultivation and malaria incidence, highlighting a strong ecological link between Jhum cultivation and disease risk. Based on the identified gaps and entomological evidence, a targeted additional intervention package was designed and evaluated for operational feasibility. Time-series analysis revealed a decline in slide positivity rates, strong community acceptance of supplementary interventions, and insights into the limitations of existing vector control measures. The findings have contributed to understanding the distinct parasite–vector dynamics of the NE region, and newer intervention strategies have been designed as follow-up studies, which will be discussed. Accurate vector identification and mapping of sibling species distribution has been emphasized as critical for region-specific control strategies. Since vectorial roles vary spatially and temporally, the complexity of primary and secondary vectors necessitates comprehensive studies of Anopheles communities. Accordingly, Plasmodium infection rates in various Anopheles species were investigated using highly sensitive molecular methods along with bionomic analyses, providing valuable information for surveillance and vector management. Novel findings on vector species and behavioural traits, with implications for transmission, will be presented. Malaria epidemiology in NE India differs substantially from the rest of the country, notably due to early emergence of antimalarial drug resistance. High frequencies of quadruple and higher order mutations in the DHFR–DHPS genes, coupled with clinical failure reports,

prompted drug policy revisions specific to this region. Over 100 Plasmodium isolates collected between 2014 2024 were analyzed through Sanger sequencing and whole-genome sequencing, revealing evolving mutation patterns that may influence therapeutic responses, warranting continued efficacy monitoring. Mass surveillance in Dhalai District (2014 and 2025) uncovered a substantial burden of RDT negative, asymptomatic, and submicroscopic malaria, including P. vivax and mixed P. vivax–P. falciparum infections during dry winter months—contrary to program data reporting P. falciparum dominance. The detection of silent reservoirs, recent rise in P. vivax prevalence, and the occurrence of P. malariae infections underscore the need for enhanced diagnostic sensitivity, surveillance, and context-specific interventions to achieve sustainable malaria elimination in NE India.

Keywords: Plasmodium, Anopheline, North-East Region, Malaria Control, Drug Resistance

Oral Presentations

Abstract ID: ICTACSR 2025/TS1/OP 01

Comparative Antioxidant Activity of L-Theanine and Its Neuroprotective Role in Dopaminergic and Cholinergic Pathways

Satarupa Deb[1*], Anupom Borah[2]
[1]Department of Zoology, Patharkandi College, Patharkandi, Sribhumi, Assam, India.
[2]Cellular and Molecular Neurobiology Laboratory, Department of Life Science and Bioinformatics, Assam University, Silchar, Assam, India.
[*]Correspondence: satarupa@pkdc.ac.in

Abstract

Oxidative stress resulting from excessive free radical production plays a central role in the onset and progression of chronic and neurodegenerative diseases. Tea (*Camellia sinensis*) is enriched with polyphenols and L-theanine, a non-protein amino acid with cognitive and mood-related benefits. Although L-theanine has been shown to modulate endogenous antioxidant enzymes and mitochondrial activity, its direct hydroxyl radical (•OH) scavenging potential and pathway of modulating cholinergic and dopaminergic activity in brain remains still unexplored.

To evaluate the hydroxyl radical scavenging capacity of L-theanine using an *in vitro* system, and to investigate its neurochemical effects on dopaminergic and acetylcholinesterase activity in Swiss Albino mouse brain.

Hydroxyl radicals were generated *in vitro* using a ferrous–ascorbate–EDTA system in the presence or absence of L-theanine or known antioxidants like catalase, melatonin, and glutathione (GSH). The resulting •OH adducts, 2,3- and 2,5-dihydroxybenzoic acid, were quantified by high-performance liquid chromatography. Additionally, Swiss albino mice received intraperitoneal administration of 5mg/kg of L-theanine twice a day for 7 days, after which striatal dopamine levels and hippocampal acetylcholinesterase activity were assessed.

L-theanine significantly reduced 2,5-DHBA formation at 0.075mM and 0.50mM concentrations in a ferrous-ascorbate EDTA system, whereas, 2,3-DHBA level was reduced at 0.075 mM, 0.1mM, and 0.50mM respectively. At the concentration of 0.075 mM, L-theanine was able to execute free radical scavenging activity better than GSH. *In vivo* experiments revealed that L-theanine administration at 5mg/kg increased striatal dopamine concentrations and decreased hippocampal acetylcholinesterase activity, indicating its dual role in supporting dopaminergic transmission and modulating cholinergic signalling.

L-theanine demonstrates direct hydroxyl radical scavenging capacity, in addition to modulating neurochemical pathways in the brain. Its efficacy, comparable to GSH and melatonin, supports its contribution to the overall antioxidant potential of tea. The observed enhancement of striatal dopamine and reduction of acetylcholinesterase activity further suggest a neuroprotective role, positioning L-theanine as a promising candidate for therapeutic development in neurodegenerative disorders.

Keywords: L-theanine, *Camellia sinensis*, Antioxidant, Acetylcholinesterase, Neuroprotection.

Abstract ID: ICTACSR 2025/TS1/OP 02

Assessment of Genotoxic Effects of Anthracene in *Allium Cepa*

Mahua Das, Anirudha Giri*
Environment and Human Toxicology Laboratory, Department of Life Science & Bioinformatics,
Assam University, Silchar – 788011, India
*Correspondence: agiri123@yahoo.com

Abstract

Toxicity evaluation of various pollutants has become increasingly important recently, leading to the rising popularity of the field of ecotoxicology. Polycyclic aromatic hydrocarbons (PAHs), one of the leading sources of aquatic contamination is found ubiquitously in nature. Anthracene, a priority pollutant belongs to the group of PAHs, and can be released into the environment by natural as well as anthropogenic sources. This study is an attempt to investigate the effects of anthracene employed on *Allium cepa* following exposure to different doses for a varying period of time. Morphological, cytological and genotoxic effects were assessed for toxicity evaluation at doses 10mg/L, 50mg/L, and 100mg/L along with a control group for reference. Exposure to anthracene disrupted the normal mitosis process and resulted in chromosomal aberrations. The root length and root numbers of *Allium cepa* was significantly reduced under anthracene treatments majorly at 100mg/L. The effective concentration (EC50) value of the aqueous anthracene solution was also determined to be 74.53mg/L or 7.4%. The cytotoxic effects were determined for the root tip meristematic cells through mitotic index (MI) and mitotic depression (MD) at 24h, 48h, 72h and 96h of study. For the genotoxic study, the different stages of cell cycle were visualized, and chromosomal abnormalities like anaphase-bridge, chromosome break, laggard etc. were detected. The control group exhibited the highest values for parameters like root length, root number and MI and lowest value for MD and chromosomal aberrations. Thus, the current study can help in establishing anthracene as a clastogenic agent, underscoring the need for monitoring and controlling its release into the environment.

Keywords: ecotoxicology, PAHs, chromosomal abnormalities, cytotoxicity, environmental monitoring

Abstract ID: ICTACSR 2025/TS1/OP 03

Decoding The Evolutionary Significance of CCHF Virus Segments and Exploring MicroRNA-Mediated Repression as a Therapeutic Strategy

Nikita Kar, Supriyo Chakraborty[a]*
[a]Department of Biotechnology, Assam University, Silchar 788011, Assam, India
*Correspondence: supriyoch_2008@rediffmail.com

Abstract

The tick-borne Crimean-Congo hemorrhagic fever virus (CCHFV) is among the most dangerous human pathogens, responsible for severe infections characterized by exceptionally high fatality rates. Despite decades of research, effective therapeutic interventions are still lacking, and existing treatment strategies have shown limited or no efficacy. This persistent gap highlights not only the seriousness of CCHFV pathogenesis but also its remarkable ability to evade host immune responses, making the development of innovative antiviral strategies an urgent global health priority.

In this context, we investigated the therapeutic potential of microRNA (miRNA)-based antiviral approaches, capitalizing on the natural regulatory functions of human miRNAs. These small non-coding RNAs have been increasingly recognized as powerful modulators of viral replication, with prior studies demonstrating their capacity to suppress a wide range of viruses by directly targeting viral coding sequences. By exploiting this host-derived defense mechanism, we sought to identify and characterize human miRNAs with the potential to repress CCHFV replication.

Our comprehensive analyses uncovered several putative miRNA binding sites distributed across the viral coding regions. Notably, computational evaluations using Codon Similarity Index (COSM) and compAI metrics revealed reduced translational efficiency in CCHFV mRNAs. Such inefficiency is considered advantageous for miRNA-mediated repression, as it increases the likelihood of successful targeting and suppression. To further substantiate these observations, we examined the predicted secondary structures of miRNA-mRNA duplexes, which consistently indicated stable hybridization between host miRNAs and viral transcripts.

To validate these predictions, nucleic-acid docking analysis was performed, confirming strong binding affinities and favorable interaction patterns between candidate miRNAs and their viral targets. These interactions suggest the likelihood of transcript cleavage or degradation, ultimately impairing viral protein synthesis and replication. Importantly, the combined evidence from sequence analysis, structural predictions, and docking

simulations strongly supports the feasibility of miRNA-based therapeutic strategies against CCHFV.

In summary, our findings underscore the promise of miRNA-driven interventions as a novel and biologically grounded antiviral strategy. By harnessing endogenous human regulatory molecules, this approach offers a potential pathway to overcome the challenges posed by CCHFV's immune evasion mechanisms and opens new avenues for the development of effective therapeutics against this highly lethal virus.

Keywords: CCHFV (or CCHF virus); codon usage; miRNA targets; repress/cleavage/degrade; miRNA-based therapy

Abstract ID: ICTACSR 2025/TS1/OP 04

Factors Affecting Codon Usage Biasness in Blotched Snakehead Virus

Nazrana Sultana Begum[1,2*], Supriyo Chakraborty[2*]
[1]Department of Zoology, Gurucharan University, Silchar 788004, Assam, India
[2]Department of Biotechnology, Assam University, Silchar 788011, Assam, India
*Correspondence: nazranasultanab@gmail.com, supriyoch_2008@rediffmail.com

Abstract

Blotched snakehead virus (BSNV) is of significant concern among fishermen. BSNV is a double stranded RNA (dsRNA) virus of the Birnaviridae family. Codon usage bias (CUB) analysis in this virus would shed light on its evolutionary history and could serve as the main source of information for developing a vaccine against it. Bioinformatic tools were used to study the nucleotide composition, ENC value, overrepresented and underrepresented codons, parity plot, correspondence analysis and neutrality plot. ENC value analysis reported a low CUB in this virus. Cytosine was the most prevalent nucleotide out of all the purines and pyrimidines. Nucleobase adenine was found to be the most occurring one in 3rd codon position. GC content was the highest at the 3rd codon position. Leucine was found to be the most occurring amino acid. Moreover, 13 overrepresented and 17 underrepresented codons were reported for this virus. Correspondence analysis revealed the influence of both mutational pressure and natural selection in shaping CUB of this virus. Neutrality plot revealed mutational pressure outweighed natural selection in the evolutionary process. Our study provided the baseline primary data for a basic evolutionary analysis of this virus and illustrated the pattern of codon choice in the blotched snakehead virus coding regions.

Keywords: Blotched snakehead virus, CUB, mutational pressure, natural selection

Abstract ID: ICTACSR 2025/TS1/OP 05

Metabolomic Insights From GC-MS Analysis into Differential Responses of *Scenedesmus* Sp. Under Cu (II) Stress

Tanushree Paul[1], Shuvasish Choudhury[2], Jayashree Rout[1]*
[1]Department of Ecology and Environmental Science, Assam University, Silchar
[2]Department of Life Science and Bioinformatics, Assam University, Silchar
*Correspondence: jayashreerout8@gmail.com

Abstract

Heavy metals like copper [Cu(II)] are persistent environmental pollutants that interrupt aquatic ecosystems and microalgae are the first organisms to respond to such stress. In the present study, gas chromatography-mass spectrometry (GC-MS)-based metabolomic approach was used to explore the metabolic alterations in the freshwater green alga *Scenedesmus* sp. under Cu(II) exposure which comprised a wide range of metabolites including amino acids, fatty acids, carboxylic acids and their derivatives, carbohydrates, sugars, alkanoids and hydrocarbons. GC-MS analysis showed significant disparity in terms of metabolic composition under Cu(II) stress as compared to the control. Statistical analyses showed distinct metabolic fingerprints for Cu(II) treatment. Cu(II) stress was linked with upregulation of b-methoxycinnamic acid (5.79-fold increase), distearin (3.64-fold increase), formic acid (3.32-fold increase), cystathionine (3.2-fold increase), D-glucose (2.77-fold increase) etc., reflecting enhanced antioxidant and detoxification pathways, increased energy and stress metabolism. Mapping these changes on metabolic pathways highlighted disruptions in carbohydrate metabolism, fatty acid biosynthesis, amino acid turnover and broader shifts in energy-related pathways like the citric acid cycle and mitochondrial electron transport. The findings showed that *Scenedesmus* relies on both common defense strategies and metal-specific adjustments to survive heavy metal stress. It provides a valuable mechanistic insight into algal tolerance to heavy metal toxicity and highlight the potential of *Scenedesmus* for bioremediation and sustainable bioresource applications.

Keywords: Copper, GC-MS, Metabolomics, *Scenedesmus* sp.

Abstract ID: ICTACSR 2025/TS1/OP 06

Computational Identification of Human microRNAs Targeting Rabies Virus Genes for Therapeutic Intervention

Aparajita Roy[1], Supriyo Chakraborty[1*]
[1]Department of Biotechnology, Assam University, Silchar, Assam 788011, India
*Correspondence: supriyoch_2008@rediffmail.com

Abstract

MicroRNAs, abbreviated as miRNAs, have a substantial impact on viral infections through their ability to control gene expression and influence the interactions between the host and the virus. This work investigates the capacity of miRNAs to selectively inhibit the expression of rabies virus genes, specifically Nucleoprotein N, Phosphoprotein M1 and M2, Transmembrane Glycoprotein G, and L protein. The 7mer-m8 model was utilised to identify human miRNAs that target these viral genes. The interactions between the miRNAs and the genes were then assessed based on binding energy, GC content, and stability. The findings indicated that miRNAs, including miR-1279, miR-4251, miR-4288, and miR-12117, successfully target the N gene. Additionally, other miRNAs target the remaining viral genes, indicating their capacity to bind and potentially inhibit viral replication. In addition, docking experiments have verified the stability of miRNA-mRNA duplexes, as evidenced by the high free energy values that indicate strong and reliable contacts between miRNA and gene. These findings indicate that certain human miRNAs have the potential to be effective therapeutic agents against the rabies virus by suppressing gene expression. This offers a new and innovative strategy to fight against this deadly infection.

Keywords: Rabies virus; microRNA targeting; docking: human microRNAs

Abstract ID: ICTACSR 2025/TS1/OP 07

Preliminary Checklist of Aquatic and Wetland Plants in Cachar District, Assam, India

Sweta Sutradhar & Debjyoti Bhattacharyya*
Plant Taxonomy & Biosystematics Laboratory, Department of Life Science & Bioinformatics, Assam University, Silchar 788 011, Assam, India.
*Correspondence: aksd158953@gmail.com, debjyoti_bsi@yahoo.co.in

Abstract

Cachar district in southern Assam encompasses a variety of aquatic and wetland habitats, including *anua*, *haors*, ponds, marshes, and seasonally inundated lowlands. These ecosystems support a rich assemblage of aquatic and semi-aquatic plant species that play vital ecological roles in nutrient cycling, habitat developing, and sustaining local livelihoods. Despite their ecological significance, comprehensive documentation of their diversity in Cachar distrct, Assam remains limited. This study presents a preliminary checklist of aquatic and wetland plant species in Cachar district, compiled from existing literature, herbarium records, and some exploratory field surveys. The recorded flora includes free-floating species such as *Pontederia crassipes* Mart., *Azolla pinnata* R.Br., *and Pistia stratiotes* L.; submerged hydrophytes like *Hydrilla verticillata* (L.f.) Royale; rooted floating-leaved species including *Trapa natans* L. and *Nymphaea pubescens* Willd.; and emergent or marsh dwelling taxa such as *Alternanthera philoxeroides* (Mart.) Griseb., *Eleocharis* spp., and *Cyperus* spp. etc. Although field-based data remain limited, this checklist provides a foundational reference for future floristic and ecological studies. Further research involving systematic seasonal sampling, habitat mapping, and conservation assessments is recommended, particularly in light of escalating anthropogenic pressures and hydrological alterations in the region.

Keywords: Barak Valley, conservation, diversity, macrophytes, taxonomic study.

Abstract ID: ICTACSR 2025/TS1/OP 08

Insights into Leaf Architectural Traits of *Averrhoa Bilimbi* and *A. Carambola*: Comparative Morphological Perspectives

Sakhila Islam Sodial & Debjyoti Bhattacharyya*
Plant Taxonomy and Biosystematics Laboratory, Department of Life Science and Bioinformatics, Assam University, Silchar, Silchar 788 011, Asaam, India.
*Correspondence: sodial70@gmail.com, debjyoti_bsi@yahoo.co.in

Abstract

The genus *Averrhoa* L. (Oxalidaceae *sensu lato*, Averrhoaceae *sensu stricto*) comprises two key species in Assam: *Averrhoa bilimbi* L. and *A. carambola* L. This comparative study explores the leaf architectural characteristics of these two species emphasizing their distinct botanical traits particularly in vegetative stage. *A. bilimbi* features an attenuate leaf apex, cordate base and well-developed areoles with eucamptodromous venation, whereas, *A. carambola* exhibits an acuminate apex, cuneate base, and imperfect areoles with brochidodromous venation. These differences highlight the taxonomic value of leaf architectural traits in species identification. A detailed comparative account of these morphological distinctions is presented here.

Keywords: *Averrhoa bilimbi, Averrhoa carambola*, leaf morphology, venation pattern, plant taxonomy.

Abstract ID: ICTACSR 2025/TS1/OP 09

In *Silico* Prediction of Phytocompounds from the Medicinal Plants Database of Assam, North East India, for Nanoplastic-Induced Neurotoxicity

Elina Parvulmawi* and Meenakshi Bawari
Department of Life Science & Bioinformatics, Assam University (Central), Silchar, Assam, India
*Correspondence: elinaparvulmawi@gmail.com

Abstract

Nanoplastics are extremely small plastic particles with a size less than 1 micrometer (0.001 mm) and are degradation products of microplastics. Nanoplastics can pass through cell membranes, tissues, and even the blood-brain barrier. Nanoplastics cause cellular and molecular damage in the brain and the nerve cells by various mechanisms, including oxidative stress, enzyme disruption-acetylcholinesterase (AChE), mitochondrial dysfunctions, inflammatory responses, calcium imbalance, and protein misfolding. Nanoplastics inhibit acetylcholinesterase (AChE), an essential enzyme that breaks down neurotransmitter-acetylcholine (ACh) in the cholinergic synapses, producing deleterious effects on the postsynaptic neurons, and hence causing neurotoxicity.

In the present study, the North East India Medicinal Plants Database (NEIMPD) is used as the source of phytocompounds from Assam state. These phytocompounds are used to perform in silico study for the amelioration of neurotoxicity caused by nanoplastics. The phytocompounds were retrieved from PubChem and ChEMBL, and the 3D structure of the target protein was obtained from the Protein Data Bank (PDB). Drug-likeness and pharmacokinetic profiling were performed using Swiss ADME. This study showed favorable ADME/Tox properties for some phytocompounds. Protein structure-acetylcholine (ACh) structure validation was performed using PROCHECK, and molecular docking was performed via AutoDock Vina and FlexX.

Keywords: Nanoplastics, Neurotoxicity, Oxidative stress, Mitochondrial dysfunction, Inflammatory responses, Calcium imbalance, Protein misfolding, Acetylcholine (ACh), Acetylcholinesterase (AChE), Cholinergic synapses, Cholinergic, Neurotransmission, Postsynaptic neurons, Enzyme inhibition, In silico study, PubChem, ChEMBL, Protein Data Bank (PDB), 3D protein structure, Swiss ADME, Drug-likeness, Pharmacokinetics, ADME/Tox properties, PROCHECK, Molecular docking, AutoDock Vina, FlexX.

Abstract ID: ICTACSR 2025/TS1/OP 10

Angiosperm Diversity of Bhuban Hill, Assam: An Overview of Floristic Wealth

Thangsangvung Vaiphei* & Debjyoti Bhattacharyya
Plant Taxonomy and Biosystematics Laboratory,Department of Life Science & Bioinformatics,
Assam University, Silchar, Assam
*Correspondence: tvaiphei23@gmail.com debjyoti_bsi@yahoo.co.in

Abstract

Bhuban hill, situated in Southern Assam, India, forms a part of the Indo-Burma biodiversity hotspot and represents a significant center of floristic diversity in the region. The present study provides an overview of the angiosperm flora of the hill through field surveys and review of relevant literature. A total of **180 species belonging to 118 genera and 61 families** were recorded, encompassing diverse life-forms such as trees, shrubs, herbs, and climbers. The flora is characterized by the dominance of families such as **Poaceae, Fabaceae,** and Euphorbiaceae which contribute substantially to species richness. Several taxa of ecological and conservation significance, including rare, endemic, and threatened elements, were also encountered. Besides its taxonomic diversity, Bhuban hill holds considerable ecological and cultural value, supporting ecosystem services and providing ethnobotanical resources to local communities. The study underscores Bhuban hill as a reservoir of angiosperm wealth and highlights the urgent need for systematic documentation and conservation strategies to protect its fragile plant diversity from increasing anthropogenic pressures.

Keywords: Barak valley, biodiversity, botanical exploration, conservation strategies.

Abstract ID: ICTACSR 2025/TS1/OP 11

In Silico Profiling of Neuroprotective Phytoconstituents from OSADHI-Online Structural and Analytics based Database for Herbs of India against Arsenic-Induced Neurotoxicity

Rajiv Sinha* & Meenakshi Bawari
Department of Life Science & Bioinformatics, Assam University, Silchar, Assam, India
*Correspondence: rajivsinha009@gmail.com

Abstract

Arsenic contamination in drinking water is a significant issue in North East India, particularly in Assam. According to data from the Central Ground Water Board and various studies:Arsenic levels above the safety threshold of 0.01 mg/L (10 µg/L, WHO guideline) have been detected in groundwater across various districts of Assam including Hailakandi, Karimganj & Cachar. Arsenic-induced neurotoxicity involves several complex mechanisms. Key pathological processes include generation of reactive oxygen species (ROS), neurotransmitter disruption: serotonin & dopamine, activation of apoptosis (programmed cell death) pathways in neurons, alteration of cytoskeletal and neurofilament proteins, inhibition of acetylcholinesterase, promotion of neuroinflammation and glial cell dysfunction, causes demyelination and axonal degeneration in peripheral nerves, predominantly affecting sensory fibers, neurodegenerative diseases including Alzheimer's and Parkinson's.

The digitization of phytoconstitutents of traditional medicinal plants has opened new avenues for performing in silico study for exploring the neurotherapeutic potential of these bioactive constituents.

In this in silico study leveraging computational tools such as molecular docking, pharmacophore modeling, and ADMET (Absorption, Distribution, Metabolism, Excretion, and Toxicity) predictions are used. The results obtained identified key phytoconstituents from the database that mitigates the neurotoxic effects of arsenic. By creating a digitized repository of molecular interactions and pharmacokinetics networking, the neurotherapeutic efficacy of the phytoconstituents is assessed.

Keywords: Arsenic-induced neurotoxicity, reactive oxygen species (ROS), neurotransmitter disruption, neurodegenerative diseases, phytoconstituents, molecular docking, neuroprotection, ethnobotanical digitization

Abstract ID: ICTACSR 2025/TS1/OP 12

Phytochemical Frontier in Parkinson's Disease Research: A Scopus-Based Bibliometric Analysis of Global Scientific Output (2000–2024)

Tamim Ahmed[1], Sibashish Kityania[1,2], Monjur Ahmed Laskar[2], Deepa Nath[3], Anupam Das Talukdar[1,2]*
[1]Department of Life Science and Bioinformatics, Assam University, Silchar-788011, India
[2]Bioinformatics and Computational Biology Centre, Assam University, Silchar-788011, India
[3]Department of Botany, Guru Charan University, Silchar – 788004, India
***Correspondence**: anupam@bioinfoaus.ac.in

Abstract

Parkinson's Disease (PD) is a progressive neurodegenerative disorder characterised by motor and non-motor impairments, primarily due to dopaminergic neuron degeneration. While current treatments, such as levodopa and dopamine agonists, provide symptomatic relief, they often lead to long-term side effects and do not halt disease progression. In this context, plant-derived phytochemicals have garnered increasing attention as potential therapeutic alternatives due to their neuroprotective, antioxidant, anti-inflammatory, and multi-targeted actions.

This study presents a comprehensive bibliometric analysis of research on phytochemicals in PD therapy, based on Scopus-indexed original research articles from 2000 to 2024. A total of 1,220 documents were analysed using Biblioshiny (R) and VOSviewer. Key bibliometric indicators—including annual publication trends, citation metrics, leading authors, institutions, countries, journals, and co-occurrence of keywords—were systematically evaluated.

The results reveal a significant upward trend in publication output, with major contributions from India, China, and South Korea, although countries like the USA demonstrated higher average citation impact. The Journal of Ethnopharmacology emerged as the most prolific and influential source. Thematic and trend analyses uncovered a shift from general neurodegeneration research to targeted, computational phytochemical studies, emphasizing approaches such as molecular docking, network pharmacology, and enzyme inhibition (e.g., MAO-B).

This study not only maps the global research landscape but also identifies underexplored areas and evolving trends, thereby offering valuable insights for future investigations into plant-based PD therapeutics. The findings can serve as a strategic guide for researchers, policymakers, and funding agencies aiming to enhance translational outcomes in neurodegenerative disease research.

Keywords: Bibliometric analysis, Parkinson's disease, Phytochemicals, Biblioshiny, VOSviewer

Abstract ID: ICTACSR 2025/TS1/OP 13

Cumulative Impact of Organochlorine Pesticide, Lindane on Freshwater Teleost Fish, *Channa punctata* (Bloch,1793)

[1] **Debasish Bhattacharjee*** and [2] Professor Suchismita Das
[2] Department of Life Science and Bioinformatics, Assam University, Silchar-11
[1] Guest Faculty, Department of Zoology, Cachar College, Silchar
[*]**Correspondence**: debasishbhat87@gmail.com

Abstract

Pesticides are a group of chemicals made for the purpose of killing pest species. In India, the main use of pesticides is in agriculture and public health sector to combat the various pests and diseases that affect man. In this study, teleost fish, *Channa punctata*, (Bloch,1793) is used as the test animal. Acute toxicities of lindane on *Channa punctata* were determined by static bioassay tests and LC_{50} found to be 3.96, 3.36, 2.85 and 2.55 g/L respectively for 24, 48, 72 and 96 hours. During acute toxicity, the normal colour was found to fade, along with copious mucous secretions, irregular, erratic and jerky movements, gulping of air and other behavioural anomalies. The present study aims to reveal the toxic effects of lindane on teleost fish *Channa punctata*, (Bloch,1793).

Keywords: Pesticide, lindane, bioassay, copious mucous secretions, LC_{50}, behaviour,

Abstract ID: ICTACSR 2025/TS1/OP 14

Checklist of Macro-Fungi in Wild Natural Habitats of Barak Valley Region of Assam, India for Livelihood, Entrepreneurship Health Foods and Ecosystem Sustainability

Biswajit Deb Roy*
Microbiology Laboratory, Department of Botany, Cachar College, Silchar-788001, Assam, India.
*Correspondence: bdebroy6@gmail.com

Abstract

Mushroom more popularly known as "Elixir of Life" is the fruiting body of macro-fungi which is a precious natural resource in terms of its multifarious role in human food, medicine, conservation of nature and prevention of climate change to achieve sustainable development goals. Mushroom cultivation can be used as an alternative source not only to provide food and nutrition for the community but also to provide medicines for many ailments. Mushroom also prevents climate change and maintains ecosystem quality. Mushroom cultivation eventually leads to the livelihood improvement of people community for socioeconomic transition. Mushroom diversity of Barak Valley zone of Assam, India have not been well documented till now even though most of the indigenous tribal communities of the area use mushroom for culinary purpose or ingredients of medicinal preparation from long back. This work is an initiative to document diversity of edible, medicinal as well as poisonous mushroom resource from the local forest, grasslands, hilly tracts as well as plains of Barak Valley region of Assam, India. Altogether, forty-one mushroom species were collected and identified on the basis of morphological characteristics. They represent thirty-six genera, twenty-five families and eight orders. Interviewing local household community, markets and referring to the available literature it is observed that out of total forty-one species reported, eighteen species are edible. Among these edible mushroom species two species viz., *Agaricus bisporus* and *Volvariella volvacea* are most popular among the tribal communities and local population. The order Agaricales being the most abundant order represents fourteen families and twenty-five species. The order Polyporales is the second abundant group representing four families and nine species. The species viz., *Stypella vermiformis*, *Auricularia thailandica* and *Phallus rigidiindusiatus* which are being used both as food and medicine by the tribal population constitutes the major findings in this study. More intensive and extensive work in the study area might explore yet undocumented species which might have potential to be used as food, fodder, besides their use in medicinal purpose.

Keywords: Macro-fungi, Wild edible mushroom, Barak Valley, *Phallus rigidiindusiatus*, *Stypella vermiformis; Auricularia thailandica*.

Abstract ID: ICTACSR 2025/TS1/OP 15

In Silico Identification of Potential Cruzain Inhibitors for Chagas Disease: A QSAR-Guided Approach

Joyobrato Nath*
Department of Zoology, Cachar College, Silchar, Assam, India
*Correspondence: joyobrato.nath@gmail.com

Abstract

Chagas disease, caused by the protozoan parasite *Trypanosoma cruzi*, remains one of the most severe and life-threatening neglected tropical diseases in Latin America, particularly in Brazil. Despite decades of research, there are still no effective therapeutic options for the chronic stage of the disease, underscoring the urgent need for novel chemotherapeutic agents. Among the validated molecular targets, cruzain—a major cysteine protease—has emerged as especially significant due to its essential role in parasite survival and pathogenicity, making it an attractive candidate for rational drug design. In this study, a diverse virtual chemical library of 2500 compounds was generated using the ilibdiverse. Structure-based screening with Flex-X identified twelve novel ligands exhibiting favorable binding affinities for the active site of cruzain (PDB ID: 3I06). Remarkably in QSAR analysis, one of the identified molecules, designated ligand N2, (docking score= 30.0898) demonstrated a very low activity (IC50= 10) value, suggesting a high degree of inhibitory potential. This study establishes ligand N2 as a valuable lead molecule with significant potential for further study.

Keywords: Chagas disease, cruzain, inhibitor, QSAR, IC50

Abstract ID: ICTACSR 2025/TS1/OP 16

Use Of Traditional Herbs Found in Northeast India for Enhancement of Fish Immunity

Bhargov Borah*
Department of zoology, Girijananda Chowdhury University
*Correspondence: Sumanbora11@gmail.com

Abstract

The integration of traditional herbal remedies into aquaculture practices offers a promising avenue for enhancing fish immunity, particularly in Northeast India—a region rich in ethnobotanical diversity. Indigenous herbs such as Centella asiatica (thankuni), Azadirachta indica (neem), Ocimum sanctum (tulsi), Zingiber officinale (ginger), and Terminalia chebula (haritaki) have long been used in local medicine and are now gaining attention for their immunostimulatory effects in aquatic organisms. These herbs contain bioactive compounds like flavonoids, alkaloids, and terpenoids that modulate immune responses, improve disease resistance, and reduce oxidative stress in fish. Experimental applications in carp and catfish species have demonstrated improved survival rates, enhanced phagocytic activity, and reduced pathogen load. The use of herbal feed additives and aqueous extracts aligns with sustainable aquaculture goals by minimizing antibiotic dependence and promoting eco-friendly health management. This approach not only leverages traditional knowledge systems but also supports community-driven aquaculture innovation in Assam and neighboring states.

Keywords - Herbal immunostimulants, Northeast India, aquaculture, fish health, ethnobotany.

Abstract ID: ICTACSR 2025/TS1/OP 17

Identification Of RIPK3 Inhibitor Through Virtual Screening And Molecular Docking Studies

Angneh Ngoruh, Shashi Kumar Yadav, Prosperwell Ingty and Atanu Bhattacharjee*
Department of Biotechnology and Bioinformatics, North-Eastern Hill University, Shillong, India.
*Correspondence: atanubioinfo@gmail.com

Abstract

Cardiovascular diseases (CVDs) are the major cause of death worldwide. Atherosclerotic plaque formation in arteries causes fatality and mortality. Receptor interacting protein kinase 3 (RIPK3) plays a role in development and instability of atherosclerotic plaque. Six-lakhs compounds from ZINC database were virtually screened for oral bioavailability, bioactivity, drug likeness, physiochemical and pharmacokinetic properties. Molecular interaction studies between small molecules and RIPK3 were performed using GOLD (Genetic Optimisation for Ligand Docking) algorithm. Molecular interaction studies reveal five small molecules with high GOLD score compared to reference drug (Zharp-99). These prospective molecules may be good candidate as RIPK3 inhibitor. Further wet lab validations are required to establish these molecules as ideal inhibitors.

Keywords: Atherosclerosis, RIPK3, molecular docking, GOLD

Abstract ID: ICTACSR 2025/TS1/OP 18

DNA Barcoding: A Reliable Tool in Identification of Pyralid Moths (Pyralidae; Lepidoptera)

Manmeet Pal Kaur[1] and Amritpal Singh Kaleka[2*]
[1]Research Scholar, Department of Zoology and Environmental Sciences
[2]Assistant Professor, Department of Zoology and Environmental Sciences, Punjabi University, Patiala
[*]Correspondence: manmeetpal37@gmail.com, apskaleka@gmail.com

Abstract

The accurate identification of moths referable to family *Pyralidae* is challenging due to their morphological similarity, cryptic diversity and subtle diagnostic features. In Lepidoptera, the traditional taxonomy largely depends on external morphology, particularly general colouration and wing patterns. However, phenotypic plasticity, intraspecific variability and deterioration of morphological traits may lead to misidentification. Furthermore, conventional identification keys are often restricted to particular life stages or genders and demand high taxonomic expertise, making them inadequate in distinguishing cryptic species. The molecular approaches, particularly DNA barcoding, provide a reliable alternative in such cases. The mitochondrial cytochrome c oxidase subunit I (COI) gene has proven to be a robust molecular marker for species-level identification in insects and especially in Lepidoptera. The present study aims has been initiated to employ cytochrome c oxidase subunit I (COI) -based DNA barcoding for the molecular identification of economically and ecologically significant pyralid moths. By comparing sequences with reference databases, this study will help to validate morphological identification, resolve cryptic diversity and establish a baseline for further ecological and evolutionary studies. The integration of classical taxonomy with molecular tools will not only enhance the accuracy in identification but also contribute to biodiversity documentation and pest management strategies.

Keywords: Pyralidae, Lepidoptera, COI gene, DNA barcoding, species identification

Abstract ID: ICTACSR 2025/TS1/OP 19

An Insilico Study of Sweet Potato, *Ipomoea batatas* L. (Lam) for Breast Cancer

Maitrayee Dutta Swargiary* and Rossilin Suting
Department of Bio-Sciences, Assam Don Bosco University, Tapesia Gardens, Sonapur, Assam, India 782402
*Correspondence: maitrayee.swargiary@dbuniversity.ac.in

Abstract

The sweet potato, *Ipomoea batatas* L. (Lam.), is one of the vegetative crops with high nutritional and chemo preventive promoting properties for breast cancer and is said to be having a promising dietary value for breast cancer patients. In this study, the sweet potato tubers were extracted using methanol and gas chromatography was used to determine significant 16 bioactive substances with a bioavailability score of 85% and were Lipinski compliant with low toxicity. In-silico studies as potential drug targets against breast cancer was performed through molecular docking studies to monitor the interactions of a significant bioactive compound 2-phenylbutanedioic acid with the selected protein 6I2U that are involved in breast cancer. 2-phenylbutanedioic acid was found to have the best affinity (-6.4 Kcal/mol) for 6I2U target protein through molecular docking studies with SwissDock server. This finding shows that 2-phenylbutanedioic acid holds a potential to be used as a suitable drug target for breast cancer patients.

Keywords Bioactive, Breast cancer, In silico, GC MS, *Ipomoea batatas*

Abstract ID: ICTACSR 2025/TS1/OP 20

Insights into Glucose-Lipid Homeostasis: Comparative Effects of Genistein, Metformin, and Enzyme Knockdown in Cellular Models

Sumit Kumar Singh* and Bidyadhar Das
Dept of Zoology, North Eastern Hill University, Shillong-793022
***Correspondence:** singhsumit221296@gmail.com

Abstract

The regulation of glucose and lipid metabolism is a complex process involving multiple enzymes and signaling pathways. Adipocytes play a central role in energy balance by storing lipids and modulating glucose homeostasis. Among the key metabolic enzymes, glycerol kinase (GK) and mitochondrial glycerol-3-phosphate dehydrogenase (mGPDH) regulate glucose utilization and glycerol metabolism, respectively. Disturbances in their activities are closely associated with obesity, insulin resistance, and type 2 diabetes. Natural compounds such as genistein and antidiabetic drugs such as metformin have been reported to modulate glucose and lipid metabolism, but their mechanisms of action in relation to GK and mGPDH remain unclear. This study investigated the effects of genistein, metformin, and siRNA-mediated knockdown of GK and mGPDH on glucose production, glucose uptake, and lipid accumulation in C2C12 (myoblast), HepG2 (hepatocyte), and 3T3-L1 (adipocyte) cells.

C2C12, HepG2, and 3T3-L1 cells were cultured in DMEM supplemented with 10% FBS and standard antibiotics. 3T3-L1 pre-adipocytes were differentiated into mature adipocytes and confirmed by triglyceride accumulation using Oil Red O staining. Cells were treated with different concentrations of genistein and metformin, followed by assessment of glucose production and glucose uptake. For gene silencing, 3T3-L1 and C3H/10T1/2 adipocytes were transfected with GK and mGPDH siRNAs using Lipofectamine 3000. Knockdown efficiency was determined by enzyme activity assays, while lipid accumulation was visualized by Oil Red O staining.

Genistein treatment resulted in reduced glucose production in all cell lines, indicating inhibition of gluconeogenesis. Metformin decreased glucose production in C2C12 and HepG2 cells but not significantly in adipocytes. Conversely, metformin enhanced glucose uptake in all cell types in a dose-dependent manner. siRNA-mediated knockdown of GK and mGPDH reduced enzyme activities, increased triglyceride

accumulation, and decreased glucose production, revealing their critical role in regulating the balance between lipogenesis and gluconeogenesis.

Genistein, metformin, and siRNA-mediated silencing of GK and mGPDH exert distinct yet complementary effects on cellular metabolism. While genistein predominantly inhibited glucose production, metformin enhanced glucose uptake, and knockdown of GK and mGPDH shifted metabolism toward lipid storage with reduced glucose output. These results identify GK and mGPDH as important metabolic checkpoints and provide insights into the regulation of glucose–lipid homeostasis, with potential therapeutic relevance in obesity, insulin resistance, and type 2 diabetes.

Keywords: Genistein; Metformin; Glucose–lipid metabolism; Type 2 Diabetes Mellitus

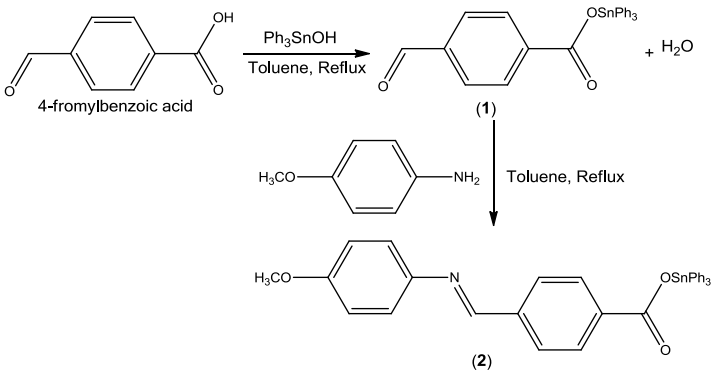
Abstract ID: ICTACSR 2025/TS1/OP 21

Triphenyltin(IV) Compounds Exhibiting Enhanced Anticancer Activities Against Human Cervical Cancer Cells

Imliwati Longkumer*
Department of Chemistry, Fazl Ali College, Mokokchung 798601, Nagaland.
*Correspondence: imliwati@gmail.com

Abstract

Metal complexes having organelle specificity and selective cytotoxicity are highly desirable. A novel triphenylstannyl 4-((arylimino)methyl)benzoates (**2**) was obtained by the reactions of triphenylstannyl 4-formylbenzoate (**1)** with *p*-anisidine. Compounds (**1**) and (**2**) were characterized by elemental analysis, IR, ^{1}H, ^{13}C and ^{119}Sn NMR spectroscopy, as well as single-crystal X-ray diffraction for compound (**2**). The *in vitro* cytotoxic activities of the compounds were assessed using the MTT tetrazolium dye assay against HeLa (human cervical) and MDA-MB-231 (breast) cancer cells, with IC_{50} values revealing high activity. Compared to cisplatin, the compounds exhibited enhanced cytotoxic efficacy, indicating their potential as potent anticancer agents. The compounds demonstrated maximum inhibition in HeLa cells, with negligible effect on normal human embryonic kidney (HEK) cells. The combined results of the DCFH-DA dye and Hoechst 33342/PI nuclear staining assays, along with flow cytometry analysis, show that they possess a dual mode of action: They induced apoptotic cell death, attributable to the tin-assisted generation of reactive oxygen species (ROS). Cell cycle analyses indicated that they exhibit cell growth inhibition and may cause turbulences in the G1 and G2/M phases.



Scheme 1 The synthetic methodology for obtaining the triphenyltin compounds.

Keywords: Anticancer; Cytotoxicity; Apoptosis; Reactive Oxygen Species (ROS).

Abstract ID: ICTACSR 2025/TS1/OP 22

Ovarian Cycle in Assamese King Fish *Cyprinion Semiplotum* (Mcclelland, 1839) with Special Emphasis on Oogenesis

Rashmi Dutta[1*], Debanshu Narayan Das[2]
[1]Department of Zoology, Gargaon College, Simaluguri, Sivasagar, Assam
[2]Department of Zoology, Rajiv Gandhi University, Doimukh, Itanagar, Arunachal Pradesh
*Correspondence: rashmidutta07@gmail.com

Abstract

This study was conducted to analyze the oogenesis and the reproductive phases of females of the Assamese King fish *Cyprinion semiplotum*. The sexually mature females of *Cyprinion semiplotum* (n=180) were obtained from Dikrong river of Arunachal Pradesh, India. The specimens' gonads were removed and processed for light microscopy. The stages of ovarian development in *Cyprinion semiplotum* begin with the oogonia, which proliferate into new cells or differentiate into prophasic oocytes that, at the end of this process, form the ovarian follicle and end folliculogenesis. Oocytes showing primary growth with pre-vitellogenic and cortical alveolus were observed. Vitellogenesis was marked mainly by the incorporation of yolk granules. Mature oocytes were defined by their migration from the nucleus to the micropyle. Post ovulatory follicles and atretic oocytes were also observed. The reproductive phases were classified as immature, early and final developing, spawning capable, regressing and regenerating. This is the first step to better understand the reproductive biology of this species, which shows great potential for food fish as well as ornamental fish.

Keywords: Fish, Germ cell, reproduction, oogonia, vitellogenesis, maturation

Abstract ID: ICTACSR 2025/TS1/OP 23

Embryotoxicity of Bisphenol A on developing chick embryo (*Gallus gallus domesticus*)

Pimily Langthasa[1,2] and Sarbani Giri[1]*
[1]Laboratory of Cell and Molecular Biology, Department of Life Science and Bioinformatics, Assam University, Silchar, Assam, India.
[2]Department of Zoology, Gargaon College, Simaluguri, Assam, India.
*Correspondence: girisarbani@gmail.com

Abstract

Endocrine disrupting chemicals (EDCs) have become a great concern in recent years due to its harmful effects to human life. Bisphenol A (BPA) is one of the potent EDC compounds, widely used in industry to manufacture polycarbonate plastic, epoxy resins. The present study aimed to investigate the toxicity of BPA in early chicken embryos. The eggs were incubated at 37.8 ± 0.2 °C with 65–75% humidity in an incubator with an automatic turning system. The eggs were randomly divided into five main groups and administered different doses of BPA (1mM, 3mM and 5mM/egg) on day 0 of incubation. Survivability of the embryos were evaluated after 72hrs. For extraembryonic vasculature and neural tube defects (NTDs) BPA concentration of 0.2mM, 0.4mM and 0.6mM (2mM, LD50) were administered. The embryos were collected and observed macroscopically, and those showing developmental delay or unfertilized were excluded. Histological samples were taken from the brain and spinal cord regions to assess neural tube formation. Embryos treated with BPA showed a significant reduction in survival rate. Reduction in relative vascular area was observed in all the treated groups. All the treated groups recorded abnormal neural tube defects when compared to control. Overall, the findings highlight the toxic effects of BPA on avian embryonic development, including in vascularization, and neural tube defects.

Keywords: Bisphenol A, embryotoxicity, endocrine disrupting chemicals, chicken embryo

Abstract ID: ICTACSR 2025/TS1/OP 24

Exploring Dietary Restriction as a Non-Pharmacological Intervention in Parkinson's Disease

Rajib Paul[1,2*], Anupom Borah[2]
[1]Pandit Deendayal Upadhyaya Adarsha Mahavidyalaya, Eraligool, Sribhumi – 788723, Assam, India
[2]Cellular and Molecular Neurobiology Laboratory, Department of Life Science and Bioinformatics, Assam University, Silchar-788011, Assam, India
***Correspondence:** rajibpaul.aus47@gmail.com

Abstract

Parkinson's disease (PD) is the second most common neurodegenerative disease state, that is, mainly known to be a progressive degeneration of dopaminergic neurons in the substantia nigra and the striatum, which is translated by the expression of motor dysfunctions. Drugs such as L-DOPA can ameliorate symptoms but do not prevent the degeneration of neurons. Dietary Restriction (DR) defined as reduced food consumption in the absence of malnutrition, emerges in recent years as a potential non-pharmacological treatment to delay PD progression. The study adopted MPTP-induced PD mice model and found that two months of DR improved the motor performances, restored striatal dopamine levels, and reduced dopaminergic neuron loss in both the striatum and substantia nigra. Moreover, DR protected mitochondrial complex III activities and attenuated glial fibrillary acidic protein (GFAP) and neuronal nitric oxide synthase (nNOS) suggesting reduced neuroinflammation and oxidative stress. These data suggest that DR promotes neuroprotection through the preservation of mitochondrial function, reduction of oxidative stress and attenuation of inflammatory stress. In summary, the dietary restriction is likely to be an adjunctive therapeutic option for PD beyond symptomatic treatment. More clinical trials are needed to validate and extrapolate these effects on human PD patients or subjects at risk.

Key words: Parkinson's disease, Dietary restriction, Dopaminergic neurons, Mitochondrial function, Neuroprotection

Abstract ID: ICTACSR 2025/TS1/OP 25

Chavibetol: Major and Potent Phytotoxin in Betel (*Piper betle* L.) leaf Essential Oil

Phirose Kemprai[a] and Saikat Haldar[b*]
[a]Department of Botany (Autonomous), Debraj Roy College, Golaghat-785621, Assam
[b]Centre for Pre-clinical Studies, CSIR– NEIST, Jorhat, Assam 785006, India
*Correspondence: phirosekemprai@gmail.com

Abstract

Many essential oils and their constituent volatile organic compounds are known to be phytotoxic and potential bioherbicides. This study investigated the phytotoxicity of propenylbenzene-rich essential oils and identified their active components. Five commercially available propenylbenzene-rich oils were screened, among which betel (*Piper betle* L.) oil was found to be the most potent natural phytotoxin. It inhibited wheatgrass (Triticum aestivum) seed germination and growth in a dose-dependent manner in both water and agar media, with half-maximal inhibitory concentration (IC50) values ranging from 23.2 to 122.7 µg mL−1. Phytotoxicity-guided fractionation and purification revealed chavibetol as the major and most active constituent, followed by chavibetol acetate. A structure–activity relationship study of 12 propenylbenzenes further indicated the significance of aromatic substitutions and their positions in determining phytotoxic activity. Chavibetol showed strong inhibitory effects on wheatgrass germination and growth in water (IC50 15.8–53.4 µg mL−1), agar (IC50 34.4–53.6 µg mL−1), and aerial (IC50 1.7–4.5 mg L−1) media, with radicle growth being more sensitive than plumule growth. In open phytojars, chavibetol effectively inhibited the growth of 3–7-day-old bermudagrass (*Cynodon dactylon*) seedlings when applied either by direct spraying (IC50 2.3–3.4 mg jar−1) or by agar supplementation (IC50 116.6–139.1 µg mL−1). Similarly, the growth of pre-germinated green amaranth (*Amaranthus viridis*) was suppressed more efficiently under both application modes (1.2–1.4 mg jar−1 and IC50 26.8–31.4 µg mL−1, respectively). Overall, the findings establish betel oil as a potent phytotoxic extract and chavibetol as its principal active molecule, highlighting its potential as a promising volatile phytotoxin for the early-phase management of weeds.

Keywords: aromatic crop; propenylbenzene; phytotoxicity; bioherbicide; gas-chromatography

Abstract ID: ICTACSR 2025/TS1/OP 26

Kombucha and its Role in Organic Farming

Maina Borah[1*], Ajoy Kumar Das[2*]
[1*] Department of Botany, Pandu College, Guwahati, Assam, India
[2]Department of Botany, Arya Vidyapeeth College (Autonomous), Guwahati, Assam, India
***Correspondence:** mainaborah85@panducollege.ac.in, ajoykrdasavc@gmail.com

Abstract

Kombucha, a fermented tea produced by a symbiotic consortium of bacteria and yeasts (SCOBY), has gained significant attention for its probiotic, antimicrobial, and antioxidant properties. Beyond its role as a functional beverage, kombucha holds potential applications in organic farming due to its microbial diversity, bioactive metabolites, and natural growth-promoting effects. The metabolites generated during fermentation, including organic acids, vitamins, enzymes, and antimicrobial compounds, can act as natural biostimulants and biocontrol agents. Their use may enhance soil fertility, suppress phytopathogens and improve plant growth without reliance on synthetic inputs. Moreover, kombucha-derived microbial cultures could be explored as biofertilizers or soil amendments, aligning with the principles of sustainable and eco-friendly agriculture. This intersection of kombucha biotechnology and organic farming presents a novel research avenue with implications for soil health management, crop productivity, and environmental conservation. Future investigations should focus on mechanistic insights, optimization of formulations, and field-scale applications to validate its scope in agricultural sustainability.

Keywords: Kombucha, SCOBY, Biostimulant, Biocontrol, Bioformulation

Abstract ID: ICTACSR 2025/TS1/OP 27

Taxonomic Diversity and Characterization of Horticultural Potentiality of Two Lesser-Known Genera Belonging to the Asparagaceae-Subfamily Convallarioideae in India

Dilip Kr. Roy
Department of Botany, Birjhora Mahavidyalaya (Degree Science College),
Bongaigaon–783380, Assam, India.
*Correspondence: dilipbsierc@gmail.com

Abstract

Most of the nurseries in North East India harbours only exotic plants and sell them in the market at high prices. Besides, exotic plants have always had adverse effects on the environment, and possibilities are always there to escape in the natural vegetation, which may lead to the development of invasive nature in them and may cause catastrophe in native vegetation structures. Besides, these exotic ornamental plants require special care to maintain. The forests of north-east India are richer in ornamental plants with beautiful flowers and foliage. They have the great potentiality to be used as ornamental plants for home gardening, indoor gardening, rooftop gardening, pot gardening, and also for vertical gardening. We should give more emphasis to developing nursery industry based on native plants. Therefore, the unemployed youths in the region should be trained with technological expertise in the nursery industry and marketing. Besides, the local community will benefit from sustainable gardening with native plants. Moreover, metropolitan cities where the air pollution rate is at an alarming level should compulsorily adopt indoor or balcony pot gardening with native ornamental flowering as well as foliage plants for both aesthetics and air purification.

Along with the taxonomy, diversity, and distribution in the Indian context, the paper deals with the characterization of the horticultural potentiality of two lesser-known genera, namely *Aspidistra* Ker-Gawler and *Tupistra* Ker-Gawler belonging to the Asparagaceae-subfamily Convallarioideae, for indoor gardening by macro-propagation technique and found that the plant has the capacity to grow in non-fertile soil as well as with less watering. The plants bear long-lasting green, glossy foliage with showy flowers developed from rhizomes. Therefore, this group of native plant species with beautiful flowering plants and attractive foliage could be used to boost the nursery industry in North East India.

Keywords: North East India, nursery industry, taxonomy, macro-propagation technique.

Abstract ID: ICTACSR 2025/TS1/OP 28

Green Applications of Nanoparticles for Phytoremediation of Contaminated Environments

Ravi Kumar Singh[1] and Sunayana Goswami [2*]
[1] Department of Zoology, Madhabdev University, Narayanpur, Lakhimpur, Assam-784164
[2] Department of Zoology, Biswanath College, Biswanath Chariali, Assam, India – 784176.
*Correspondence: worldoftamanna@gmail.com

Abstract

Nano-phytoremediation (NPR) is an innovative remediation technique that relies on the use of nanomaterials. NPR allows to tackle and address the formidable challenges of 21st century such as pollution crisis, contaminated land management, restoration of environmental imbalance and presents innovative solutions for quick and efficient removal of pollutants from contaminated environment. "Green" synthesis has drawn a lot of interest in materials science as a dependable, Eco-friendly, and sustainable method. NPR technologies entail the applications of reactive nanoparticles (NP) such as metal oxides, nanodots, bimetallic nanoparticles, carbon nanotubes, and nanocomposites for the degradation and mineralization of contaminants. NP based remediation technologies are emerging tools to mitigate the pollution crisis all over globe, whether it may be air, water or soil pollution. Nanoengineered materials (NEMs) like nano-adsorbents, nanomembranes, nano-sensors, modified photocatalysts, metallic NP have shown promising potential for the environmental remediation due to their structural robustness and improved surface properties. Phytoremediation is easy to use, affordable, doesn't disturb soil structure and ecosystems much, looks good, is highly adaptable, and is well-liked by the general public. This review aims to discuss the Green Applications of NP in Phytoremediation in the context of water and soil treatment presenting current studies and approaches for environmental remediation.

Keywords: Nanoparticles, Nanoremediation, Nano-adsorbents, Green Applications.

Abstract ID: ICTACSR 2025/TS1/OP 29

Systematics, Distribution Patterns and Economic Utility of the tribe Andrographideae (Acanthaceae) in Assam State, India

Kangkan Kumar Das & Debjyoti Bhattacharyya*
Plant Taxonomy & Biosystematics Laboratory, Department of Life Science & Bioinformatics, Assam University, Silchar-788011, Assam, India
*Correspondence: debjyoti_bsi@yahoo.co.in

Abstract

Andrographideae Endl. is the fifth largest tribe under the subfamily Acanthoideae of the family Acanthaceae Juss. in terms of its species number. Globally, *c*. 130 species under eight genera are recorded within the tribe distributed in the tropical Asia. In India, 54 species under six genera are enumerated; of which, 27 species (50%) are endemic. In Assam, the tribe is represented by five genera and 11 species. In Assam, *Phlogacanthus* Nees represents the most species-rich genus of the tribe, comprising seven species. It is followed by *Andrographis* Wall. ex Nees, *Gymnostachyum* Nees, *Haplanthodes* Kuntze and *Haplanthus* Nees, each represented by a single species. Andrographideae exhibits a close affinity with the tribe Justiceae as both shares common morphological features *viz*. corolla aestivation pattern, two fertile stamens (rarely three in *Phlogacanthus*) with or without staminodes and zygomorphic, 2-lipped corolla. Although many fragmentary works were carried out, the morphological and molecular phylogenetic relationships within the tribe Andrographideae remain poorly understood. Many generic circumscriptions are still under revision leading to considerable taxonomic instability. Consequently, many taxa within the tribe have been shifted between genera or reinstated under different generic group. The present study aims to provide a comprehensive taxonomic investigation of the tribe occurring in Assam, along with updated information on their distribution, economic importance and conservation status.

Keywords: Morphology, Northeastern India, Taxa, Taxonomy.

Abstract ID: ICTACSR 2025/TS1/OP 30

Identifications of Potential Drug Targets for Hepatocellular Carcinoma (HCC) Therapeutics Using Gene Network Analysis

Rajat Nath[1*]
[1]Department of Biotechnology and Microbiology, Techno India University, Tripura, Agartala, Tripura, India, 799004
*Correspondence: rajat.n@tiut.ac.in

Abstract

Hepatocellular carcinoma (HCC) remains a serious worldwide health concern, with limited avenues for treatment and a poor prognosis. To identify novel biological targets for intervention, we used a network biology approach that combined transcriptome data and protein-protein interaction networks. Differentially expressed genes linked with HCC were mapped onto curated interaction networks, which were then analyzed for topology and modularity to identify essential regulators. Our findings showed 17 upregulated and 8 downregulated potential targets, several of which are involved in key cancer pathways such as cell cycle control, apoptosis, and metabolic regulation. Because of their high interconnectedness and regulatory significance, hub and bottleneck nodes in the network have a great potential for use as therapeutic targets. Importantly, cross-referencing with drug-target interaction databases revealed multiple candidates with current modulators, indicating potential opportunities for drugs repurposing. The identified targets provide mechanistic insights into HCC's dysregulated molecular pathway and are intriguing candidates for future validation in therapeutic advancement. Overall, our findings show that network biology is a powerful tool for unravelling the complexity of HCC and prioritizing molecular nodes for precision drug discovery.

Keywords: Hepatocellular carcinoma, Network biology, Differential expression, Protein–protein interactions, Drug targets

Abstract ID: ICTACSR 2025/TS1/OP 31

Aqueous Fruit Pulp Extract of *Garcinia pedunculata* Ameliorates Rotenone-Induced Renal Injury in Mice

Muhammed Khairujjaman Mazumder[1,2,*], Rajib Paul[1,3], Anupom Borah[1]
[1]Cellular and Molecular Neurobiology Laboratory, Department of Life Science and Bioinformatics, Assam University, Silchar – 788011, India
[2]Department of Zoology, Dhemaji College, Dhemaji – 787057, Assam, India
[3]Department of Zoology, Pandit Deendayal Upadhyaya Adarsha Mahavidyalaya, Eraligool – 788723, Sribhumi, Assam, India
*Correspondence: khairujjaman1987@gmail.com

Abstract

Garcinia pedunculata Roxb. (Family Clusiaceae) is an evergreen tree distributed widely in south Asia. Traditionally, its fruits have been in use against gastrointestinal disorders, while pharmacological studies demonstrated anti-tumor, anti-bacterial, lipid-lowering, anti-diabetic, hepatoprotective and neuroprotective potentials. In the present study, the nephroprotective potential of aqueous extract of dried fruit pulp of *G. pedunculata* was assessed in mice model of acute renal injury, induced by administering rotenone at 3 mg/kg bw for 5 days (i.p.). In another group, mice were administered with the extract of *G. pedunculata* at 5 mg/kg body weight (p.o.), 30 min before administration of rotenone. Renal function tests were performed 24 hrs after the last dose, followed by sacrificing the mice for histological studies. The findings revealed that rotenone induces marked morphological changes in the kidneys, with a significant increase in combined kidney weight by 1.53-fold, compared to control group (0.379 g *versus* 0.579 g). However, treatment with the extract of *G. pedunculata* significantly ameliorated kidney weight by 25.07%, compared to the rotenone treated group. Similarly, rotenone significantly increased serum urea (36.12 mg/dL *versus* 108.72 mg/dL) and creatinine (0.45 mg/dL *versus* 1.55 mg/dL) by 3.01-fold and 3.43-fold respectively, inflicting acute renal injury. *G. pedunculata* fruit extract significantly ameliorated the elevated levels of urea and creatinine by 58.21% and 48.5% respectively, compared to the rotenone treated group. Renal histological studies revealed a marked increase in glomerular injury and leukocyte infiltration in rotenone-treated group, which was significantly ameliorated by *G. pedunclata*. Rotenone is a mitochondrial complex-I inhibitor, causes mitochondrial dysfunctions by generating reactive oxygen species and thereby leads to oxidative stress and cell death. *G. pedunclata* has a wide range of phytochemicals having anti-oxidant potentials and thus the nephroprotective potentials of the fruit extracts of *G. pedunculata*

against rotenone-induced acute renal injury in mice may be attributed to its antioxidant potentials.

Keywords: Creatinine; Oxidative stress; Medicinal plants; Nutraceutical; Nephroprotection

Abstract ID: ICTACSR 2025/TS1/OP 32

Pathogen and Pest-Induced Alteration of Caffeine Concentration and its Role in Plant Défense

Gopal Sharma*
Department of Zoology, Kalimpong College, Kalimpong, West Bengal, India
*Correspondence: gopalsharma121986@gmail.com

Abstract

Caffeine is an established purine alkaloid and one of the most effective plants defines chemicals. In the tea plant (Camellia sinensis), it is one of the most important components of the defensive chemical arsenal against pests and pathogen attacks. Along with the alkaloids that include caffeine, one of the estimated 100,000 secondary metabolites, plants also pester the other organisms to safeguard itself. Based on natural conditions, endogenous caffeine amounts in tea plants are adequate to sustain active defences. In addition, caffeine, along with defensive metabolites, also entices pollinators to the reproductive structures of the plant. The responsiveness of the system is remarkable. Transcriptome results indicate that biotic stressors (pest and pathogen attacks) sharply increase transcription of several key genes in the caffeine biosynthetic pathway, S-adenosylmethionine synthetase (CsSAMS), and tea caffeine synthetase (CsTCS) that the plant possesses. The increase in caffeine levels in pathogen attacked leaves is also supported by GC-MS results. This study primarily targets the decrease of caffeine levels due to biological stress and the subsequent effects on the virulence and survival of the attacking pathogens and parasites.

Keywords: *Camellia sinensis*, secondary metabolites, caffeine, biotic stress, plant defence

Abstract ID: ICTACSR 2025/TS1/OP 33

Captive Breeding Practice in *Mystus dibrugarensis* by Artificial Hormone Administration

Bhenila Bailung[1*], S. P. Biswas[2]
[1]Assistant Professor, Sonari College
[2]Professor (Retired), Department of Life Sciences, Dibrugarh University
*Correspondence: bhenila.sonaricollege@gmail.com

Abstract

Induced breeding of fish, is a widely used management tool in fish farming to restore and conservation of the wild populations of endangered and endemic species and simultaneously to supplement and enhance maximum yields for fisheries. In this study, the selected species *Mystus dibrugarensis* were collected from Dihingmukh of Dibrugarh district of Assam. It is a fresh water catfish belonging to the family Bagridae. It is native to upper Assam mainly Dibrugarh and Tinsukia districts of Assam, India. According to IUCN though it is considered under least concern, it is found in certain pockets of upper Brahmaputra basin. Therefore a standardization of breeding protocol suitable to the climate condition of Assam will definitely boost the entrepreneurs in the field of fisheries of the native species. The same dose of ovaprim hormone ranging from 0.4 to 1.0 ml was applied to the both sexes with a practice of different male and female ratio. The spawning activity appeared after 5-9 hours after hormonal injection. The male was observed more actively involved in courtship behaviour. Eggs were found adhesive (clinged to plant substrate), (0.9±0.2) mm in size, creamy or yellowish in colour. Unfertilized eggs were found less adhesive and off-white in colour and sometimes seem to be detached from the substrate. Positive result of fertilization and hatching was observed only against 0.8 ml/kg hormone dose in 1 ♂: 1 ♀ whereas in 2 ♂: 1 ♀ and 3 ♂: 1 ♀ fertilization was observed in all sets except in control and 0.4 ml/kg hormone dose. In 2♂: 1 ♀the no. of eggs varied from 517-927 and 350-560 respectively and spawning rate was 45-115 and 18-31 respectively. Highest percentage of fertilization in all the three sets was found 57.5, 58.1 and 55.8 respectively.

Keywords: Ovaprim, Breeding, Courtship, Fertilization

Abstract ID: ICTACSR 2025/TS1/OP 34

From Cocoon to Cuisine: Nutritional Evaluation of Sericigenous Insects Consumed by Tribal Communities of Assam, India

Dipika Doloi*
Assistant Professor, Department of Zoology, Barkhetri College, Nalbari-781126, Assam, India
*Correspondence: dipikadoloi31@gmail.com

Abstract

Insects have long been an integral component of the traditional diets of several tribal communities of Assam, India. The practice of entomophagy, or the consumption of insects, reflects a deep understanding of ecology, nutrition, and sustainability among these communities. Among the wide diversity of edible insects, sericigenous or non-mulberry insect species such as *Antheraea assamensis* (muga silkworm) and *Samia ricini* (eri silkworm) hold a distinctive place due to their dual importance in silk production and as nutrient-rich food resources. Communities such as the Bodo, Mishing, Rabha, Tiwa, and Karbi commonly consume these insects in various traditional preparations, reflecting an intimate connection between biodiversity, culture, and nutrition. The present study aimed to assess the nutritional potential of *A. assamensis* and *S. ricini* through proximate and mineral analyses. Proximate composition parameters, including moisture, total ash, crude protein, crude fat, crude fibre, nitrogen-free extract (NFE) were determined following the standard methods of the AOAC (2016). The mineral composition, covering both macro-minerals (Na, K, Mg, Ca, P) and micro-minerals (Fe, Zn, Cu, Mn), were analysed using Inductively Coupled Plasma–Optical Emission Spectroscopy (ICP–OES). Statistical analysis was performed and significant level was taken at $p < 0.05$. The findings revealed that both *A. assamensis* and *S. ricini* are rich in crude protein, along with substantial quantities of key minerals such as potassium, magnesium, calcium, iron, and zinc. Their high calorific and mineral values highlight their potential as sustainable and protein-rich alternatives to conventional animal sources. The results emphasize the nutritional significance of sericigenous insects and their contribution to enhancing food and nutrition security among the tribal communities in Assam.

Keywords: Entomophagy, tribal communities, sericigenous insects, nutrition, food security

Abstract ID: ICTACSR 2025/TS1/OP 35

In silico identification of potential lead molecules against Phosphoinositide 3-kinase gamma (PI3Kγ), an important biomolecular mediator in atherosclerotic conditions

Prosperwell Ingty[1], Angneh Ngoruh[2], Shashi Kumar Yadav[3] and *Atanu Bhattacharjee
Department of Biotechnology & Bioinformatics, North-Eastern Hill University, Shillong, Meghalaya-793022
*Correspondence: atanubioinfo@gmail.com, prosperwellingty@gmail.com

Abstract

For decades, cardiovascular diseases have been the leading cause of death worldwide. Despite its therapeutic advancement, it remains inadequately controlled by conventional interventions. This study aims to find novel lead molecules against Phosphoinositide 3-kinase gamma (PI3Kγ), a protein known to play a critical role in the development of atherosclerotic plaques. In silico virtual screening and molecular docking were performed to evaluate the binding affinities of the selected ligands with PI3Kγ. The best-ranked compounds were then analyzed for their ADME and toxicity profiles. Additionally, density functional theory (DFT) calculations were employed for the selected molecules to investigate the electronic properties and atomic interactions. This computational approach provides valuable insights into PI3Kγ inhibition, which would help to identify potential lead candidates for further experimental testing in the development of novel anti-atherosclerotic drugs.

Keywords: Atherosclerotic plaques, PI3Kγ, Virtual screening, Molecular docking, and DFT.

Abstract ID: ICTACSR 2025/TS2/OP 01

Stimuli-Responsive Metallogels as Multifunctional Platforms for Biomedical Applications

Suman Mukhopadhyay*
Department of Chemistry, Indian Institute of Technology Indore, Simrol 453552 Indore, Madhya Pradesh
*Correspondence: suman@iiti.ac.in

Abstract

Metallogels, soft materials incorporating metal ions within gel networks, offer unique features such as stimuli-responsiveness, self-healing, and metal-mediated functionality. These properties make them promising candidates for biomedical applications, including targeted drug delivery, cancer therapy, and metal ion sequestration. The design and development of bioresponsive metallogel systems for cancer treatment and iron scavenging, focusing on their synthesis, structural properties, and functional performance, are explored. Three metallogel platforms are examined: (1) a Ruthenium(II)-based metallogel using a novel G5 gelator that responds to acidic conditions by releasing Ru(II) species for selective cancer targeting; (2) pH-responsive nanogels derived from chitosan–biotin polymers loaded with Ru(II) arene complexes, enabling targeted drug delivery, reactive oxygen species (ROS) generation, and apoptosis induction; and (3) an iron-selective metallogel formed by a carbohydrazide-based gelator (CBTC) with trimesic acid, mimicking natural siderophore activity for iron capture and controlled release under reducing conditions. All systems exhibited structural stability, reversible gel–sol transitions, and tunable properties confirmed through spectroscopic, microscopic, and rheological analyses. The pH-responsive behavior and functional versatility of these metallogels underscore their potential for site-specific drug delivery, ROS-mediated anticancer activity, and metal ion regulation. This integrated approach highlights metallogels as multifunctional platforms with significant promise for next-generation cancer therapy and selective iron binding and release, paving the way for advanced biomedical applications.

Abstract ID: ICTACSR 2025/TS2/OP 02

Ne VIII Absorbers in the Low-Redshift Universe: Physical Conditions, Ionization Models, and Implications for the Cosmic Baryon Census

Tanvir Hussain*
Assistant Professor, Department of Physics, Patharkandi College, Sribhumi, Assam
*Correspondence: 10tanvir.h88@gmail.com

Abstract

The detection of Ne VIII (seven-times ionized neon) absorption lines in quasar spectra provides a unique window into the warm-hot phase of the intergalactic medium (IGM) and circumgalactic medium (CGM), particularly in the temperature range of 10□–10□ K. As an elusive tracer of low–density, highly ionized gas, Ne VIII plays a central role in efforts to identify the reservoir of baryons unaccounted for in the low-redshift Universe. However, its detection remains observationally challenging due to the intrinsic weakness of the lines, contamination from blending features, and the limited redshift range accessible to current ultraviolet spectrographs.

Advances in far-ultraviolet spectroscopy, especially with the Cosmic Origins Spectrograph (COS) on board the *Hubble Space Telescope (HST)*, have led to a growing number of confirmed Ne VIII absorbers in quasar sightlines. Ionization modelling has shown that both collisional ionization and photoionization contribute to the observed Ne VIII population, with hybrid scenarios often necessary to explain the full set of ionic column densities. In many cases, Ne VIII appears to trace warm-hot, metal-enriched gas in the extended haloes of galaxies, reinforcing its role in probing the interaction between galaxies and their surrounding medium.

This review presents a comprehensive synthesis of current research on Ne VIII absorbers, including detection methods, ionization mechanisms, statistical properties, and the physical environments they trace. Recent observational and theoretical developments are examined to assess the role of Ne VIII in characterizing the multiphase structure of the CGM and IGM, and in constraining the distribution of baryons in the low-redshift Universe. Key challenges in detection and interpretation are discussed, along with the prospects for future ultraviolet spectroscopic facilities to advance the study of this important ion.

Keywords: quasar absorption lines, warm-hot intergalactic medium (WHIM), circumgalactic medium (CGM), missing baryons, NeVIII absorbers, ionization, galaxy halos.

Abstract ID: ICTACSR 2025/TS2/OP 03

Fabrication of Zr-based Novel UiO-66@ZnFe-LDH Heterostructure for Degradation of Water Pollutants: Kinetics and Mechanistic Insights

Pranjit Borah, Saptarshi Roy, and Md. Ahmaruzzaman*
Department of Chemistry, National Institute of Technology Silchar – 788010, Assam, India
*Correspondence: mda2002@gmail.com, borahpranjit2015@gmail.com

Abstract

Aquatic ecosystem contamination has increased dramatically due to the rapid expansion of industrial and economic activities. To mitigate water pollution, a growing environmental issue, the development of environmentally friendly methods and cutting-edge technologies is necessary. In this regard, the current work describes the design and creation of a novel binary heterostructure, UiO-66@ZnFe-LDH, which was made using a straightforward solvothermal technique by combining layered double hydroxides (ZnFe-LDH) and zirconium-based metal–organic frameworks (UiO-66) in a weight ratio of 1:1. Under visible light irradiation, the photocatalytic activity of UiO-66@ZnFe-LDH was systematically assessed for the degradation of two model organic dyes, Congo Red (CR) and Rose Bengal (RB). Based on a pseudo-first-order model, kinetic calculations showed that at an optimised catalyst loading of 0.40 g/L, the rate constants for RB and CR were 3.8×10^{-2} min^{-1} and 1.98×10^{-2} min^{-1}, respectively, resulting in total degradation in 50 and 60 minutes. The synergistic interaction between ZnFe-LDH and UiO-66 is principally responsible for the improved photocatalytic activity. Because of ZnFe-LDH's narrow band gap, this heterojunction effectively increases the visible light absorption range. It also makes it easier to separate and transfer photoinduced electron-hole pairs, which reduces recombination losses. Using valence-band X-ray photoelectron spectroscopy (VB-XPS), radical scavenging tests, and high-resolution liquid chromatography–mass spectrometry (HR-LCMS) to identify reactive oxygen species (ROS) and degradation intermediates, the likely degradation mechanism was clarified. Additionally, the impact of several operational parameters—such as reaction conditions, coexisting ionic species, distinct wastewater matrices, and the presence of dissolved organic matter—was examined, highlighting the material's originality and practicality. As a result, this work offers a multipurpose, economical, and sustainable photocatalyst, providing important insights into the sensible design of next-generation materials for environmental remediation.

Keywords: Metal-Organic Framework, Layered Double Hydroxide, UiO-66, Dye.

Abstract ID: ICTACSR 2025/TS2/OP 04

Poly-o-anisidine Sn (IV) silicophosphate nanocomposite in selective removal of Pb (II) ion: A toxic water contaminant

Md Dilwar Alam Khan
Srikishan Sarda College, Hailakandi, Assam, India-788151
*Correspondence: dilwarkhan.chem@gmail.com

Abstract

Heavy metal toxicity is a matter of great concern in the rapidly increasing arena of industrialization. The presence of lead (Pb) in industrial wastewater discharge that enters the human body through drinking contaminated water affects many vital organs of the body. The removal of such contagious metal from water is of outmost necessity before its use. Nanocomposite ion exchanger in this regard proved to be an effective agent in the removal of such contagious toxic metal ions from water. In the present endeavor a novel poly-o-anisidine based nanocomposite cation exchanger has been synthesized via sol-gel approach. The ion exchange capacity of the nanocomposite was found to be 2.36 meq g^{-1} for Na^{+} ion. The characterization of the synthesized material using FTIR, XRD, SEM and TEM shows the agglomeration of Sn(IV)silicophosphate on polymer matrix. The nanocomposite shows the semicrystalline nature with improved thermal and chemical stability than their inorganic and organic counterpart alone. The selective removal of Pb(II) ion was carried out using synthesized nanocomposite in different solvent media. The practical utility of the nanocomposite was assessed by selective removal of Pb(II) from battery manufacturing industry wastewater. The limit of detection (LOD) and limit of quantification (LOQ) was found to be 0.98 and 2.36 $\mu g L^{-1}$ respectively. This nanocomposite can be used as potential environmental wastewater detoxicant in controlling the water pollution.

Keywords: Nanocomposites, ion exchange, lead, wastewater, pollution

Abstract ID: ICTACSR 2025/TS2/OP 05

Effect of Metal Atom on Surface Morphology of Schiff Based Ligand

Trirup Dutta Choudhury
Assistant Professor, Department of Chemistry, Karimganj College, Karimganj-788710
*Correspondence: trirupaus@gmail.com

Abstract

Surface morphology of the ligand is greatly altered by the introduction of the metal atom. The firm and definite geometry of the metal atom reduced the random ordering of organic molecule. This result in decrease in surface roughness of the metal complex compare to their respective ligands. To study this fact a series of Schiff base ligands and their corresponding metal complexes with varying metal atom like Cu(II), V(V), Ln(III) & Pd(II) were synthesized. All these ligand and complexes are liquid crystalline in nature. The surface morphology of both of these ligands and metal complexes were studied through the Atomic Force Microscopy (AFM) in solid state. The study was done in Nanoscope III Multimode (digital instrument) atomic force microscopy using tapping mode. Most of the cases it was found that surface of ligand become more uniform on introduction of the metal atom and roughness decreases considerably. Roughness of the metal complexes varied depending on the geometry of the metal atom. All these finding will be discussed in this paper.

Keywords: Surface Morphology, AFM, Schiff Bases

Abstract ID: ICTACSR 2025/TS2/OP 06

Study of Antioxidants: from DFT perspective

Swarnadeep Biswas
Assistant Professor, Department of Physics, Assam University Silchar
*Correspondence: swarnadeep.biswas@aus.ac.in

Abstract

Antioxidants play a crucial role in reducing the oxidative stress by scavenging the oxidants in our body. Imbalance in the homeostatic equilibrium between the oxidants and antioxidants leads to plethora of diseases including cancer. Using DFT the mechanism behind the scavenging ability of antioxidants can be studied. Radical Adduct Formation (RAF), Hydrogen Atom Transfer (HAT) and Single Electron Transfer (SET) are some of the widely studied mechanisms followed by antioxidants. In this presentation, radical scavenging mechanism of some of the antioxidants like curcumin, chlorophyll etc will be discussed. M062X/6-311+G(d,p) level of theory available in Gaussian 09 software is used for the study. PCM model is employed for the study of the aqueous phase.

Keywords: Antioxidants, DFT, RAF, HAT, SET

Abstract ID: ICTACSR 2025/TS2/OP 07

Beginning of Everything: Clue Embedded in Gravitational Waves

Manali Chakraborty
Aryan Senior Secondary School
*Correspondence: tuli10manali@gmail.com

Abstract

The Evolution of universe before the Big Bang Nucleosynthesis (BBN) is quite complex and needs to be understood with the help of various cosmological models as of now. Primordial gravitational waves serve as a direct window to the universe's earliest moments, acting as a unique probe because they travel through space unimpeded by matter, providing a way to study the universe right back to the end of inflation. Detecting the "Stochastic Background" of these waves, generated by violent events like inflation or cosmic phase transitions, can reveal information about new physics at extremely high energies. In this review work, an attempt has been made to study the available models that predict gravitational waves in pre- BBN Universe. At first, we will outline the models and then discuss their contribution in connecting pre-BBN Era to the present day universe.

Abstract ID: ICTACSR 2025/TS2/OP 08

Density Functional Investigation of Structural, Electronic and Mechanical Properties of Sb_2Se_3 Compound

Md Hasnain[1], B.Indrajit Sharma[1]
[1]Assam University Campus, Silchar -788011, Assam, India.
*Correspondence: md.hasnain@aus.ac.in, indraofficial@rediffmail.com

Abstract

In this article, we have investigated the structural, mechanical and electronic properties of antimony selenide (Sb_2Se_3) by using density functional theory. The computations have been performed using WIEN2k simulation package and the exchange–correlation effects are treated within the generalized gradient approximation (GGA) employing the Perdew–Burke–Ernzerhof (PBE) functional. The calculated lattice parameters are in good agreement with the experimental values. The detailed study of mechanical properties also discussed. The calculated elastic constants meet the Born stability conditions, demonstrating that Sb_2Se_3 is mechanically stable. We have calculated elastic constants such as C_{11}, C_{22}, C_{33}, C_{44}, C_{55}, C_{66}, C_{12}, C_{13} and C_{23} in which C_{22} is found to be greater than C_{11} and C_{33}. From the calculated elastic constants, the corresponding elastic moduli such as Young's modulus (Y), Bulk modulus (B) and Shear modulus (G) are calculated Using the Voigt–Reuss–Hill approximation. Analysis of B/G and Poisson's ratio reveals that Sb2Se3 behaves as ductile material. In addition, The longitudinal (v_l), transverse (v_t), average elastic wave velocity (v_m) are determined from which Debye temperature (θ_D), and Vickers hardness (H_v) are subsequently determined. In order to extend the investigation beyond mechanical stability and assess its functional behavior, we further carried out electronic structure calculations. From the band structure analysis, it is evident that Sb_2Se_3 exhibits an indirect band gap, with the calculated value of the band gap being approximately $0.95\ eV$. To gain deeper insight into the electronic behavior, the total density of states (DOS) are also evaluated, which provides detailed information on the contribution of different atomic orbitals near the valence and conduction bands exhibits characteristics of semiconductor and represents potential material for solar cells, photo detectors, and batteries.

Keywords: Density functional theory; WIEN2k; Structural properties; Mechanical Properties

Abstract ID: ICTACSR 2025/TS2/OP 09

Synthesis and Characterization of Mixed Ligand Peroxo Vanillin Complex of Copper (II)

[1]**Tapashweta Purkayastha**,[1]Bornali Roy Choudhury, [2]Babulal Das, [1]Biswajit Deb, [1]Sumita Paul Purkayastha*
[1]Department of Chemistry, Karimganj College, Sribhumi-788710, Assam, India
[2]CIF, IIT Guwahati-781039, Assam, India
*Correspondence: tapashweta13purkayastha04@gmail.com , p.purkayasthasumita@gmail.com

Abstract

Copper complexes of mixed ligands find tremendous importance in the recent years due to their relevance in enzymatic functions, redox processes and potential applications in catalysis, medicine and material science. Considering the current scenario of research, herein, an anionic mono-nuclear hexa-coordinated peroxo vanillin copper (II) complex of the type $[Cu(vanillin)(O_2)_2]Na_3$ was synthesized by stirring alkaline solution of $CuSO_4.5H_2O$ (P^H~10) with hydrogen peroxide (30% w/w) and vanillin in 1:1 ratio at room temperature. The composition of the synthesized complex was determined by instrumental metal estimation and quantitative analysis of copper and peroxo group. The complex was characterized by UV-Visible, FT-IR and Powder XRD techniques. The stability of the complex was also studied by Thermo Gravimetric Analysis (TGA). As it is well known that peroxo-vanilline copper (II) complex is an excellent molecule to exhibit biological activity, the anti-microbial activity of the synthesized complex is in progress.

Keywords: Copper (II); Peroxide; Vanillin; Mixed ligand; Thermal analysis.

Abstract ID: ICTACSR 2025/TS2/OP 10

Nanosponges: Revolutionizing Oil Spill Clean-Up for a Cleaner Ocean and Environment

[1]**Abdul Jalil** and [2]Arup Purkayastha
[1]Department of Chemistry, Karimganj College, Assam, India
[2]Ultrananotech Pvt. Ltd., Bangalore, Karnataka, India
*Correspondence: jalilbeacon121@gmail.com

Abstract

Oil spills pose a significant and enduring threat to marine ecosystems, biodiversity, and coastal economies. Conventional remediation approaches such as physical containment, skimming, and chemical dispersants are often limited by inefficiency, high cost, and secondary environmental harm. This article explores the emerging application of nanosponges—nanoscale, porous network structure, hydrophobic-oleophilic materials—as an innovative and eco-friendly solution for oil spill clean-up. Nanosponges demonstrate high oil absorption capacity, selective oil-water separation, and reusability, with several material classes including carbon nanotube (CNT) sponges, polymer-based sponges, magnetic nanocomposites, and photothermal variants. Mechanisms such as capillary action and adsorption enable effective oil capture and containment, even in harsh weather conditions. Despite current challenges in scalability and long-term stability, ongoing research is advancing toward biodegradable, multifunctional, and smart nanosponges that offer integrated environmental monitoring and recovery. The adoption of nanosponges represents a critical advancement in sustainable marine pollution management and oil spill remediation strategies.

Keywords: Oil spill remediation; Nanosponges; Carbon nanotubes; Marine pollution; Nanotechnology; Photothermal materials; Magnetic nanocomposites; Environmental cleanup; Sustainable technologies

Abstract ID: ICTACSR 2025/TS2/OP 11

NANOBOTS: Role of Artificial Intelligence (AI) in Enhancing the Efficiency of Nanobots

Md. Nasim Uddin[1] and Arup Purkayastha[2]
[1]Department of Chemistry, Karimganj College, Assam, India
[2]Ultrananotech Pvt. Ltd., Bangalore, Karnataka, India
*Correspondence: mdnasimuddin9707@gmail.com

Abstract

The convergence of nanotechnology and artificial intelligence (AI) has opened new frontiers in science and engineering, particularly through the development of intelligent nanobots—nanoscale machines capable of performing precise, complex tasks. Nanobots, ranging from 1 to 100 nanometers in size, are revolutionizing multiple industries, including medicine, electronics, environmental science, agriculture, and defense. When augmented with AI, these nanobots gain adaptive capabilities such as decision-making, pattern recognition, and real-time response to stimuli, drastically enhancing their performance and application scope. In medical science, AI-driven nanobots enable targeted drug delivery, minimally invasive surgery, and early disease diagnosis. In electronics, they assist in nanoscale circuit repair and component assembly. Environmentally, nanobots contribute to water purification and oil spill remediation, while in agriculture and defense, they facilitate biosensing, health monitoring, and pathogen detection. Despite their promise, challenges remain in algorithm design, data acquisition, and ensuring bio-compatibility. This paper provides a comprehensive overview of AI's role in optimizing nanobot functionality, addresses current limitations, and outlines future directions for intelligent nanosystems in transformative applications.

Keywords: Nanobots; Nanotechnology: Artificial intelligence; Smart nanorobots; Targeted drug delivery; Nano-electronics; Environmental nanotechnology; Military nanodevices; AI in nanomedicine; Biosensors; Nano-agriculture

Abstract ID: ICTACSR 2025/TS2/OP 12

Cybotactic Cluster Formation and Phase Behaviour in Bent-Core Liquid Crystals: An overview

Rahul Kanti Nath
Department of Chemistry, Cachar College, Silchar-788001
*Correspondence: rahulknath@gmail.com

Abstract

Banana-shaped liquid crystals (also known as bent-core mesogens) have gained substantial attention due to their ability to manifest unique mesophases and unusual physical properties, notably the cybotactic nematic phase characterized by local smectic-like cluster formation within an overall nematic matrix. This review synthesizes major advances on the structure-property relationships, synthetic strategies, and phase behavior of bent-core liquid crystals focusing on cybotactic cluster formation. The cybotactic nematic phase (Ncyb) arises from self-assembly of bent-core molecules into short-range, smectic C-type clusters that coexist with conventional nematic ordering, as revealed by polarizing optical microscopy, X-ray diffraction, and dielectric spectroscopy. The influence of molecular architecture, including the number of rings, substitutions at the central bent-core, and terminal chain length is critically examined to understand their roles in promoting cybotactic ordering and suppressing or enabling long-range polar order and ferroelectric switching. Comparative studies demonstrate that the lateral and terminal group modifications not only tailor the incidence and extent of cybotactic clustering but also affect phase sequences such as the emergence of conventional nematic, skewed cybotactic nematic, and tilted smectic phases. Despite the presence of polar clusters, the manifestation of macroscopic ferroelectricity remains elusive in many analogs, indicating that both dipole moment orientation and antiparallel molecular packing play pivotal roles in the realization of ferronematic phases or suppression thereof. Recent design and synthesis of unsymmetrical four-ring bent-core molecules with targeted substituents have provided new insights and broadened the phase diversity, revealing opportunities for fast-switching, high-performance devices based on cybotactic liquid crystalline materials. This presentation aims to consolidate key literature findings and highlight future directions for the rational design of cybotactic nematic systems.

Keywords: Cybotactic clusters, Bent-core Mesogens, Nematic phase, Smectic C ordering

Abstract ID: ICTACSR 2025/TS2/OP 13

SnO_2 Nanoparticles/CeO_2 Nanorods Enriched with Oxygen Vacancies for Bifunctional Sensing Performances Towards Toxic CO Gas and Arsenate Ions

Dipyaman Mohanta[1*], Md. Ahmaruzzaman[2]
1 Department of Chemistry, Cachar College, Silchar, 788001, Assam, India
2 Department of Chemistry, NIT Silchar, 788010, Assam, India
*Correspondence: mdipyaman@gmail.com

Abstract

In this paper, we present a novel, one-step synthesis of SnO_2 nanoparticle/CeO_2 nanorods sensing material using surfactant mediated hydrothermal method. The bifunctional utility of the synthesized sensing material towards room-temperature sensing of CO gas and low concentration optosensing of arsenic has been thoroughly investigated. The CeO_2-SnO_2 nanohybrid was characterized with sophisticated analytical techniques such as transmission electron microscopy, X-ray diffraction analysis, Energy dispersive X-ray analysis, X-ray photoelectron spectroscopy etc. The CeO_2-SnO_2 nanohybrid based sensor exhibited a strong response towards CO gas at room temperature. Under low concentration (3 ppm) of CO gas, the CeO_2-SnO_2 sensing material showed an excellent response time of 21.1 s for 90 % of the response was achieved with higher recovery time of 59.6 s. The nanohybrid sensor showed excellent low concentration (1 ppm) sensing behavior which is ~6.7 times higher than that of the pristine SnO_2 sensors. The synergistically enhanced sensing properties of CeO_2-SnO_2 nanohybrid based sensors were discussed from the points of CeO_2-SnO_2 n-n heterojunction and the effect of oxygen vacancies. Further, SnO_2/CeO_2 nanohetrojunction showed luminescence centers and prolongs electron-hole recombination, thereby resulting in quenching of luminescence in presence of the arsenate ions. The photoluminescence of CeO_2-SnO_2 is sensitive to the arsenate ion concentration in water and can be used for sensing arsenate with a limit of detection of 4.5 ppb under a wide linear range of 0-100 ppb.

Keywords: CO gas sensing, optosensing of arsenate, n-n heterojunction, oxygen vacancies.

Abstract ID: ICTACSR 2025/TS2/OP 14

Annihilation of NMSSM Neutralinos and Branching Ratios of Lightest CP-even and CP-odd Higgs Bosons

Gayatri Ghosh*
Department of Physics, Cachar College, Silchar-788001
*Correspondence: gayatrighsh@gmail.com

Abstract

The next−to−minimal supersymmetric standard model (NMSSM) featuring constrained mSUGRA model, has the capability to inherently anticipate a light dark matter component within the existing limitations encompassing Higgs data, sparticle−mass constraints, dark matter explo- ration, muon g-2. We examine neutralino dark matter within the NMSSM framework by conducting a comprehensive analysis of its parameter space. This involves evaluating neutralino capture and annihilation rates within the Sun. The exploration of potential detection strategies for neutralino dark matter in neutrino experiments hinges on the composition of neutralinos and their primary annihilation pathways. Our study also involves reassessing the maximum thresholds for branching ratios of lepton flavour violation decays $BR(\mu \rightarrow e + \gamma)$, $BR(\tau \rightarrow e + \gamma)$ by directly referencing the constrained limits on Δa_μ from $g_\mu - 2$ experiment. This work also presents constraints of muon flux, photon, positron and antiproton flux, specifically its independence from experimental intricacies and the universal applicability of recalculation coefficients across NMSSM model. In this work, we delve into the intricate calculations of muon flux resulting from the annihilation of dark matter, examining various sources including the cores of celestial bodies like the Sun and Earth, as well as cosmic diffuse neutrinos generated in dark matter annihilation within halos. A significant finding of our investigation lies in the distinct energy distribution of muons stemming from dark matter
annihilation, contrasting sharply with those produced by atmospheric neutrinos. Furthermore, we meticulously consider the two scenarios of muon flux: upward flux, originating from muons created in the substratum beneath the detector, and contained flux, where muons are generated within the detector material itself. Additionally, we discuss the implications of neutrino flavor dependence and its ramifications for detection methodologies, providing valuable insights into the nuanced interplay between dark matter annihilation and neutrino observation. We also calculate the Branching Ratios,

Particle Decay Channel of lightest CP odd, even Higgs in NMSSM. Within the scope of this research, we have chosen to utilize this NMSSM scenario as a case study to investigate the funnel− annihila- tion mechanisms pertaining to light dark matter and the concealed Higgs decay. In this particular scenario, our findings reveal that there exist decay channel−annihilation mechanisms for the lightest supersymmetric particle ˜χ^1_0, which include the h2, h1, Z, W+, W−, G, s, S, b, B, c, C, a, A, d, D, l,L decay funnels

Abstract ID: ICTACSR 2025/TS2/OP 15

Comparison of Size of ZnO Nanoparticle using Different Characterization Technique

Jyoti Prasad Roy Choudhury[a,b], Barnali Pathak[* b], Nayan Mani Nath[c],
[a]Department of Physics, Assam Don Bosco University, Sonapur-784028, Assam, India
[b]Department of Physics, B. H Collage, Howly-781316, Assam, India
[c]Department of Physics, Barnagar College, Sorbhog
*Correspondence: barnalipathak1@gmail.com

Abstract

Preparation of molar concentration varied ZnO nanoparticles were done by chemical bath deposition technique and characterized using XRD, HRTEM and PL spectroscopy. XRD reveals hexagonal structure of ZnO according to standard JCPDS data. The line broadening of ZnO nanoparticles due to small crystal size and strain was analyzed by DS formula and WH technique. HRTEM image of ZnO nanoparticles were compared with the size obtained from the above two methods. The size obtained from HRTEM image is little larger than that obtained from XRD as XRD revels only the crystallite size whereas combination of many crystallite forms a particle which is observed by HRTEM image. The particle size was also calculated from PL study using Gaussian equation which also well supports our results obtained from XRD and HRTEM study.

Keywords: Nanoparticles, Chemical bath deposition, WH technique

Abstract ID: ICTACSR 2025/TS2/OP 16

Parity of Superspace Coordinate in the NMSSM

Priti Bhajan Byakti *
Department of Physics, Pandit Deendayal Upadhyaya Adarsha Mahavidyalaya, Eraligool, Sribhumi.
*Correspondence: priti137@gmail.com

Abstract

Superspace coordinate θ of N= 1 supersymmetry, can be used to define a new kind of parity, called the theta parity. NMSSM has some advantages over the MSSM. We had investigated how component level or Poincare level parities of the NMSSM Lagrangian can be derived from this parity.

Keywords: Theta-Parity, MSSM, NMSSM

Abstract ID: ICTACSR 2025/TS2/OP 17

The Responsive COF Toolbox: Smart Design Strategies for Dynamic Materials

Gobinda Das [a*] and Ali Trabolsi [a,b]

[a] Science Division, New York University Abu Dhabi, Saadiyat Island, PO Box 129188, Abu Dhabi, UAE

[b] Water Research Centre, New York University Abu Dhabi, Saadiyat Island, PO Box 129118, Abu Dhabi, UAE

*Correspondence: gd57@nyu.edu

Abstract

Smart materials that can undergo reversible changes in their structures or properties in response to external stimuli, such as light, pH, heat, or redox reagents, have emerged as a thriving area of research due to their diverse applications. These applications include shape memory devices, information storage, and light-controlled molecular machines. Immobilizing organic molecular switches into covalent organic frameworks (COFs), a class of robust organic porous crystalline materials, offers an attractive approach for achieving reversible switching. In this context, we present three families of COF materials incorporating viologen, azobenzene, and spiropyran molecular switches (Figure 1). These materials exhibit diverse properties, including solid state reversible photochromism, light-responsive surfaces with controllable wettability, excellent stability under solvent-free conditions, and the ability to capture and release rhodamine B under light control. Additionally, they demonstrate reversible chromism induced by heat or pH.

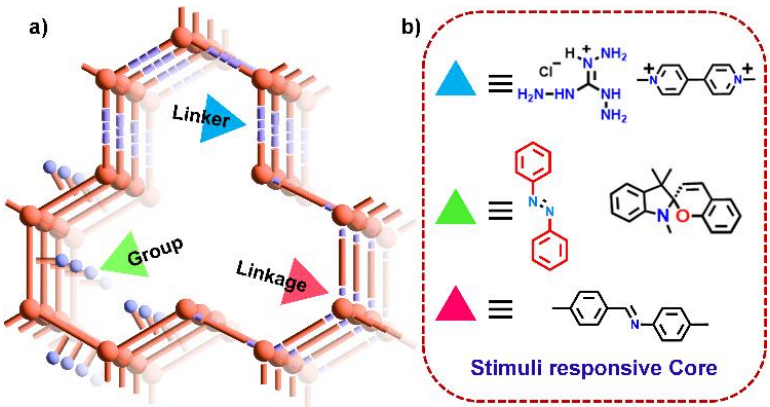


Figure1: Stimuli responsive COFs

Keywords: Covalent Organic Framework, Stimuli Responsive, actuator, sensing

Abstract ID: ICTACSR 2025/TS2/OP 18

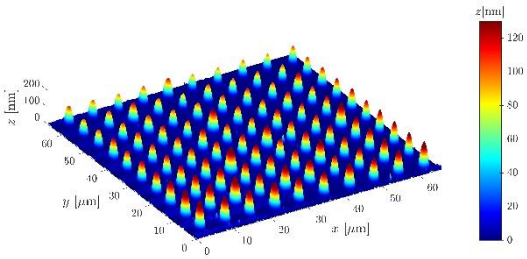
Trace-Level Detection of Lead in the Presence of Toxic Organic Pollutants Using Meta-Chemical Surface Fabricated by Dip-Pen Nanolithography

Abhinandan Mahanta[a], Dror Shamir[b*], Moshe Zohar[c], Ariela Burg[a]*
[a]Department of Chemical Engineering, Sami Shamoon College of Engineering, Beer-Sheva 8410802, Israel, E-mail: arielab@sce.ac.il
[b]Analytical Chemistry Department, NRCN, Beer-Sheva, Israel, E-mail: drorshamir@gmail.com
[c]Department of Electrical and Electronics Engineering, Sami ShamoonCollege of Engineering, Beer Sheva 8410802, Israel
*Correspondence: abhinandan.mahanta@gmail.com

Abstract

Heavy metals contamination threatens human health. Lead is among such heavy metals, which, when present above a permeable limit (WHO allowed limit in drinking water ≤0.01 ppm), can cause detrimental effects. Waste, which includes heavy metals, usually includes toxic organic compounds. Therefore, the detection of Pb (II) in the ppb range in the presence of organic compounds is very important.

Several techniques have been developed to detect such pollutants, the most common of which is ICP-MS. Its major disadvantage is that it is not portable. A problem that can be solved by using electrochemical sensors.



In the current study, nitrophenols (NPs) were chosen as a model for a water soluble toxic organic compound. We found the optimal conditions to detect lead in the presence of NPs by using an electrochemical sensor, which could be portable.

The sensor was produced by dip-pen nanolithography (DPN). This technique allows the patterning of ink (a mixture of polymethyl methacrylate (PMMA) and glutathione used to entrap the lead) as nano-clusters on a conductive surface, resulting in an efficient sensor electrode with an enhanced surface-to-volume ratio of the nanoclusters.

DFT studies were carried out to investigate the interactions between Pb (II) and NPs. It was seen that para-NP could bind to Pb (II) directly and reduced the sensitivity, while

ortho-NP did not bind to Pb (II), hence providing a preferential binding between Pb (II) and the sensor, resulting in higher sensitivity.

Our results indicate that we can detect Pb (II) in the ppb range in the presence of NPs. **This is an important result that could significantly improve the detection of waste near the water source.**

Keywords: Pb (II), Nitrophenols, Electrochemical sensors, Dip-pen nanolithography, nano-clusters.

Abstract ID: ICTACSR 2025/TS2/OP 19

Electrochemical Energy Storage: A Mini Review on Metal Vanadium Oxide, Sulfide and Nitride Electrode Materials

Atowar Rahman[1]*
[1*]Department of Physics, School of Applied Science, University of Science and Technology Meghalaya, Ri-Bhoi, Techno City, Killing Road, Baridua, Meghalaya 793101, India,
*Correspondence: atowar.r@gmail.com

Abstract

In recent years, electrochemical capacitors/supercapacitors have become a major focus in the field of electrochemical energy storage. The capacitance of these electrochemical capacitors, which is based on pseudocapacitance, primarily stems from redox reactions between the electrolytes and active materials, with these materials typically having multiple oxidation states that facilitate both oxidation and reduction. A great deal of research has been directed at finding alternative materials for electrochemical capacitors, with transition metal oxides, in particular, showing promise as electrode materials. Among these, vanadium-based materials are of particular interest due to their excellent specific capacitance, long cycle life, high conductivity, and strong electrochemical reversibility, making them ideal for high power/energy density electrochemical capacitors. This review offers a detailed summary and evaluation of recent advancements in metallic vanadium contained oxide, sulfide and nitride-based materials for electrochemical capacitors.

Keywords: Supercapacitors, Vanadium, Oxides, Sulfides, Nitrides.

Abstract ID: ICTACSR 2025/TS2/OP 20

Portable Bioanalysis: Quantifying Proteins, Enzymes and Carbohydrates via Smartphone Imaging

Sibasish Dutta
Department of Physics, PDUAM Eraligool, Sribhumi-788723
*Correspondence: dutta.sibasish94@gmail.com

Abstract

This study highlights the use of smartphones as a practical tool for colorimetric analysis of biological macromolecules. By leveraging the V-channel within the HSV color model, quantification of BSA protein, catalase enzyme, and carbohydrates (specifically D-glucose) has been done. A correlation between V-channel with sample concentration has been made for calibration to estimate samples of unknown concentration. A specially developed Android application facilitated the estimation of total biomolecular concentrations. The performance of this smartphone-based system was evaluated against a conventional spectrophotometer, which typically measures absorbance at defined wavelengths in laboratory environments. The findings revealed a close correlation between the smartphone sensor and spectrophotometer results. Notably, the proposed sensor is cost-effective, durable, and holds promise for expanding applications in various bioanalytical domains.

Keywords: Biomolecules; HSV color space; colorimetry; smartphone, camera

Abstract ID: ICTACSR 2025/TS2/OP 21

Advances in the Biomass-Derived Carbon for Application as Electrode Material in Flexible Supercapacitor

Nungsangtola[1]*
[1]Department of Physics, Fazl Ali College, Mokokchung - 798601, Nagaland
*Correspondence: nungsangtola20@gmail.com

Abstract

As the society transitions towards a more sustainable future, efforts are been made to develop novel methods to synthesis materials that are environmentally benign. Alongside the initiatives taken for a greener future, there is also a rising demand for a portable and flexible electronic device globally. Thus, a flexible energy storage device with superb performance, synthesized from non-toxic and sustainable materials is of utmost importance. Recently, biomass-derived carbons for application in flexible supercapacitors has garnered a significant amount of interest not only in the field of academia but also in industry. The two most important characteristics of a flexible supercapacitor lies in its resilience to mechanical stress and efficient electrochemical performance. Carbon derived from biomass is an ideal sustainable material for the synthesis of electrode for flexible supercapacitor, due to its abundance in nature and renewability. Biomass-derived carbon also exhibits mechanical flexibility and electrochemical stability. The carbon electrode materials can be synthesized from the biomass such as microorganism, plants and its derivatives as well as biomass-derived precursors. The biomass derived carbon due to its hierarchical structure and size of pores may exhibit a better performance as compared to its other carbon counterparts. The distribution of the pore size in the biomass is also largely dependent on the initial structure of the plant tissues. To fully understand the potential application of biomass-derived carbon in flexible supercapacitor, comprehension in the advancement of synthesis processes and biomass derived carbon studied thus far seems vital. There are certain challenges that still remains in the synthesis techniques to enhance the energy density, flexibility and cost of production in biomass-derived carbon electrode flexible supercapacitor.

Keywords: Biomass, flexible supercapacitor, porous carbon, biomass precursors.

Abstract ID: ICTACSR 2025/TS2/OP 22

Design and Analysis of a D-Shaped Optical Fiber Sensor Based on Localized Surface Plasmon Resonance for alcohol sensing

Dimpi Paul[1*]
[1*] Department of Physics, Patharkandi College, Patharkandi, Sribhumi (Assam)-788724
*Correspondence: paulddimpi21@gmail.com

Abstract

The reported study demonstrates a gas sensor exploiting the LSPR effect of metal nanoparticles to achieve enhanced sensitivity. Localized Surface Plasmon Resonance (LSPR) refers to the collective oscillation of conduction electrons in metallic nanoparticles when excited by incident light at specific resonant frequencies. This phenomenon is highly sensitive to changes in the local refractive index of the surrounding medium, making it an excellent mechanism for chemical and gas sensing applications. By leveraging shifts in plasmon resonance upon gas adsorption, this sensor provides a highly responsive, label-free, and potentially miniaturizable platform for diverse gas detection applications. Thus, in this piece of work a cost-effective technique has been used for detection of alcohol present in environment adjacent to noble metal nanoparticles. To enable effective gas detection for laboratory purposes, the D-shaped fiber-optic probe was coated with noble metal nanoparticles, and volatile liquids introduced into the chamber change the local refractive index near the nanoparticles.

Keywords: LSPR (Localized Surface Plasmon Resonance), Alcohol, Plasmonic

Abstract ID: ICTACSR 2025/TS2/OP 23

Charged Debris Induced Solitons in a Plasma with Kappa-Distributed Electrons Using Physics-Informed Neural Networks

Bikramjit Joardar[1], Hitendra Sarkar[1], and Madhurjya P. Bora[1]
[1]Department of Physics, Gauhati University, Guwahati-781014, Assam, India
*Correspondence: bikramjitjoardar1@gmail.com

Abstract

In this work, we present the results of a numerical simulation of external charged debris embedded in a flowing collisionless, unmagnetized plasma consisting of inertial ions and kappa(κ) -distributed electrons. We derive the forced Korteweg-de-Vries (fKdV) equation for our plasma model using the reductive perturbation method, which is then solved using a Physics-Informed Neural Networks (PINNs) framework and further validated with the analytical solutions. Our results show that the amplitudes of the solitons excited by the debris are significantly influenced by the spectral index (κ) of the electron distribution as well as the velocity of the debris. Our work is relevant for understanding the propagation of ion-acoustic waves in space plasmas as well as near-Earth plasmas.

Keywords: Charged Debris, Kappa Distribution, Physics-Informed Neural Networks

Abstract ID: ICTACSR 2025/TS2/OP 24

Cosmological Models with Bounce Scenario in f (Q, C)-Gravity

Bhaswati Mandal [1*], B. C. Paul [2]
Department of Physics, North Bengal University, Darjeeling, West Bengal
*** Correspondence:** bhaswatimandal93@gmail.com

Abstract

We obtain a bounce universe in modified f(Q,C) gravity, considering both linear and exponential modified theories of gravity. Bounce cosmological models are introduced to remove the singularity problem of the universe, even in an early inflationary era. A new quadratic boundary term (C^2), which is added in the modified gravity to study different features of the universe in the framework of bouncing cosmology. Both power-law expansion and exponential emergent universe are explored in linear modified gravity. The energy conditions and stability of cosmological bounce models are studied. We also explored emergent universe in both linear and exponential modified theories of gravity.

Keywords: f(Q,C) modified gravity; Bouncing Universe Model; Stability of de Sitter-like solutions.

Abstract ID: ICTACSR 2025/TS2/OP 25

Study of Nonlinear Excitations in Self-Gravitating Complex Plasma

Himangshu Kalita*[1], Karabi Devi[2], Apratim Nag[3], Pralay Kumar Karmakar□
[1]Department of Mathematics, Dibrugarh University, Dibrugarh-786004, Assam, India
[2]Department of Mathematics, Golaghat Commerce College, Assam-785621, India
[3]Cachar College, Silchar-788001, Assam, India
□Department of Physics, Tezpur University, Napaam-784028, Tezpur, Assam, India
*Correspondence: himangshukalita2011@gmail.com

Abstract

We develop a theoretical framework to explore the nonlinear dynamics of gravito-electrostatic perturbations in an unmagnetized, self-gravitating dusty plasma cloud containing active negative ions. The considered complex plasma system comprises five constituents: three nonthermal, inertia less light species—electrons, positive ions, and negative ions—and two thermal, inertial heavy species—neutral and charged dust grains. Through a localized nonlinear normal mode analysis, a distinct pair of extended KdV–Burgers (KdV-B) equations is derived, capturing the hybridised behaviour of coupled gravito-electrostatic potential fluctuations. Numerical investigations within an appropriate range of plasma parameters indicate that these fluctuations evolve into self-gravitational solitary modes and electrostatic solitary spectral patterns. The propagation features are found to be highly sensitive to variations in plasma parameters, resulting in significant alterations in the overall nonlinear wave dynamics.

Keywords: Dusty plasma; Soliton; Gravito-electrostatics; Viscoelasticity

Abstract ID: ICTACSR 2025/TS2/OP 26

Novel Organic Calamitic Materials Exhibiting Aggregation-Induced Emission

Saurav Paul[a*], Sudip Choudhury[b]
[a]Department of Chemistry, Dhemaji Engineering College, Dhemaji-787057
[b]Department of Chemistry, Centre for Soft Matter, Assam University, Silchar-788011
*Correspondence: chemsaurav1@gmail.com

Abstract

Aggregation-induced emitters (AIEgens) are distinguished by their stronger photoluminescence in the aggregated or solid state compared to the solution phase. Their high emission efficiency, thermal stability, and easy processability make them highly promising for the development of next-generation luminescent and optoelectronic materials. In this work, a new series of organic thermotropic liquid crystalline compounds has been synthesized that successfully combine liquid crystalline behavior with aggregation-induced emission (AIE) properties. The synthesized materials exhibit intense green fluorescence in the solid state, which quenches sharply upon heating to the smectic mesophase-demonstrating a clear phase-dependent emission. Moreover, these compounds show solvent-dependent luminescence, revealing a dual-mode AIE response arising from both aggregation and environmental effects. The mesogenic behavior of the compounds was characterized using X-ray diffraction (XRD), polarized optical microscopy (POM), and differential scanning calorimetry (DSC). Their photophysical properties, including AIE characteristics, were analyzed through fluorescence spectroscopy and variable-temperature fluorescence microscopy. To gain theoretical insights into the emission mechanism and molecular electronic structure, density functional theory (DFT) studies were performed. Overall, this study introduces a new class of calamitic liquid crystalline AIE-active materials that combine structural order with efficient light emission. These findings provide a foundation for designing multifunctional, solvent-independent, and thermally tunable luminescent systems with potential applications in optical sensors, smart displays, and advanced light-emitting devices.

Keywords: AIEgen; liquid crystal; Schiff’s base

Abstract ID: ICTACSR 2025/TS2/OP 27

Advances in Diameter Estimation of Near-Earth Asteroids: Integrative Methods and Recent Results

Abinash Suklabaidya*
PDUAM,, Eraligool, Sribhumi,
*Correspondence: bnshsklbd3@rediffmail.com

Abstract

Reliable measurement of asteroid diameters remains vital for planetary defence, mission planning, and understanding solar system evolution. Emerging observational methods and computational modeling have considerably enhanced the fidelity of size estimation for near-Earth asteroids. This study synthesizes current advancements in asteroid diameter estimation, focusing on integrated datasets obtained through infrared, radar, and optical observations. Recent analyses of the asteroid 2024 YR4, based on data from the James Webb Space Telescope (JWST) and NASA's Jet Propulsion Laboratory (JPL), indicate an estimated diameter of roughly 60 meters derived from thermo physical and spectral models. The use of Convex Inversion Thermo physical Modeling (CITPM) in combination with adaptive machine learning algorithms, including regression-based predictions, allows improved correction for uncertainties related to albedo, rotational motion, and compositional irregularities. Radar polarimetry has further refined estimations of density and internal texture by correlating structural reflections with surface and sub-surface properties. Contemporary data analytics, as highlighted by 2025 model evaluations, show a marked improvement in prediction precision compared to traditional photometric approaches. Moreover, statistical analysis of diameter–spin correlations offers deeper insight into asteroid cohesion limits, contributing to collision probability modeling. Collectively, these integrative methods foster reproducible and highly accurate diameter estimations, thereby strengthening space situational awareness and ensuring more effective planetary defence initiatives.

Keywords: Asteroid Diameter Estimation, Thermo Physical Modeling, Infrared Observations, Near-Earth Object.

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Growth Condition, Surface Morphology and Magnetization Dynamics of FeCoPt Alloy Thin Films

Rajib Kr. Basumatary[a,*], Rajeeb Brahma[b] and Sandeep Kr. Srivastava[c]
[a,*]Darrang College (Autonomous), Tezpur, Assam, India-784001
[b]Bodoland University, Kokrajhar, Assam, India-783370
[c]Central Institute of Technology, Kokrajhar, Assam, India-783370
*Correspondence: rajibkrbasumatary@gmail.com

Abstract

This study presents a comprehensive investigation into the magnetic properties of $Fe_xCo_yPt_z$ ($x = 31 - 36, y = 10 - 76, z = 50 - 53$ in % age) alloy thin films, a promising candidate for advanced high-density magnetic storage applications. The films were deposited using sputtering technique under two conditions, one at room temperature and the other at high temperature. Leveraging precise sputtering techniques, the $Fe_xCo_yPt_z$ films demonstrated exceptional magnetic anisotropy in order of 10^7 erg/cc and remarkably high saturation magnetization of order 10^3 emu/cc. Detailed analysis revealed a synergistic effect of films growth conditions, resulting in pronounced magnetic anisotropy and tunable coercivity. Microstructural and magnetic property examinations via atomic force microscopy (AFM) and the vibrating sample magnetometry (VSM) respectively underscored the role of film surface morphologies in enhancing magnetization dynamics. Furthermore, the study also explored the impact of alloying concentration and crystal structural effects on magnetization dynamics of the films, offering new insights into optimizing magnetic performance for next-generation devices. These findings pave the way for FeCoPt alloy thin films to serve as a foundation for innovative next generation magnetic storage and spintronic applications, overcoming limitations of conventional soft and hard magnetic materials. We believe that the present research outcomes contribute significantly to the ongoing discourse in thin film nanomagnetism and materials science highlighting FeCoPt's versatility and potential in cutting-edge technological domains.

Keywords: Thin Film, Magnetic property, perpendicular anisotropy, Magnetization dynamics

Abstract ID: ICTACSR 2025/TS2/OP 29

Biopolymer Grafted Nanocomposites as Sustainable Food Packaging Material

Rebika Baruah*[1,2], Archana Moni Das[1,2]
[1]CSIR-NEIST, Jorhat, Assam, India-785106
[2]Academy of Scientific and Innovative Research (AcSIR), Ghaziabad- 201002, India
*Correspondence: baruahrebika9@gmail.com

Abstract

Biopolymer grafted nanocomposites have gained attention in recent years owing to their antimicrobial activity. The article summarizes recent developments in improving antimicrobial, mechanical and barrier properties of biodegradable polymers chitosan, cellulose, gelatin and starch. ZnO and Ag nanoparticles (NPs) reinforced biopolymer nanocomposites exhibit improved tensile strength due to intercalation of nanomaterials into the polymer matrices. Ag NPs reinforced polymer nanocomposites have shown significant antimicrobial properties against various strains of bacteria and fungi. Although, development of antimicrobial NPs embedded packaging films has helped to augment shelf-life of food, leakage of nanomaterials into the packaged food remains an area of concern.

Abstract ID: ICTACSR 2025/TS2/OP 30

Tuning Dielectric and Magnetic Properties of ZnO through Synergistic Cr and Al Co-Doping

Jayshri Narzary[1] and Rajeeb Brahma[2]
[1, 2] Department of Physics, Bodoland University, Kokrajhar, Assam
*Correspondence: ijayshri@gmail.com

Abstract

The structural and frequency-dependent dielectric properties, such as dielectric constant, dielectric loss and ac conductivity, and ferromagnetic properties were investigated in pure and (Cr, Al) co-doped ZnO with $Zn_{1-x-y}Cr_xAl_yO$ (with x=0.04; y=0.01, 0.02, 0.03, 0.04), synthesised via solid-state reaction route. X-ray diffraction (XRD) analysis confirmed the formation of single-phase hexagonal wurtzite structure of ZnO, indicating successful incorporation of Al^{3+} and Cr^{3+} in the lattice site of Zn^{2+} in the ZnO matrix. The crystallite size, calculated from Williamson-Hall plot, was found in the range of 29-31nm. At room temperature, the dielectric constant improved in lower frequency region, which was attributed to the decrease in crystallite size, space charge polarization and defect-induced dipoles in co-doped samples. The dielectric constant decreased progressively from lower to higher frequencies and became nearly constant at higher frequencies, consistent with Maxwell-Wagner model and interfacial polarization theory. The prepared samples exhibited low dielectric loss and enhanced AC conductivity. The impedance spectroscopy analysed through Nyquist plot revealed a depressed semi-circular arc, suggesting a contribution from both grain and grain boundaries to the electrical conduction mechanism, reflecting non-Debye type of dielectric relaxation. The overall real and imaginary parts of impedance were observed to decrease upon co-doping which indicating reduction in the electrical resistance. This behaviour arises from the donor Al^{3+} ions increasing the free carrier concentration, while Cr^{3+} introduces defect states that facilitate hopping conduction. The magnetic properties investigation showed that the co-doped samples exhibit room temperature ferromagnetism originating from the bound magnetic polaron. The observed improvement in dielectric constant and AC conductivity, and ferromagnetic properties indicates that Cr and Al co-doped ZnO are potential candidates for energy storage device applications.

Keywords: Cr and Al co-doped ZnO, dielectric constant, AC conductivity, Nyquist plot, magnetic properties

Abstract ID: ICTACSR 2025/TS2/OP 31

Excimer Fluorescence of Acriflavine Dye in Glycerol and Ethylene Glycol

Hiren Swargiary[1,2], Seikh Mustafa Radiul[1], Simanta Hazarika[1]*
[1]Department of Physics, Gauhati University, Guwahati 781014, Assam, India Department of Physics
[2]Eastern Karbi Anglong College, Sarihajan, Karbi Anglong 782480, Assam, India
*Correspondence: simanta@gauhati.ac.in

Abstract

This study explores at the excimerization of acriflavine dye in ethylene glycol and glycerol solvents. Acriflavine, a member of the acridine dye family, is well-known for its distinctive fluorescence capabilities, which are used in cellular imaging, nucleic acid analysis, and dye laser active media. The study investigates the effect of solvent environment, dye concentration, and pH on acriflavine emission properties, focusing on excimer production and its implications for photonic applications. UV-visible absorption spectroscopy reveals concentration-dependent absorption characteristics represented by different monomer bands. Steady-state fluorescence studies demonstrate that at increasing concentrations in both solvents, red-shifted excimer bands appear. Temperature-dependent studies imply that excimer production is regulated by dynamic diffusion. Time-resolved fluorescence spectroscopy verifies the singlet character of both monomeric and excimeric states, offering mechanistic insights into the excimerization process. Critical concentrations are established, indicating the equilibrium between the monomer and excimer populations. Furthermore, pH-dependent spectrum changes demonstrate the importance of acidity in influencing fluorescence characteristics. Overall, this study gives a thorough knowledge of acriflavine excimerisation in viscous solvents, with the potential to increase its performance in dye laser technologies and other applications.

Keywords: Monomer, Excimer, Acriflavine, Fluorescence, Dye-laser, Diffusion-controlled, Aggregation.

Abstract ID: ICTACSR 2025/TS2/OP 32

Sustainable Synthesis of Carbon Nano-Sheets and Tubes from Rice Bran Oil and Cat Tail Inflorescence: Application as Adsorbent for Polluting Dyes

Ananya Bhattacharjee[1*], Abhijit Nath[1], Dipankar Das[3], Saikatendu Deb Roy[1], Sarbasri Nath[1], &Manabendra Nath[2]
[1]Department of Chemistry, Gurucharan University, Silchar, Assam, India 788004
[2]Department of Geology , Gurucharan University, Silchar, Assam, India 788004
[3]Department of Chemistry,Ramkrishnanagar College, Ramkrishnanagar, Sribhumi, Assam 788166
*Correspondence: ananyabhattachajee195@gmail.com

Abstract

Carbon nanostructures, such as carbon nanotubes and nanosheets, they are widely recognized for their remarkable biological, thermal, and electrical properties, making them highly valuable for various technological and environmental applications. This study reports the sustainable synthesis of carbon-based nanomaterials from low-cost, renewable precursors, i.e., rice bran oil and cat's tail inflorescence, and analyzes their ability as adsorbents for dye removal from polluted wet areas. The carbon nano particles were obtained by calcining the raw materials at 400°C for one hour. The structural characteristics of the synthesized materials were examined using Field Emission Scanning Electron Microscopy (FE-SEM). The SEM images revealed visible structural differences: cat tail inflorescence yielded tube-like carbon nano structures, while rice bran oil produced uniform, spherical carbon nano sheets. These structural variations influenced their adsorption behavior toward Malachite Green dye solutions. Using a catalytic dose (0.25 mg) of the adsorbents, the carbon nano sheets obtained from rice bran oil achieved an adsorption efficiency of 82.56% for a 50 ppm Malachite Green solution within 60 minutes. Similarly, the carbon nano tubes synthesized from cat tail inflorescence exhibited a slightly higher efficiency of 85.12% under identical conditions. The high adsorption capacities of both materials are assigned to π–π stacking interactions, van der Waals forces, and their large surface area, that facilitates dye molecule bonding. Overall, this research demonstrates a sustainable, cost-effective approach to producing efficient carbon nanomaterials from natural sources. The resulting carbon tubes and sheets exhibit excellent potential as adsorbents for water remediation and could also find future applications in catalysis, energy storage, and other environmental technologies.

Keywords: Carbon nano particles; SEM; Dye adsorption; Water remediation.

Abstract ID: ICTACSR 2025/TS2/OP 33

Synthesis of NdBiOBr/C3N4 heterojunction photocatalyst for photodegradation of Acid Red 27 and Orange G dyes and its mechanism insights

Aishwarya A. [a], Arpita Paul Chowdhury [a,*], K.S. Anantharaju [a,*], Y.S. Vidya
[a]Department of Chemistry, Dayananda Sagar College of Engineering, Bengaluru, India,
[b]Department of Physics, Government Science College, Chitradurga, Karnataka, India
*Correspondence: **aishwaryakiran9693@gmail.com**

Abstract

For the first time, a neodymium (Nd)-doped Bismuth oxybromide anchored with graphitic carbon nitride nanocomposite (NCs) was synthesized, and its photocatalytic performance was evaluated for dye degradation to address environmental pollution issues. The synthesized materials include BiOBr:Nd (BN), g-C3N4 (CN), and a series of nanocomposites: BiOBr:Nd-CN-1 (BNCN-1), BiOBr:Nd-CN-2 (BNCN-2), BiOBr:Nd-CN-3 (BNCN-3), and BiOBr:Nd-CN-4 (BNCN-4), prepared via the coprecipitation method. XRD analysis confirmed the tetragonal phase of BiOBr in BN, with no distinct Nd peaks, indicating successful doping, while the (100) and (002) planes verified the formation of graphitic CN. In BNCN-1 and BNCN-2, CN related peaks were absent due to its lower concentration, whereas BNCN- 3 and BNCN-4 displayed weak (002) peaks. Morphological analysis revealed Bi-based clusters embedded over thin CN layers. The band gaps, determined using diffuse reflectance spectra and Kubelka– Munk analysis, were 2.63, 2.86, 2.75, 2.60, 2.55, and 2.78 eV for BN, CN, BNCN-1, BNCN-2, BNCN-3, and BNCN-4, respectively. Under visible-light irradiation for 90 min, BNCN-3, achieved degradation efficiencies of 92.10 % for Orange G. Scavenger tests revealed the dominant reactive species involved in the process, and the nanocomposite exhibited good reusability, demonstrating its potential as an efficient and sustainable photocatalyst for wastewater treatment.

Keywords: Orange G, Scavenger, composite

Abstract ID: ICTACSR 2025/TS3/OP 01

An EOQ Model for Deteriorating Items with Ramp-Type Demand Pattern to Study the Effect of Advance Payment

[1]**Biman Kanti Nath**, [2]Nabendu Sen
[1]Department of Mathematics, Patharkandi College, Patharkandi, Sribhumi, Assam, India
[2] Department of Mathematics, Assam University, Silchar, Assam, India
*Correspondence: [1]bimannath2012@gmail.com, [2]nsen08@yahoo.com

Abstract

In the business world, it is common for suppliers to offer cash discounts for advance payments. Buyers may choose to pay either the full purchase price or only a portion of it prior to receiving the products. In the case of full advance payment, the buyer immediately receives the cash discount. Alternatively, if the buyer opts for partial advance payment, the discount is extended while the remaining balance is settled upon receipt of the goods. This study develops an EOQ model that integrates an advance payment scheme (both full and partial) with ramp-type demand. The model is further illustrated through numerical examples, and a sensitivity analysis is conducted on key system parameters to examine their impact on overall profit of the system.

Keywords: Advance payment, discount, ramp-type demand, deterioration, EOQ.

Abstract ID: ICTACSR 2025/TS3/OP 02

Functional Efficiency Quality with Linear Regression for Some Software Company in India

Sajal Kanti Das[1], Jamal Hussain[2], Piya Das[3]
[*1,2]Department of Mathematics & Computer Science Mizoram University, Mizoram-796004, India
[3]Radhamadhab College, Silchar, Assam-788006, India
*Correspondence: sajalhere@gmail.com

Abstract

There are many software companies from India which cater the need of domestic as well as global software market. While having their legacy and global presence the software or IT sector in India is a major contributor for the service sectors in the country. The study of growth and efficiency in this regard is very significant for the software industry. The present work ventures into assessing the efficacy of some selected software companies in India in terms of their overall functioning. The notion of integrated functional efficiency quality (IFEQ) is introduced and assessed. The data of Indian software companies is collected from CMIE Prowess database. The data is analyzed for 30 years from 1992 to 2021. The performance trends of those companies are compared and plotted. Later the integrated functional efficiency quality is used to train the machine learning model of linear regression. The trained model of linear regression is eventually used to evaluate the performance of those selected companies. The model performance metric of linear regression is presented. As revealed by experimental results most of the companies are at average level in order of IFEQ. Consequently, a benchmark company is decided. The less efficient company can follow the benchmark one. The managerial decision making may be supported in policy design and adoption. Such practice may yield business efficacy.

Keywords: Linear regression, functional efficiency quality, software industry.

Abstract ID: ICTACSR 2025/TS3/OP 03

Triple-Diffusive Instability in a Power-Law Fluid Saturated Porous Layer under Local Thermal Non-Equilibrium

Devraj Das[1], Venkatarao Chukka[1*]
1Department of Mathematics, Assam University, Silchar-788011, Assam, India
*Correspondence: devrajd1002@gmail.com , vraochukka@gmail.com

Abstract

The linear stability of a triple-diffusive convection in a power-law fluid saturated horizontal porous layer subject to local thermal non-equilibrium is investigated. The base state consists of a non-quiescent parallel throughflow. Shear-thinning and shear-thickening behaviours of fluids are captured using the Ostwald-de Waele rheological model. The analytical expressions for stability thresholds are obtained in the closed form by employing a one-term Galerkin approach. The marginal stability eigenproblem is also numerically treated using the Chebyshev spectral collocation method, and the stability thresholds obtained using both approaches are compared. The impact of horizontal throughflow and the two temperature fields and two concentration fields on shear thinning and shear-thickening fluids is discussed. The Newtonian fluid behaviour emerges naturally as a special case of the present study.

Keywords: Convection · Local thermal nonequilibrium · Porous medium · Power-law fluid· Triple diffusion

Abstract ID: ICTACSR 2025/TS3/OP 04

Acceptability of RFID as a Security Mechanism for Girl Children: A Brief Study

Susmita Bandyopadhyay*
Department of Business Administration, The University of Burdwan, West Bengal, India-713104
*Correspondence: Bandyopadhyaysusmita2010@gmail.com

Abstract

Radio Frequency Identification (RFID) is a wireless technology that is going to be the future of many real applications. The existing literature contains plenty of research studies on the technological aspects of RFID. However, the existing literature is lacking significant studies on the behavioral and managerial aspects of the use of RFID. This paper investigates the acceptability of RFID technology for the safety of girl children in India, from the perspective of parents. Data have been collected based on a set of questionnaires which have been sent through Gmail. The collected data have been analyzed for concluding remark.

Keywords*:* RFID; Security of Girl Children; Multiple Linear Regression

Abstract ID: ICTACSR 2025/TS3/OP 05

Overcoming the Challenges of Triple-Negative Breast Cancer Through Artificial Intelligence

Dipshikha Gogoi[ab], Hridoy Jyoti Mahanta[ab**], G Narahari Sastry[c]
[a]Advanced Computation and Data Sciences Division, CSIR North East Institute of Science and Technology, Jorhat, Assam, India
[b]Academy of Scientific and Innovative Research, Ghaziabad, UP, India
[c]Fifth Paradigm Lab, Indian Institute of Technology, Hyderabad, Sangaredyy, Telangana, India
*Correspondence: hridoy.neist@csir.res.in

Abstract

In India Breast cancer is the most major health challenge among the public, with the largest population-based survival analysis to date reporting a 5-year age-standardized relative survival (ASRS) of 66.4% across 17,331 cases (2012–2015). Among subtypes, Triple-Negative Breast Cancer (TNBC) accounts for approximately 15 to 20% of cases and is defined by the absence of hormonal receptors ER (estrogen receptor), HER2 (human epidermal growth factor receptor) and PR (progesterone receptor). TNBC is clinically aggressive compared to the other sub-types of breast cancer, characterized by early relapse, high metastatic potential and poor survival outcomes, largely due to the lack of effective targeted therapies. Till now standard chemotherapy is the initial treatment modality; however, its efficacy is hindered within the tumor heterogeneity and the emergence of adaptive resistance. Although recent therapeutic advances including immune inhibitors, PARP inhibitors, and antibody drug conjugates show durable responses that are limited to specific patient subsets. TNBC research has been enhanced by enabling patient stratification, biomarker discovery, and drug development which are the results of advancement in AI (Artificial Intelligence) and ML (Machine Learning). Computational frameworks trained on chemical protein interaction databases facilitate the identification of novel therapeutic leads, while AI-based radiomics and computational pathology provide non-invasive insights into tumor heterogeneity and immune microenvironment. Furthermore, multi-omics deep learning models and TNBC-specific subtyping tools, such as TNBCIS, are advancing precision oncology by integrating transcriptomic, proteomic, and imaging data to predict prognosis and guide individualized therapy. This review synthesizes recent developments at the interface of TNBC biology and AI, focusing on (1) classical computational approaches for drug discovery, (2) AI-driven imaging modalities, and (3) multi-omics integration for biomarker identification. Collectively, these advances highlight the potential of AI-

assisted strategies to overcome TNBC heterogeneity and improve clinical outcomes, particularly in high-burden regions such as India.

Keywords: Artificial Intelligence (AI), Triple-Negative Breast Cancer (TNBC), Machine Learning (ML) Models, Natural Products (NP), Multi-omics.

Abstract ID: ICTACSR 2025/TS3/OP 06

Sunspot Number Prediction through High-Order Intuitionistic Fuzzy Time Series Forecasting with CPDA

Geeta Mathpal[1], Sukhdev Singh Gangwar[2], Arvind Bhatt[1], Rajesh Mathpal[3*] , Kamlesh Bisht[1], and Seema Negi[4]
[1] Department of Mathematics, Uttarakhand Open University, Haldwani 263139
[2] Department of Mathematics, G.B. Pant University of Agriculture and Technology, Pantnagar, India,
[3] Department of Physics, Uttarakhand Open University, Haldwani 263139
[4] Department of Mathematics, S. V. Government P. G. College, Lohaghat (Champawat)
*Correspondence: rmathpal@uou.ac.in

Abstract
The Sunspot Number is a fundamental parameter in solar and space weather research with wide-ranging implications for communication systems, aerospace operations, and disaster prevention. In this work, a novel computational model is designed to enhance prediction accuracy while simplifying the forecasting process. We introduce a novel forecasting approach, termed the higher□order intuitionistic fuzzy time series (IFTS) model, that integrates linear and nonlinear pattern recognition by leveraging Atanassov's intuitionistic fuzzy sets (IFS) and a Cumulative Probability Distribution Approach (CPDA) for interval partitioning. This method uniquely integrates the degree of hesitation into its forecasting algorithm, a key feature that demonstrably leads to superior accuracy. The model's effectiveness has been tested by its Comparative assessments. Our study also highlights that incorporating hesitation and higher-order relationships offers a promising direction for accurate and computationally efficient sunspot-number forecasting.

Keywords: IFS: intuitionistic fuzzy sets, IFTS: intuitionistic fuzzy time series, CPDA: Cumulative Probability Distribution Approach

Abstract ID: ICTACSR 2025/TS3/OP 07

Stability Analysis of MHD Boundary Layer Flow Over a Stretching/Shrinking Porous Wedge with Variable Viscosity

Mwblib Basumatary*
Department of Mathematics, Lumding College, Lumding-782447, Assam (India)
*Correspondence: mwblib.lmg@gmail.com

Abstract

Magnetohydrodynamic (MHD) boundary layer flow past a stretching/shrinking porous wedge is examined when fluid viscosity varies with temperature. Similarity transformations reduce the governing momentum and energy equations to a coupled nonlinear boundary value problem, which is solved numerically using MATLAB's bvp4c solver. Parametric effects of stretching/shrinking rate, magnetic field, suction/injection, wedge angle, and viscosity variation on velocity and temperature profiles are examined through graphical representations. Dual steady solutions emerge for certain parameter ranges. To assess their physical viability, a temporal stability analysis is performed by introducing small perturbations and solving the corresponding eigenvalue problem. Results show that, within the dual solution regime, the upper branch solution is temporally stable whereas the lower branch is unstable.

Keywords: MHD flow; porous wedge; variable viscosity; dual solutions.

Abstract ID: ICTACSR 2025/TS3/OP 08

Some New Congruences of Overcubic Partitions With 5-Tuples

Pradip Bahadur Chetri*
Lumding College, Department of Mathematics
*Correspondence: pradip3101@gmail.com

Abstract

Kim studied congruence properties of $\bar{b}(n)$. We can interprete $\bar{b}(n)$ as the number of 4-color partitions of a positive integer n with colors r, y, o, and b subject to the restriction that the colors o and b appear only in even parts in which the first occurrence parts may be overline. $\bar{b}(n)$ known as the overcubic partition pair. $\bar{b}_k(n)$ denotes the overcubic partitions of the integer n with $k-tuples$. Using q-series manipulations and dissections techniques, we will establish some Ramanujan type congruences and some infinite families of congruences of $\bar{b}_5(n)$.

Keywords: Cubic partition, overcubic partition, congruences.

Abstract ID: ICTACSR 2025/TS3/OP 09

Inequalities Involving Energy and Laplacian Energy of Non-Commuting Graphs of Finite Groups

Walaa Nabil Taha Fasfous[1*] and Rajat Kanti Nath[2*]
Department of Mathematical Sciences, Tezpur University, Napaam-784028, Sonitpur, Assam, India.
*Correspondence: [1]w.n.fasfous@gmail.com [2]rajatkantinath@yahoo.com

Abstract

Let G be a finite non-abelian group with center Z(G). The commuting graph of G, denoted by Γc(G), is a simple undirected graph whose vertex set is G\Z(G), and two distinct vertices a, b are adjacent if and only if ab = ba. The complement of this graph is known as non-commuting graph or NC-graph of G and it is denoted by Γnc(G). The study of commuting graphs of finite groups was introduced by Brauer and Fowler in the year 1955. However, the study of non-commuting graphs of finite groups was originated from the work of Erd¨os and Neumann in the year 1976.

In this paper, we compute spectrum and energy of Γnc(G) for certain classes of finite groups. As a consequence of our results we construct infinite families of integral complete r-partite graphs. We compare energy and Laplacian energy (denoted by E(Γnc(G)) and LE(Γnc(G)) respectively) of Γnc(G).

Abstract ID: ICTACSR 2025/TS3/OP 10

Accurate and Efficient FAS-FML algorithm for RBF Meshfree Method

Nikunja Bihari Barik*
PG Department of Mathematics, Government College, Koraput, Odisha
*Correspondence: nikunjamath@gmail.com

Abstract

This paper presents an efficient full approximation scheme-full multilevel (FAS-FML) algorithm for the radial basis function-based finite difference (RBF-FD) method. The algorithm produces an accurate solution by solving the discretized equations from the coarsest level to the coarser level and then to the finer level to desire the finest level node points. Convection-dominated problems are taken to demonstrate the validity of the algorithm. The proposed algorithm saves a minimum 66% of computation time for the convection-dominated problems than the general RBF-FD method. The convergence conditions of the method were verified numerically. Outcomes prove that the developed algorithm concurs with exact solutions in the measure of accuracy and efficiency.

Keywords: FAS-FML algorithm, meshfree method, Convection dominated problems, CPU time, convergence of the method.

Abstract ID: ICTACSR 2025/TS3/OP 11

A Perspective on the Application of Algebraic Principles towards the Development of Cryptography

Merenlemla Jamir[1]*
[1]Department of Mathematics, Fazl Ali College, Mokokchung - 798601, Nagaland
*Correspondence: mjamir.faith@gmail.com

Abstract

Modernity with its technological advancements such as quantum computing, artificial intelligence, blockchain, robotics etc, has made significant strides. With that, priorities like maintaining data privacy and security has become a necessity. Mathematics is a discipline that contributes in many areas and branches of science including engineering, physical sciences, life sciences and data science. Algebra is one branch of mathematics that has many applications including cryptography, a science that ensures encrypted and decrypted communication. Algebra acts as one of the foundational theories in the development of cryptography as a discipline. Theories in algebraic structures such as groups, rings and fields forms the basis for understanding the operation of modern cryptography and thereby its many applications from secure online payments, transactions and relaying confidential information. Group theory is particularly essential in the structuring of public-key algorithm. In lattice-based cryptography, ring theory specifically polynomial rings are applied. Another algebraic theory, finite fields are utilized not only in symmetric cryptography but also in pseudo random number generation and error-correcting codes vital for a secured communication. This paper highlights the algebraic structures as a mathematical tool that provides the essential equipment to enhance the field of cryptography. Latest algebraic structures suggest promising development in the field of cryptography. Moreover, this field in cryptography which is still evolving has opened new avenues for academicians for further research.

Keywords: Algebraic structure, Groups, Rings, Fields, Cryptography.

Abstract ID: ICTACSR 2025/TS3/OP 12

A Study on Fuzzy set and their Application in Multi Criteria Decision Making Problems

Debakanta Buragohain*
Asst. Prof., Dept. of Mathematics, Tinsukia College
*Correspondence: debakantabura@gmail.com

Abstract

The concept of fuzzy sets, introduced by Zadeh in 1965, provides a powerful mathematical framework to model uncertainty, vagueness, and imprecision inherent in real-life problems. Unlike classical sets, fuzzy sets allow partial membership, thereby enabling more realistic representation of complex systems where crisp boundaries are not possible. One of the significant areas of application of fuzzy set theory is multi-criteria decision making (MCDM), which involves selecting the most suitable alternative from a set of options evaluated against multiple, often conflicting criteria. Traditional decision-making models often assume precise data and deterministic preferences, which rarely reflect practical situations. Fuzzy sets overcome this limitation by capturing linguistic variables, subjective judgments, and incomplete information in decision processes. Over the years, various fuzzy MCDM methods—such as fuzzy TOPSIS, fuzzy AHP, and fuzzy VIKOR—have been developed and successfully applied in domains including supply chain management, healthcare, engineering design, environmental management, and financial decision analysis. The integration of fuzzy sets into MCDM not only enhances flexibility and robustness of decisions but also provides a structured approach to deal with ambiguity in human reasoning. This makes fuzzy set theory a vital tool for advancing intelligent decision support systems in both academic research and practical applications.

Keywords: Fuzzy set theory, multi-criteria decision making (MCDM), Decision Support Systems, Fuzzy TOPSIS.

Abstract ID: ICTACSR 2025/TS3/OP 13

Empowering Interdisciplinary Research: The Evolving Role of Libraries in the Digital Era

Deepsikha Sensua*
Librarian, Tinsukia College, Tinsukia
*Correspondence: deepusensua@gmail.com

Abstract

In today's research landscape, solving complex global problems often requires knowledge from multiple scientific fields. Libraries play a vital role in supporting this kind of research by providing access to diverse information resources, tools for collaboration, and spaces that encourage knowledge sharing. This paper explores how libraries help connect ideas from different areas of science and support researchers working across fields such as health, technology, environment, and social sciences.

The discussion focuses on how libraries organize and manage information in ways that make it easier for researchers to find and use knowledge beyond their own disciplines. It also highlights the use of digital repositories, open access platforms, and data management services that support broader scientific collaboration. This paper shows how libraries are not just supporting research; they are helping to shape a more connected and cooperative scientific community.

This presentation offers insights for librarians, educators, and research professionals on strengthening library services to meet the needs of modern science.

Keywords: Digital Repositories, Scientific research, Library Services, Data Management, and Information Management.

Abstract ID: ICTACSR 2025/TS3/OP 14

Robust Stacked Classifiers for Breast Cancer Outcome Prediction on WPBC Dataset

Rahul Paul[1*] & Prithiraj Paul[2]
[1]Department of Mathematics, National Institute of Technology Silchar, Assam, India;
[2]Department of Computer Science and Engineering, National Institute of Technology Silchar, Assam
*Correspondence: rahulpaulfb@gmail.com

Abstract

Accurate breast cancer prognosis underpins treatment planning and shared decision-making. It guides adjuvant therapy intensity to balance benefit and toxicity, shapes surveillance schedules, and informs choices around reconstruction and fertility preservation. Reliable risk stratification focuses resources on patients most likely to recur while avoiding overtreatment in low-risk cases. Strong prognostic tools also support clinical trials and quality benchmarking and ultimately improving survival, quality of life, and equity of care. Machine Learning (ML) models can synthesize multivariate clinical features, capture nonlinear interactions, and deliver individualized risk estimates that go beyond simple rules. Learned from historical outcomes, they enable earlier risk stratification, consistent triage, and targeted follow-up even with imbalanced or partially missing data. With calibrated probabilities and lightweight explanations (e.g., SHAP), they provide transparent, reproducible decision support that clinicians can audit and trust. Using the Wisconsin Prognostic Breast Cancer (WPBC) dataset, we develop a compact stacking approach that blends complementary base learners- Random Forests (RF), radial-basis Support Vector Machine (SVM), and distance-weighted k-Nearest Neighbours (kNN) under a Logistic Regression (LR) meta-learner. The workflow reflects practical deployment needs while remaining concise: training-only imputation for missing values, interquartile-range (IQR) handling of outliers, synthetic oversampling to address class imbalance, scaling and tree-based feature selection to reduce noise, probability calibration to produce meaningful risk scores, and a single operating threshold determined from out-of-fold (OOF) predictions and held fixed at test time. Model explanations are provided with SHAP summaries for the tree component to surface feature contributions in a clinician-friendly way. The result is an interpretable, ensemble-based prognostic tool tailored to WPBC that prioritises clear risk estimates and robust evaluation, and can be readily adapted to related oncology and other binary classification datasets.

Keywords: Breast cancer prognosis, class imbalance, stacking ensemble, calibration, SHAP.

Abstract ID: ICTACSR 2025/TS3/OP 15

Production Inventory Model to Study the Machine Breakdown with an Approach to Replenish the Shortage of In-Hand Stock Due to Prolonged Machine Downtime Under an Alternative Production Unit

Nabajyoti Bhattacharjee*
Department of Mathematics, Pandit Deendayal Upadhyaya Govt. Model College, Katlicherra
Email: nbgg2017@gmail.com

Abstract

In the manufacturing sector, machine failures frequently disrupt the supply chain, leading financial losses, particularly when downtime is prolonged. Various methods have been proposed to assess the impact of machine failures on profitability. However, the literature lacks a comprehensive approach that addresses machine failures in the context of maintaining a continuous supply chain through the implementation of an alternative production source during shortage. To bridge this gap, this study proposes an Economic Production Quantity (EPQ) model that incorporates machine failure and compares the manufacturer's profit under two scenarios: one with shortages and another with an alternative production unit compensating for the shortfall. The model aims to maximize profit by optimizing the decision variables. The proposed model is validated through numerical example, with a detailed sensitivity analysis and managerial insights provided to support decision-making from a business perspective

Keywords: Production inventory, Machine failure, Carbon emission, Green investments, Shortages

Abstract ID: ICTACSR 2025/TS3/OP 16

Exploring Weakly Nil-Semicommutativity Through Ring Endomorphisms

Sagar Pal[1*], Shouvik Bhattacharya[1*] and Krishnendu Das[2*]
[1]Department of Mathematics, Tripura University, Agartala, India.
[2]Department of Mathematics, Women's College, Agartala, India.
*Correspondence: spal71441@gmail.com , shouvik@tripurauniv.ac.in , krishnendu82@gmail.com

Abstract

In 2023 Dutta and Buhphang introduced the concept of weakly nil-semicommutative rings. A ring R is said to be weakly nil-semicommutative if for any $a,b \in Nil(R)$, $ab = 0$ implies $aRb \subseteq Nil(R)$. In this paper we introduce the concept of weakly nil-semicommutative endomorphism and weakly nil-semicommutative ring with respect to a ring endomorphism. We also discuss several properties of rings by skewing with a weakly nil-semicommutative ring endomorphism and also study interrelations with the other classes of rings. We also explore the nature of certain extensions of these classes of rings viz trivial extensions, Dorroh extensions, Nagata extensions etc.

MSC (2010): Primary: 16U80; Secondary: 16N40.

Keywords: Nil-semicommutative ring; Weakly Nil-semicommutative ring; Weakly Nil-semicommutative endomorphism; weakly alpha-nil-semicommutative ring, Nagata extension; Dorroh extension; Trivial extension.

Abstract ID: ICTACSR 2025/TS3/OP 17

Simulation Times of Smoke Voxels and FLIP Particles in Houdini FX

Hemaksh Gandhi*
Department of Information Technology
Somaiya School of Basic and Applied Sciences, Somaiya Vidyavihar University
Mumbai, India
*Correspondence:hemaksh.g@somaiya.edu

Abstract

Accurate estimation of simulation times of FX based visual effects like smoke, fire, water, destruction etc has been a challenge ever since digital effects became the standard way to do visual effects in the early 1990s. Most technological hurdles encountered since then have been eliminated but the long wait times for FX simulations continue to persist. This is due to the ever-increasing demand for better output where despite substantial research and technological advancements in this field, simulation times continue to be a major cause of frustration among artists. This research paper focuses on taking a different approach where instead of coming up with methods to reduce wait times, it directly gives artists a quick glance at how long their simulations could take based on the resolution of their effect. A basic simulation has been employed to obtain simulation times so that this study caters to the widest audience possible. It has been found that simulation times roughly octuple each time the resolution of the effect is halved. Furthermore, some unexpected findings are identified where liquid simulations consistently take lesser time to simulate for a given resolution. This discovery possibly opens avenues for further research into this phenomenon.

Keywords: Houdini FX, simulation, voxel, FX artist, FLIP, SideFX

Abstract ID: ICTACSR 2025/TS3/OP 18

ByT5-based Grapheme to Phoneme Model for Kashmiri Language

Kh Mohmad Shafi* & Javaid Iqbal
Department of Computer Sciences, University of Kashmir
*Correspondence: kmshafi@kashmiruniversity.ac.in

Abstract

We present a systematic supervised grapheme-to-phoneme (G2P) system for Kashmiri language written in the Perso–Arabic script. We compile and normalise a multi-source lexicon, design linguistically motivated, orthography-aware data augmentation, and fine-tune the ByT5 model with parameter-efficient LoRA. We evaluate using Phoneme Error Rate (PER) and sequence-level exact match on a held-out test set. Despite Kashmiri's orthographic variability and phonological richness, the model attains strong accuracy. A confusion analysis characterises residual errors and highlights systematic ambiguities in the grapheme-to-phoneme mapping. The resource-efficient approach provides a practical foundation for Kashmiri G2P, supporting downstream ASR/TTS and lexicographic applications in this under-resourced language.

Keywords: Kashmiri; Grapheme-to-Phoneme (G2P); Text-to-Speech (TTS); ByT5; LoRA; Low-resource TTS;

Abstract ID: ICTACSR 2025/TS3/OP 19

An NHPP-Based Software Reliability Model with Gompertz Testing Effort Function

Rabia Nazir, Javaid Iqbal
Department of Computer Science, University of Kashmir, Srinagar India;
*Correspondence: mir.rabia.96@gmail.com, iamjavaid@gmail.com

Abstract

Software reliability is an important measure of software quality, especially as modern systems get bigger and more complex. To ensure reliability during development, it is essential to understand the fault detection and correction process. This process mainly relies on the amount of testing time and effort put into the software. The testing effort shows the resources spent during testing activities, including manpower, time, and computational resources. This effort directly affects how quickly software faults are found and fixed. Accurately modeling this relationship helps project managers make better choices about release timing, cost estimates, and quality assurance. This paper presents two new Software Reliability Growth Models (SRGMs) that apply the Gompertz Testing Effort Function (GTEF) and Exponentiated Gompertz Testing Effort Function (EGTEF), within the Non-Homogeneous Poisson Process (NHPP) framework. The Gompertz function captures the realistic pattern of testing effort, which typically begins slowly, increases steadily, and then levels off as testing progresses. To evaluate their effectiveness, the proposed models are compared with six existing Software Reliability Growth Models using a real time dataset. The performance of all models is evaluated using six standard evaluation metrics: including Mean Square Error (MSE), R-square, Sum of Squared Errors (SSE), Pham's Criterion (PC), Bayesian Information Criterion (BIC) and Akakie's Information Criterion (AIC). The results indicate that the Gompertz Testing Effort Function based model offers better fit and prediction accuracy than all other models. Overall, this study supports the use of the Gompertz Testing Effort Function as a practical and reliable approach for modeling fault detection during software testing.

Keywords: SRGM, Reliability, Testing Effort, Gompertz.

Abstract ID: ICTACSR 2025/TS3/OP 20

Magneto-Hydrodynamic Newtonian Flow Past an Inclined Porous Surface with Buoyancy Effect & Radiation

Lakhyajit Borah, Paban Dhar*
[1]Department of Mathematics, Karimganj College, Karimganj, Assam-788710
*Correspondence: paban5dhar@gmail.com, lakhyajit.bora16@gmail.com

Abstract

The effect of buoyancy and thermal radiation in an incompressible two-dimensional MHD fluid flow past an inclined porous surface in presence of heat and mass transfer has been studied in this paper. A similarity technique is incorporated to transform the non-linear partial differential equations into ordinary differential equation. **Matlab bvp4c** solver has been used to solve the governing equations of motion and effects of various flow parameters are discussed and depicted graphically.

Keywords: MHD, Matlab bvp4c solver, similarity technique

Abstract ID: ICTACSR 2025/TS3/OP 21

Non-Solvable Graph of Finite Groups

P. Bhowal, D. Nongsiang and R. K. Nath
Department of Mathematic, Cachar College, Silchar - 788001, Assam, India.
Department of Mathematics, North Eastern Hill University, Shillong, Meghalaya - 793022, India.
Department of Mathematical Sciences, Tezpur University, Napaam-784028, Sonitpur, Assam, India.
*Correspondence: bhowal.parthajit8@gmail.com, ndeiborlang@yahoo.in , rajatkantinath@yahoo.com

Abstract

Let G be a finite group and $Sol(G) = \{x \in G : \langle x, y \rangle$ is solvable for all $y \in G\}$. The non-solvable graph NS_G is defined on the vertex set $G \setminus Sol(G)$, where two vertices are adjacent if they generate a non-solvable subgroup.

We show that NS_G is neither complete multipartite nor bipartite and is Hamiltonian under certain order conditions of solvabilizers. The domination number of NS_G is greater than 1, and its clique number is at least 6. Moreover, the order of a finite non-solvable group G is bounded by the independence number of NS_G. Finally, we prove that NS_G is neither planar nor toroidal.

2010 Mathematics Subject Classification: Primary 20D60; Secondary 05C25.

Keywords: Non-solvable graph; Finite group.

Abstract ID: ICTACSR 2025/TS4/OP 01

Northern King Cobra (*Ophiophagus hannah* Cantor 1836), Rescue and Conservation efforts in and around Assam University, Silchar, Cachar District, Assam

Bishal Sonar*and Parthankar Choudhury
Wildlife Conservation Research Laboratory, Department of Ecology and Environmental Science, Assam University, Silchar, Assam 788011, India.
*Correspondence: bishalsonar47@gmail.com

Abstract

This article presents comprehensive data on Northern King Cobra (NKC) rescues, road mortality incidents, and human–King Cobra conflicts in and around Assam University, Silchar (India), intending to assess the status and threats of the species in the Barak Valley, Assam, and inform its conservation requirements. Between July 2020 and December 2024, data were collected on King Cobra rescues and mortality events. Rescue operations were conducted by a trained two-member team equipped with protective gear and standard snake-handling tools. Rescue and relocation were considered secondary options, employed only when necessary; in most cases, the snakes were allowed to disperse naturally away from human settlements. During each rescue event, the length and body weight of the snakes were recorded prior to release into nearby forested habitats. A total of 49 NKCs were rescued and released over the study period. The lengths of the rescued individuals ranged from 3 to 14 feet, and weights ranged from 2.8 to 14.48 kg, with a mean length of 10.27 feet and a mean weight of 5.84 kg. Observational data indicated a significantly higher incidence of snake appearances in human-inhabited areas during April ($\chi^2 = 36.01$, df = 11, $p < 0.001$). Seasonally, sightings were more frequent during the pre-monsoon period; however, the variation across seasons was not statistically significant ($\chi^2 = 2.19$, df = 3, $p > 0.01$). A simple linear regression analysis showed a positive relationship between snake length and weight, indicating that each additional foot in length is associated with an approximate increase of 1.00 kg in body mass. We emphasise the need for further research into the ecological and biological characteristics of this ecologically significant and charismatic species. Given the frequent human-induced mortality driven by fear, we recommend implementing conservation education and community engagement programs to promote coexistence and support effective conservation strategies.

Keywords: Conservation; Northeast India; Rescue; Serpent; Venomous

Abstract ID: ICTACSR 2025/TS4/OP 02

Biodiversity, Nutrition, and Traditional Knowledge: Implications for Reproductive Health of Women Tea Garden Workers in South Assam

Nilkamal Bhattacharjee[1 &] Kh Narendra Singh[1*]
[1]Department of Anthropology, Assam University, Silchar (Diphu Campus), Assam, India
Email: [1]bhattacharjeenilkamal@gmail.com, nsingha66@gmail.com

Abstract

This study examines the intersections between biodiversity, nutrition, and traditional knowledge, and their impact on the reproductive health of tea garden women workers in South Assam. The study was carried out in six chosen tea gardens across South Assam, with a sample of 750 women of reproductive age (15–49). A mixed-method approach was followed, which combined household surveys, anthropometric measurements, physiological parameters, and dietary recall with ethnographic interviews to document traditional food and medicinal practices, correlation, and thematic analysis.

According to the results, socio-economic marginalisation severely restricts access of women to diverse diets, causing a high prevalence of undernutrition, anaemia, and reproductive morbidities such as irregular menstruation, high-risk pregnancy, and maternal fatigue. Women with higher dietary diversity scores, often sustained by the consumption of traditional herbal medicines, exhibited significantly higher nutrition, resulting in fewer reproductive complications.

The research shows that biodiversity and local wisdom play a crucial role in keeping mother and child healthy in tea garden communities. However, due to deforestation and insufficient healthcare, there is an increased risk to health. To enhance the well-being of women working in Assam's tea gardens and improve their overall lives, it's crucial to protect nature, prioritise good nutrition, improve hospitals, and integrate traditional knowledge into basic healthcare.

Keywords: Biodiversity, Nutrition, Traditional Knowledge, Reproductive Health, Tea Garden Women Workers, Assam

Abstract ID: ICTACSR 2025/TS4/OP 03

Water quality status of the habitat of the edible freshwater red alga *Lemanea* in Iril river, Manipur

Yumnam Nganthoibi Chanu[1] and Jayashree Rout[2]*
Department of Ecology and Environmental Science, Assam University, Silchar-788011, India
Email: [1]yumnamnganthoibi125@gmail.com [2]jayashreerout8@gmail.com

Abstract

The Iril river of Manipur state, N E India has been facing serious threat due to drastic human anthropogenic activities. It provides sufficient fertile plains and slopes for cultivation, good grounds for community fishing and hunting. The river is important for the state of Manipur as it provides an edible freshwater red alga of the genus *Lemanea*. This alga has been reported only from Manipur in India and is used as a food and added in Manipuri cuisine as a delicacy. In recent years, increasing demand for its nutritional and medicinal properties has led to continuous harvesting, placing the genus at the risk of extinction. The present study investigates the seasonal growth dynamics, and water quality relationships of *Lemanea* in the Iril river over a one-year period. Physicochemical parameters including pH, temperature, turbidity, electrical conductivity, dissolved oxygen (DO), biological oxygen demand (BOD), chemical oxygen demand (COD), nutrients, and dissolved silica were systematically measured from three selected sites in the which the alga grows. Maximum water quality index (WQI) values were recorded during monsoon season in all the sites followed by pre-monsoon, post-monsoon and winter. The WQI revealed seasonal variation, winter and pre-monsoon seasons exhibited good water quality ($25 < WQI < 50$), which coincided with peak algal biomass, with the highest value (91.69 g/m²) recorded at Site-2 in February. In contrast, the monsoon season exhibited poor water quality ($WQI > 50$), characterised by high turbidity and nutrient enrichment which leads to the disappearance of *Lemanea*. Principal component analysis (PCA) highlighted conductivity, alkalinity, DO, free CO□ and silica as key drivers supporting algal growth during winter, while turbidity, nitrate, and higher water temperature during monsoon negatively influenced its persistence. This study confirms that *Lemanea* occupies a narrow ecological niche and is highly sensitive to environmental fluctuations, thriving only in stable, cool, well-oxygenated, and low-turbidity conditions.

Keywords: *Lemanea*, freshwater red algae, water quality index (WQI), Iril river, Manipur.

Abstract ID: ICTACSR 2025/TS4/OP 04

Age, Socio-Economic Status and Nutritional Variation Among Karbi Women of Karbi Anglong District, Assam

Kloree Rongpipi*
Assam University Diphu Campus, Karbi Anglong -782462, Assam.
*Correspondence: kloree112@gmail.com

Abstract

Humans are the totality of their evolutionary life history that encompasses their biological and social past, as well as the present-day socio-cultural and epigenetic changes. In due course of time, human societies have undergone many transformations, some of which can be reflected in their diet patterns and nutritional health. The problem of undernutrition and overnutrition is still persistent in India. The prevalence of underweight among adults is found to be relatively high alongside overweight-obesity, which continues to increase rapidly.

This paper attempts to explore the nutritional health variation across different age groups and socio-economic status. A cross-sectional study was conducted among 326 married Karbi women, through random selection method, between the ages of 25-60 years, living in different areas under Bokajan-sub division of Karbi Anglong district, Assam. Anthropometric measurements such as height and weight were taken and BMI was derived to assess general nutritional status. Nutritional status was assessed on the basis of BMI classification for Asian population as recommended by WHO. Pre-structured questionnaires were used for collecting socio-economic and demographic data. Socio-economic status was calculated using Kuppuswamy's socio-economic status scale of 2024. However, in the present study, the scale was modified and adjusted according to the socio-economic information that was obtained. Informed consent was obtained from each participant before conducting the study. All consenting members were included in the study, and those of who did not provide their consent were excluded from the study. Descriptive statistics was employed to analyze the distribution and variation of the study population.

According to BMI classification, overweight-obesity was found among women of all age groups, but it was mostly prevalent among women between the ages of 25-44. According to socio-economic status, women belonging to lower middle, upper lower and lower class were found to be more overweight and obese, while underweight prevalence was also observed among lower class. Conclusion: Malnutrition in the form of underweight and overweight was found among Karbi women and the prevalence also

varied on the basis of age and socio-economic status. Nutritional status of women in India is an important subject matter and emphasis should be made to improve, develop and achieve proper nutritional requirements for women across the country.

Keywords: Undernutrition, Overnutrition, Women, Nutritional health

Abstract ID: ICTACSR 2025/TS4/OP 05

Coal Mining in Meghalaya, India: An Overview of Mining Method, Adverse Environmental Issues and Mitigation Strategies

Manabendra Nath*
Department of Geology, Gurucharan University, Silchar, Assam, India
*Correspondence: dr.manabendra.nath@gmail.com

Abstract

Coal mining plays a significant role in the economy of Meghalaya, India, with the region being known for its extensive coal reserves. However, the predominant practice of rat-hole mining has led to severe environmental degradation and serious health risks for miners and nearby communities. This unscientific method involves digging narrow tunnels to extract coal, posing significant safety hazards, including cave-ins and fatalities. Exposure to coal dust and fumes results in respiratory diseases such as silicosis and tuberculosis, while noise pollution from heavy machinery contributes to hearing impairments. The use of explosives in blasting operations further exacerbates air pollution, increasing the risk of respiratory and auditory complications. Additionally, coal mining effluents contaminate local rivers and streams, leading to widespread waterborne diseases such as diarrhea, cholera, and typhoid. The environmental consequences include land degradation, soil erosion, biodiversity loss, and reduced soil fertility, which impact natural resources and contribute to food insecurity and malnutrition. Despite the 2014 ban imposed by the National Green Tribunal (NGT), illegal and unsafe mining practices continue due to weak regulatory enforcement and economic dependence on coal extraction. This paper underscores the urgent need for scientific mining techniques, stricter environmental regulations, and sustainable rehabilitation measures. A coordinated effort among policymakers, industry stakeholders, and local communities is essential to balance economic benefits with ecological preservation and public health safety.

Keywords: Coal mining, rat-hole mining, environmental impact, respiratory diseases, water pollution, land degradation, Meghalaya

Abstract ID: ICTACSR 2025/TS4/OP 06

The Assam Roofed Turtle: Endemic Endangered Reptilian Species of Assam

Ratnadeep Deb* and **Pronabananda Choudhury**
Dept. of Zoology, Gurucharan University, Silchar.
***Correspondence:** ratna.d.deb@gmail.com ; shivamchoudhury005@gmail.com

Abstract

The Assam roofed turtle (*Pangshura sylhetensis*), belonging to the family Geoemydidae, is a critically endangered freshwater reptile species endemic to the northeastern region of India and parts of Bangladesh. Characterized by its distinctive roof-shaped carapace with serrated edges and vivid head markings, this species inhabits the Brahmaputra and Barak river systems, preferring slow-moving rivers, oxbow lakes, and marshes with sandy or loamy banks for basking and nesting. Ecologically, the turtle plays a vital role in maintaining freshwater ecosystem balance through vegetation control, scavenging, and nutrient recycling. However, its population has declined drastically due to multiple anthropogenic pressures including habitat destruction, river pollution, sand mining, illegal wildlife trade, and accidental entanglement in fishing nets. Although the species is protected under Schedule I of India's Wildlife Protection Act (1972) and listed as Critically Endangered by the IUCN Red List, enforcement remains limited.

Recent conservation initiatives—such as captive breeding programs by the Turtle Survival Alliance and the Assam Forest Department, and community-based awareness campaigns like the "Kaso Sakhi" project in Biswanath Ghat—have shown promise in promoting both population recovery and local stewardship. Continued public engagement, habitat restoration, and stricter anti-poaching measures are essential to mitigate ongoing threats. Furthermore, expanded research on population genetics, reproductive biology, and ecological requirements will provide vital insights for future management strategies. The long-term survival of Pangshura sylhetensis depends on coordinated action among conservation organizations, government bodies, and local communities to ensure the protection of this unique and ecologically significant species.

Keywords: Pangshura sylhetensis, Assam roofed turtle, endangered species, habitat loss, freshwater conservation, community participation

Abstract ID: ICTACSR 2025/TS4/OP 07

Impending Perils of Environmental Crisis and Climate Alteration in Amitav Ghosh's Gun Island

Georgina Khakhlari*
Assistant Professor, Department of English, Cachar College, Silchar
*Correspondence: khakhlarig@gmail.com

Abstract
The environmental crisis is one of the global threats the world is witnessing in the Anthropocene era. It is an unprecedented challenge that requires urgent attention. Anthropocentric cultures and lifestyles that subjugate and devalue nature as mere resources for fulfilling consumerist desires are considered the driving force behind environmental degradation. Among the many ecological catastrophes, climate change is one of the most pressing issues that requires immediate attention. The complex and seemingly unmanageable climate alteration transcends national boundaries and affects the environment and humans around the globe. Climate alteration, a significant factor in shaping human history, is the primary focus of Amitav Ghosh's novel *Gun Island*. As a writer of brilliant fiction, Amitav Ghosh has contributed to depicting human connections across geographical and historical boundaries for decades, set against the backdrop of the devastating effects of the environmental havoc and climate crisis. *Gun Island*, a story about travel and migration layered with myth, explores a broad range of topics, including globalization, digital technology, mass migration, human trafficking, modern slavery, and the impending perils of the climate crisis. This paper aims to explore the anthropocentric activities on the environment and the effects of climate alteration on both humans and non-humans.

Keywords: Environmental degradation, Climate catastrophe, Migration, ecology, Humans, and Animals

Abstract ID: ICTACSR 2025/TS4/OP 08

Assessment of Phytoestrogen Profile of Some Edible Green Leafy Vegetables & Legume and Their Synergistic Utero-Vaginotrophic Effects in Albino Mice

Nitu Debnath[1], Saurav Dey [2], Rajat Nath [3], Manabendra Dutta Choudhury [3,4]
[1] Department of Zoology, Cachar College, Silchar, Assam, India
[2] Biotech Park, Indian Institute of Technology, Guwahati, Assam, India
[3] Department of Life Science and Bioinformatics, Assam University, Silchar, Assam, India
[4] Vice Chancellor, Rabindranath Tagore University, Hojai, Assam
***Correspondence:** nitudebnath1234@yahoo.co.in

Abstract

The edible Green Leafy Vegetables (GLVs) and Legumes (LGMs) reportedly are potent sources of plant-derived endocrine-active substances called phytoestrogens, possessing multiple health–beneficial impact in humans. However, reports on quantitative estimation of such compounds in locally consumed GLVs & LGMs in Barak Valley, Assam as well as on their plausible effects in human and animals are limited. Therefore, the present study attempts to quantify 15 well-known phytoestrogens in four GLVs *viz., Hibiscus sabdariffa, Corchorus olitorius, Basella rubra, Trigonella foenum-graecum* & one LGM *viz.*, *Perkia speciosa*, which are commonly consumed in Barak Valley Assam. A total of 5 Isoflavones *viz.*, Genistein, Daidzein, Formononetin, Biochanin A and Coumestrol, 7 flavonoids *viz.*, Apigenin, Quercetin, Kaempferol, Myricetin, Rutin, Catechin and Naringenin and 3 lignans (non-flavonoids) *viz.*, Secoisolariciresinol, Matairesinol & Pinoresinol were quantified in all the five plant samples. The single and combinatorial *in-vivo* effects of methanolic extracts on certain utero-vaginotrophic parameters were studied in ovariectomized (OVX) albino mice with respect to both negative (OVX) and positive control Estradiol 17 Beta (E2).
Sequential Sauxhlet extraction with Petroleum Ether, Ethyl Acetate & Methanol was followed by determination of phenolic and flavonoid content of methanolic extracts (Hazra *et al.*, 2008) taking Gallic acid and Quercetin as reference standards respectively. The quantitative phytoestrogen profiling was done using standard reference phytoestrogen compounds (Sigma Aldrich) and through HPLC analysis (Agilent Technologies 1260 infinity Series) with reverse-phase Zorbax Eclipse Plus C18 column.
Almost all the samples were found to have higher phenolic (>50 µg/ml) and flavonoid (>200 µg/ml) content with *Perkia speciosa* exhibiting the highest content of flavonoids

and total phenolic content. Among isoflavones, amount of Formononetin is higher in *Hibiscus sabdariffa, Corchorus olitorius, Perkia speciosa,* while that of Genistein and Coumestrol are abundant in *Trigonella foenum-graecum.* Among Lignans, Secoisolariciresinol is highest in *Corchorus olitorius,* while Matairesinol and Pinoresinol contents are high in *Trigonella foenum-graecum* and *Perkia speciosa.* Among Flavonoids, Myrecetin is found to be highest in *Corchorus olitorius* while Apigenin and Naringenin are abundant in *Trigonella foenum-graecum.*

Interestingly, although the utero-vaginotrophic effect of individual methanolic extracts of *Hibiscus sabdariffa* and *Corchorus olitorius* is higher compared to OVX control and E2, all the uterine as well as vaginal parameters like uterine wet weight, uterine luminal epithelial height, uterine stromal gland number, vaginal epithelial height and vaginal cornification were less influenced by the combination of all five extracts, compared to E2.

Therefore, the results of this study revealed the fact that the commonly consumed food plants are potent sources of some well-studied phytoestrogens. The differential modulation of estrogenic effects by single and combination of such edible vegetables and legumes clearly indicate that a composite diet might have some positive role in reducing over-stimulation of estrogen-sensitive tissues and thus have beneficial effects in human. Thus, considering the multi-faceted health beneficial impact of phytoestrogens, the present study warrants further studies exploring their serum bioavailability and interactions at biochemical and molecular level to ascertain how the simultaneous exposure to various such natural plant-derived compounds influences endocrine and metabolic functions. Moreover, the analysis of dietary composition and dietary habit is also quintessential to correlate the actual exposure pattern with the prevalence of reproductive and endocrine disorders, cancer, cardiovascular diseases etc. in diverse communities residing in this part of Assam and Northeast India.

Keywords: Phytoestrogens, Isoflavones, Flavonoids, Lignans, Green leafy vegetables, Legumes, Utero-vaginotrophic effect.

comparatively high in some samples while moderate in others. Daidzein is high in Drumstick, *Moringa oleifera* & Biochanin A and Catechin flavonoid are high in Peppermint, *Mentha piperita*. Interestingly, highest amount of formononetin is found in Pea Greens, *Pisum sativum*. Fenugreek Greens, *Trigonella foenum-graecum* is found to have highest amount of isoflavones, Coumestrol & Genistein and flavonoids Apigenin and Myrecetin. Gongura*, Hibiscus sabdariffa* has almost equal quantity of Apigenin, Kaempferol & Naringenin. 19 GLVs exhibited comparable DPPH activity while 15 GLVs exhibited significant Superoxide radical scavenging activity. Therefore, this study identified potent sources of phytoestrogens among edible vegetables of this Valley of southern Assam which also exhibit potential antioxidant activity. Thus, considering the health beneficial impact of phytoestrogens, the present study warrants vigorous future studies to ascertain the actual exposure pattern through analysis of dietary habit of various communities residing in this Valley and to extrapolate the influence of such exposure on human health and diseases in this part of Assam, India.

Keywords: Phytoestrogens, Isoflavones, Flavonoids, lignans, Green leafy vegetables

Abstract ID: ICTACSR 2025/TS4/OP 09

A Study on Fish Diversity in the Ganol River Near the Assam–Meghalaya–Bangladesh Border Regions

Anjam Hussain Barbhuiya*, Samia Ahmed
Department of Zoology, Goalpara College, Goalpara, 783101, Assam
*Correspondence: anjam.barbhuiya@gmail.com

Abstract

River Ganol (Kalu) a tributary of River Barak is a first order river originating from the eastern side of the Nokrek Biosphere, runs towards the west through Damalgre, Garobadha and Rangapani joining several other tributaries before entering Assam through South Salmara Mankachar District after travelling a distance of 94 km from the origin. The river then enters Bangladesh near Char Aomkhaoa (25^0 31' 45.22" N 89^0 51' 18.02" E) and flows a major distance, which joins the Barak near Munshiganj and ultimately falls in the Bay of Bengal after joining with the Brahmaputra drainage traveling a distance of 655.5 km.

The present study highlights the rich and diverse ichthyofauna of the Ganol River, particularly along the ecologically sensitive border stretches of a 5 km segment in Assam–Meghalaya and Assam–Bangladesh. A total of 50 species were recorded, and classified under 10 orders and 26 families. This species richness reflects the ecological integrity and biological productivity of the riverine ecosystem.

From a conservation perspective, although the majority of species fall under the Least Concern category in the IUCN Red List, the presence of few Vulnerable and Near Threatened species calls for proactive conservation planning. Human-induced pressures such as overfishing, habitat modification, pollution, and cross-border developmental activities pose potential threats to the ecological integrity of the river. Without timely management interventions, these pressures could lead to the decline of sensitive species and overall biodiversity.

Keywords: Brahmaputra, Barak, Ganol, Bangladesh, Vulnerable.

Abstract ID: ICTACSR 2025/TS4/OP 10

Spider (Arachnida: Araneae) Fauna from the Vicinity of Chandubi Tectonic Lake of Kamrup (Rural) District, Assam with Special Reference to their Feeding Ecology

Jyotiprakash Boro[1], Chandramita Boro[2*], Samir Terdalkar[3]
[1,3]Department of Zoology, Fergusson College (Autonomous), Pune, Maharashtra
[2]Department of Zoology, Gurucharan University, Silchar, Assam
*Correspondence: jyotiprakashboro1@gmail.com, chandramita98@gmail.com

Abstract

The spider fauna from the vicinity of Chandubi tectonic lake are documented for the first time. The study reports a total of 56 species belonging to 28 genera and 12 families. The dominant family was Araneidae with 17 species followed by Salticidae with 9 species. Among all the species, *Nephila pilipes* (Fabricius, 1793) and *Argiope pulchella* (Thorell, 1881) were the most encountered. This preliminary investigation reveals a rich diversity of spider fauna associated with the habitat mosaic in and around Chandubi Tectonic Lake in Kamrup (Rural) District of Assam, covering riparian forests, marshy-lands, tea-gardens, paddy agro-fields, scrublands, and secondary scrub vegetation. The study also highlights the importance of conserving green spaces around the lake that are increasingly threatened by land-use change. Overall, these findings provide a foundational reference for long-term biodiversity monitoring and conservation planning in lower Assam.

Keywords: Araneae, Guild structure, Northeast India, Chandubi Tectonic Lake, Diversity

Abstract ID: ICTACSR 2025/TS4/OP 11

Documentation of Edible Hydrophytes of Baksa District, BTR, Assam

Nilakshi Ramchiary*
Assistant Professor, Jawaharlal Nehru College, Boko, Kamrup, Assam
*Correspondence: nilakshiramchiaryn@gmail.com

Abstract

The groups of plants that specifically grows on the water bodies are called as Hydrophytes. Hydrophytes are the chief primary producers in the aquatic ecosystem and also plays an important role in human life. Baksa district is one of the four Districts comes under Bodolad Territorial Region situated in the North bank of mighty Brahmaputra comprises enormous aquatic bodies like swamps, ponds, lakes, rivers etc. For authentic documentation, intensive routine exploration has been done in the aquatic bodies of the study area. A large no of Hydrophytes have been reported to be used as human food, medicine and animal fodders. Altogether 75 Hydrophytes have been reported in the present study including 3 aquatic pteridophytes 53 dicots and 19 monocot species respectively. Due to harsh anthropogenic activities, a number of aquatic bodies are declining in the study area prompting loss of aquatic diversity.

Keywords: Hydrophytes, Baksa, human food, herbarium, anthropogenic activity.

Abstract ID: ICTACSR 2025/TS4/OP 12

A Preliminary Assessment of Water Quality by Phytoplankton Diversity of Two Beels of Kokrajhar District, Assam, India

Puja Singh Das and Jwngma Narzary*
Department of Zoology, Science College, Kokrajhar-783370, Assam, India
*Correspondence: jwngma@rediffmail.com

Abstract

Planktons are indicator of water quality. The present study was carried out to investigate the water quality by studying phytoplankton diversity of two beels namely Deeplai beel and Dheer beel of Kokrajhar district, Assam, India. A total of 7 families of phytoplanktons was recorded from the two beels. The diversity of plankton's family was found more in Dheerbeel than Deeplai beel. In Dheerbeel 5 families of phytoplanktons - Chlorophyceae, Bacillariophyceae, Cyanophyceae, Xanthophycea Zygnematophyceae were recorded whereas in Deeplaibeel only 3 families of phytoplanktons- Chlorophyceae, Bacillariophyceae and Cyanophyceae were recorded. It was revealed that Deeplaibeel has a rich diversity of phytoplanktons than Dheerbeel. In the present study, many organic pollution tolerant species were recorded. Such organic pollution indicator species were found more in Deeplaibeel (*Pediastrum sp*., *Closterium sp*., *Scenedesmus sp*., *Ankistrodesmus sp*., *Synedra sp.*, *Frustulia sp*., *Pinnularia sp*., *Nitzchia sp*.) than Dheerbeel (*Closterium sp*., *Synedra sp*., *Frustulia sp*., *Navicula sp*., *Pinnularia sp*., and *Surirella sp*).

Key words: Deeplai, Dheer, Diversity, Plankton

Abstract ID: ICTACSR 2025/TS4/OP 13

Lepidopteron Pollination of an endangered terrestrial orchid *Calanthe sylvatica* (Thouars) Lindl.

Bhaskar Buragohain*
Department of Botany, Mariani College, Mariani, Jorhat, Assam, India, 785 634
*Correspondence: bhaskar.mariani@gmail.com

Abstract

The pollination biology of an endangered terrestrial orchid was studied in their natural habitat (Holongapar Gibbon Wild-Life Sanctuary; 26°40″N, 94°21″E, Jorhat, Assam) for several years. Flowering of this orchid occurs between July to October. This orchid is grow luxuriantly on the humus rich forest floor beside the small and medium size streams inside the sanctuary. Flowers bright purple-violet in colour, mildly scanted like urine and showy. Labellum trilobed and ends with a long, curved tubular spur c. 4cm in length. The column short united extensively with the labellum, pollinia 8 present in two groups. Stigma lateral represented two shallow cavities filled with concave shaped stigmatic exudates. Rostellum is covered by the viscidium just above the opening of the spur opening. The spur remains dry without any trace of nectar. During day light various genera of bees like *Anthophor*a and *Xylocopa*, moths of the genus *Macroglossum*, black ants, slugs and butterflies like *Notoicripta curvifascia* (Restricted demon), *Pelopidas sinensis* (Large Branded demon), and *Udaspes folus* (Grass demon), *Papilio polytes* (Common mourmon), *P. helenus* (Red Helen) were observed to forage the flowers of *C. sylvatica*. During the observation it has been observed that only the Butterflies can pollinate the flowers. While the butterflies insert their proboscis into the long spur of the flowers in search of nectar and pull back the proboscis, it rubs the protruding portion of the viscidium and the sticky viscidium attached on the proboscis. During repeat visit carrying the pollinaria the viscidium is stuckde by the rostellum and the pollinia are mounted over the sticky stigmatic exudates, thus accomplished the process of pollination. Pollinaria removal takes place from c. 70% of flowers immediately after opening. Pollination success and reproductive success is low c.1.58%.

Key words: *Calanthe sylvatica*, rewards, deception, pollinaria, pollinator, pollination.

Abstract ID: ICTACSR 2025/TS4/OP 14

A preliminary study on the moth diversity in Parbatipur, a residential area in Sonari Town and their ecological importance

Amrita Mech*
Assistant Professor, Dept of Zoology, Sonari College, Sonari.
*Correspondence: amritamech9@gmail.com

Abstract

A preliminary study was conducted to assess the moth fauna diversity in Parbatipur, a residential area in Sonari town. The study area is bordered by the Towkak river to its south and rice and tea plantations were present in the vicinity. A total of 96 species of moths were recorded and their importance was studied. The families Erebidae and Geometridae dominated followed by Crambidae and Noctuidae. They included nocturnal pollinators, defoliators, stem borers, agricultural pests and most importantly environmental indicators. This record and documentation would surely help in preservation of the environment.

Keywords: moth, diversity, pests, environmental indicators.

Abstract ID: ICTACSR 2025/TS4/OP 15

Impact of anthropogenic disturbance on carbon stock in a forest of Aizawl district, Mizoram

Elizabeth Nemhoihkim*, BP Mishra
Department of Environmental Science, Mizoram University, Aizawl-796004, Mizoram, India
*Correspondence: elihoihkim@gmail.com;

Abstract

The study examines the effects of anthropogenic disturbance on carbon stock along forest stands with varying levels of disturbance: undisturbed (UD), moderately disturbed (MD), and highly disturbed (HD). Total carbon stock declined from 241.26 t/ha in UD to 166.275 t/ha in MD and 60.667 t/ha in HD stands, representing a 75% reduction from UD to HD. This decline was primarily driven by human activities such as shifting cultivation, grazing, logging and land clearing that severely compromise forest carbon storing potential. Trees stored 182.488 t/ha carbon in UD, 112.604 t/ha in MD and 23.738 t/ha in HD forests, an 87% decline attributed to loss of mature trees. Species composition shifted along the disturbance gradient, with *Ostodes paniculata* and *Quercus floribunda* dominating UD forest, *Drimycarpus racemosus* and *Quercus xylocarpa* in MD forest, while *Schima wallichii* and *Macaranga denticulata* dominated the HD forest stand. Litter carbon experienced a decline from 0.993 t/ha in UD to 0.087 t/ha in HD, representing over 90% reduction, which may be a result of reduced litter input or faster decomposition in disturbed conditions. Soil organic carbon (SOC) decreased from 57.694 t/ha in UD to 36.5 t/ha in HD. The carbon storage in shrubs increased from 0.06 t/ha (UD) to 0.309 t/ha (MD), while non-woody vegetation carbon rose from 0.025 t/ha (UD) to 0.106 t/ha (HD), which resulted from enhanced light availability and reduced competition following canopy opening and tree removal, which favoured the growth of fast-growing understorey vegetation. These findings underscore anthropogenic disturbance as a critical factor reducing forest carbon sequestration potential.

Keywords: anthropogenic disturbance, forest carbon stock, tree biomass, soil organic carbon

Abstract ID: ICTACSR 2025/TS4/OP 16

Study of Land use-land cover pattern of Kaoijana reserve forest, Assam, India- One of the important isolated habitats of Golden Langur (*Trachypithecus geei*)

Anindita Chakravarty*
Assistant Professor, Department of Zoology, Bijni College, Bijni
*Correspondence: Anindita.chakravarty548@gmail.com

Abstract

The term "land cover" refers to the surface features of the earth, including bare soil, water, plants, and urban infrastructure. Land cover identification provides the baseline data for tasks such as change detection analysis and thematic mapping. The term "land use" describes how the land is utilized, such as for agriculture, wildlife habitat, or recreation. When combined, the term "Land Use/Land Cover" (LU/LC) generally refers to the classification of natural features and human activities on the landscape over a specific period using accepted scientific and statistical methods. Kakoijana Reserve Forest (26 ° 22' N- 26 ° 21' N and 90 ° 33' E - 90 ° 34' E) is an important habitat for the golden langur (Trachypithecus geei), located in the western part of Assam, India. The study site is a hilly area covering 17. 19 km^2, completely isolated from the primary habitat of the golden langur and surrounded by 22 villages. Satellite imagery from 2013 was analysed to categorize different habitat types with remote sensing and geographic information system (GIS) tools. For ground verification, a grid map measuring 500 m x 500 m was created using ArcGIS 9. 9.3 software. The centre points of each grid were visited, and GPS coordinates were collected along with detailed information on vegetation. The results indicate seven different land cover types: deciduous moist mixed dense forest, deciduous moist mixed open forest, scrubland, degraded land, edge matrix with secondary vegetation, and plantation areas. Vegetation maps of various landscape types were prepared. Analysis revealed that the area is mainly covered with 37. 29% moist mixed deciduous open forest, followed by 33. 97% scrub forest, 9. 54% moist mixed dense forest, 9. 08% degraded forest, 7. 04% edge matrix and secondary forest consisting of Sal, Teak, bamboo, and rubber species, along with some man- made horticulture gardens inside the forest. Water bodies occupy 1. 11%, while croplands and non- forest areas account for 1. 98%. Total 97 tree species, along with 19 shrubs, three grasses (bamboo), and 20 climbers and lianas, were recorded in the study area, along with several herb species. From the study, it was found that about 43% of the forest consists of scrub and degraded land. Since the forest is a crucial habitat for the arboreal

golden langur, planting non-timber and non-economic food plants in scrub and degraded areas is a priority. Habitat restoration through several habitat management activities and community conservation efforts is essential.

Keywords: Kakoijana reserve forest, landscape matrices, Land Use-Land Cover pattern, satellite imagery, vegetation map.

Abstract ID: ICTACSR 2025/TS4/OP 17

Diversity and Distribution of Bulbuls – The Song Birds in North Bengal

Raja Routh*
Department of Zoology, Kalimpong College, Kalimpong, West Bengal, India
*Correspondence: rajarouthbhbl@gmail.com

Abstract

The present study highlights the diversity, distribution, and ecological roles of Bulbul birds (Family: Pycnonotidae) in the diverse habitats of North Bengal. The region, comprising the Terai-Dooars plains and the lower Himalayan foothills, supports a wide range of avifaunal species due to its varied topography and climatic conditions. Field observations and literature reviews confirm the occurrence of several Bulbul species, including the Red-vented Bulbul (Pycnonotus cafer), Red-whiskered Bulbul (P. jocosus), Himalayan Bulbul (P. leucogenys), Black Bulbul (Hypsipetes leucocephalus), and Ashy Bulbul (Hemixos flavala).

These species exhibit clear preferences for specific habitats — the Red-vented and Red-whiskered Bulbuls dominate gardens, tea plantations, and urban fringes, whereas the Himalayan and Black Bulbuls are confined mainly to forested and hilly regions. The Ashy Bulbul, though less common, prefers moist subtropical forests. Bulbuls are ecologically significant as seed dispersers, pollinators, and insect controllers, contributing to the regeneration and maintenance of forest ecosystems.

The study also identifies key factors influencing their distribution, such as altitude, vegetation type, food availability, and human activities. Increasing urbanization, pesticide use, and habitat degradation pose emerging threats to their diversity and abundance. The findings emphasize the need for continuous monitoring, conservation of natural habitats, and awareness among local communities to ensure the survival of these melodious songbirds. Overall, the diversity and distribution of Bulbuls serve as vital indicators of ecological health and environmental balance in North Bengal.

Keywords: Bulbul diversity, North Bengal, habitat distribution, avian ecology.

Abstract ID: ICTACSR 2025/TS4/OP 18

Coexistence or Conflict? A Doctrinal Study on Human–Wildlife Interactions and Environmental Jurisprudence

Abhisek Ghosh[1], Anuradha Chakraborty[2]
[1]Department of Law, Brainware University, Kolkata, West Bengal 700125, India
[*]Correspondence: info6412@gmail.com anuradhachakraborty126@gmail.com

Abstract

The rise in human-wildlife conflict (also known as HWC) can be attributed to a number of factors, including climate change, the destruction of habitat, and development. HWC is harmful to crops, causes death to animals, and poses a threat to the health of humans. "Coexistence or Conflict?" is the title of the research undertaking. In the book titled "A Doctrinal Study on Human-Wildlife Interactions and Environmental Jurisprudence," the author takes a doctrinal approach to investigate the impact that environmental legislation, constitutional clauses, and judicial conceptions have on the resolution of human-animal disputes in India. It examines the tension that exists between the right of individuals to earn a living and the imperative to safeguard the welfare of animals for the sake of the global community. The obligations that come with CITES and CBD are discussed, in addition to the ways in which institutions function and the methods by which salaries are received. In this article, the primary concerns are discussed, and suggestions are made regarding how to make cohabitation more manageable. These include modifying the law and providing individuals with more opportunity to engage.

Keywords: Human–Wildlife Conflict, Environmental Jurisprudence, Wildlife Protection Law, Ecocentric Approach, Community Participation

Abstract ID: ICTACSR 2025/TS4/OP 19

Impact of Dam Construction on Living Fish: A study with reference to Gumti River, Tripura

Trishadri Banik
Department of Zoology, MBB College, Agartala, Tripura
*Correspondence: trishadribanik@gmail.com

Abstract

The construction of the dam to form the Gumti (Dumboor) Reservoir in 1977 had several notable impacts on the river's ecosystem and fish population, consistent with the general effects of large dams on riverine systems. Dams in Tripura, particularly the Gumti (Dumboor) Dam, have significant negative impacts on native fish populations by altering the natural river ecosystem, blocking migration routes, and changing water quality and flow regimes. Of course, the construction of a dam fundamentally and permanently alters a river, creating a cascade of significant impacts on local fish populations. While the effects are overwhelmingly negative for native river-dwelling fish, they also create a new, artificial environment with different opportunities. A dam acts as a hard barrier that fragments the river, degrades its habitat, and alters its very chemistry. While it may create a new, artificial reservoir fishery, it does so at the expense of the native, river adapted fish, many of which are pushed to the brink of extinction. The main objective of this paper is to highlight the impacts and measures taken to address of the study. This study is descriptive research and the data has been collected from various sources like books, journals, and different websites. Key words: Fish, Dams, Gumti River, Tripura, Artificial Reservoir Fishery.

Abstract ID: ICTACSR 2025/TS5/OP 01

Impact of Microplastics and Nanoplastics on Plant–Microbe Interactions in Soil Ecosystems

Ashim Das Astapati [1] and Soumitra Nath [2,*]
[1] Department of Botany, Gurucharan University, Silchar-788004, Assam, India
[2] Department of Biotechnology, Gurucharan University, Silchar-788004, Assam, India
*Correspondence: nath.soumitra1@gmail.com

Abstract

Plant–microbe interactions form the backbone of soil fertility and crop productivity, driving nutrient cycling, stress resilience, and ecosystem stability. However, the rapid rise of microplastics (MPs) and nanoplastics (NPs) in terrestrial environments poses an emerging threat to these critical relationships. Recent reports show agricultural soils in India containing around 1,500 particles/kg from 2021 to 2024 and agricultural soils in China and Europe containing 1,000 to 2,500 particles/kg from 2020 to 2023. These contaminants alter soil structure and water dynamics and directly influence microbial communities and plant physiology. Evidence indicates that MPs and NPs reduce microbial diversity, disrupt community composition, and impair enzymatic activities essential for carbon and nitrogen cycling. Polystyrene MPs have been shown to suppress dehydrogenase and phosphatase activities while promoting urease activity, leading to nutrient imbalances. MPs physically and chemically affect the rhizosphere, where symbiotic associations such as arbuscular mycorrhizal fungi (AMF) and nitrogen-fixing bacteria are crucial for plant health. Reduced colonization rates of AMF and altered nodulation in legumes have been documented under microplastic stress, resulting in diminished nutrient uptake and crop biomass losses of up to 25-30 %. Plants experience impaired germination, altered root morphology, and reduced chlorophyll content when grown in MP-contaminated soils. Combined with changes in microbial function, these effects compromise plant growth, resilience, and yield. Recent findings of nanoplastic translocation into root tissues and edible plant parts raise additional concerns for food security and human exposure. Future directions should focus on standardized methods for soil microplastic quantification, long-term studies on rhizosphere responses, and innovative mitigation strategies to preserve beneficial plant–microbe interactions and ensure sustainable agriculture.

Keywords: Microplastics; nanoplastics; soil microbiome; plant–microbe interaction; sustainable agriculture

Abstract ID: ICTACSR 2025/TS5/OP 02

Areca Nut Waste-Derived Lignin Nanoparticles: Antioxidant and UV Shielding Properties

Nirupam Das[1], Pratap Kalita[2], and **Lalduhsanga Pachuau[1]***
[1]Department of Pharmaceutical Science, Assam University, Silchar, India
[2]Pratiksha Institute of Pharmaceutical Science, Guwahati, India
*Correspondencel: aduhapc@gmail.com

Abstract

This study investigates the extraction of lignin from areca nut husk, which is often considered agricultural waste. A proximate analysis was conducted to assess the husk's composition, and the extracted lignin was characterized using FTIR, TGA, and XRD techniques. Lignin nanoparticles were synthesized *via* a simple nanoprecipitation method, and their antioxidant activity was evaluated through total phenolic content and various scavenging assays (DPPH, ABTS, nitric oxide), as well as reducing power analysis. The UV protection properties were assessed by calculating their Sun Protection Factor (SPF) values following the Mansur equation. Physicochemical investigation shows that the isolated lignin exhibits typical lignin characteristics. The results indicate that areca nut husk is a significant source of bioactive lignin, with the nanoparticles displaying substantial antioxidant activity and SPF values ranging from 2.75 to 16.6 at different concentrations. This research highlights the potential of areca nut husk as a sustainable resource for the healthcare and cosmeceutical industries, fostering the development of innovative value-added products while reducing waste and contributing to economic sustainability.

Keywords: Arecanut husk; Lignin nanoparticles; Valorization; Antioxidant; Sun Protection Factor.

Abstract ID: ICTACSR 2025/TS5/OP 03

Metabolic Changes in Tea Seedlings During Aluminium Stress and Possible Implications of Biochar Amendment

Seuj Priya Borah[1]*, Chira Ranjan Bhattacharjee[2], Arun Jyoti Nath[3], Shuvasish Choudhury[1]
[1]Department of Life Science and Bioinformatics, Assam University, Silchar 788011, India
[2]Department of Chemistry, Assam University, Silchar 7880011, India
[3]Department of Ecology and Environmental Science, Assam University, Silchar 7880011, India
*Correspondence: seujpriyaborahjrt15@gmail.com

Abstract

Soil acidity has been a grave concern across the globe as it directly impacts agricultural sustainability and food security. Tea is widely consumed beverages globally and also an important cash crop in many south-east Asian counties. Tea preferentially grows in acidic soil, however, due to extensive use of inorganic amendments to boost its productivity, there has been a significant increase in soil acidification. Thus, there is an unrelenting need to develop sustainable strategies to improve tea growth under acidic conditions. The present study assesses the role of biochar derived from tea processing waste in the mitigation of Al^{3+} induced stress responses in tea seedlings. For Al^{3+} stress imposition, tea seedlings were exposed to 4mM of $AlCl_3$ enriched soil. The effective biochar dose was amended at 3% kg^{-1} concentration in Al^{3+} infested soil. The seedlings were harvested for analysis after 90 days of Al^{3+} exposure. HRLC-QToFMS based metabolomic study was employed to investigate the role of biochar in Al^{3+} stress mitigation. The analysis reports upregulation of amino acids (Tryptophan,Proline,Vallyl glycine), sugar (D-glucose, L-Arabinose) that play significant role in regulating cellular homeostasis. Moreover, biochar addition enhances expression of several crucial metabolites intricately associated with ROS scavenging mechanism and maintaining plasma membrane integrity during Al^{3+} exposure. The result suggests prominent role of tea processing waste biochar in Al^{3+} stress mitigation in tea seedlings.

Keywords: aluminium, biochar, tea, metabolomics, stress, soil acidification

Abstract ID: ICTACSR 2025/TS5/OP 04

Effect of Magnesium (Mg) and Boron (B) Supplementation on Physiological and Metabolic Adjustments Under Arsenite (As^{3}□) Stress in Developing Rice Seedlings

Padmasri Ghosh[1*], Shuvasish Choudhury[1,]
[1]Department of Life Science and Bioinformatics, Assam University, Silchar 788011, India
*Correspondence: padmasrighosh@gmail.com

Abstract

Arsenic contamination of rice agroecosystems poses a serious threat to plant growth, yield and food safety. In the present study, weevaluated the physiological, biochemical, and metabolic responses of rice (*Oryza sativa* L. cv. Gomati) seedlings underarsenite As^{3}□ stress and examined the ameliorative role of magnesium (Mg) and boron (B) supplementation in stress mitigation. Exposure to 50 µM As^{3}□ inhibited growth, induced chlorosis and increased oxidative stress, which was evidenced by overproduction of reactive oxygen species(ROS), lipid peroxidation, oxidative protein damage.The supplementation with excess Mg and B (2X), substantially alleviated these effects by enhancing seedling growth, limiting ROS overproduction, and restoring antioxidant enzyme activities (CAT, APX, SOD, GPX), along with increased levels of non-enzymatic antioxidants (AsA and GSH). The ^{1}H-NMR based metabolomic profiling revealed As^{3}□ mediated metabolic disruption, especially in roots, which was differentially modulated by Mg and B supplementation. Multivariate and correlation analyses further highlighted the stronger protective effect of B compared to Mg. Overall, the results demonstrate that Mg and B supplementation provide anutrientbasedapproach for improving rice tolerance to arsenic toxicity.

Keywords: Arsenite stress, *Oryza sativa*, magnesium, boron, antioxidant defense, 1H NMR metabolomics, ROS, nutrient management.

Abstract ID: ICTACSR 2025/TS5/OP 05

The Impact of Ecotourism on Biodiversity Conservation and Indigenous livelihood in Dima Hasao, Assam, Northeast India.

Lumgailiu Newme, Soumendra Nath Biswas
Assam University, Department of Hospitality and Tourism Management
*Correspondence: biswassoumendra@gmail.com

Abstract

The hill district of Dima Hasao in Assam, Northeast India, is a region rich in biodiversity and home to various indigenous communities. Their livelihoods are closely tied to natural resources. This study looks at how ecotourism affects biodiversity conservation and the economic well-being of indigenous people in Dima Hasao. When managed responsibility, ecotourism can support sustainable development by aligning ecological preservation with local economic. The research looks at how ecotourism helps protect the district's unique landscapes and ecosystems. At the same time, it offers new job options for indigenous communities that rely on natural resources. Both secondary and primary data has been used for the research to identify pattern of participation in ecotourism activities, temporal trends in biodiversity and the socio-economic implications for participation household using fieldwork reports, interviews, observations and reviewing of relevant literatures. The study unveiled that ecotourism has increased awareness and in turn help to conserve biodiversity hotspots and sacred groves. It resulted in the recovery of degraded natural ecosystems and forests and reduced destructive activities such as hunting and deforestation. Ecotourism has provided indigenous communities with alternative means to earn money through handicraft, cultural displays, guided treks and homestays. This has led to strengthened district local governance and improved livelihood. Nonetheless, with those comes challenges in the district. These range from uneven benefits, inadequate infrastructure and the threat of cultural commodification. All of these challenges require the enactment of integrated local capacity building and an inclusive policy framework. This study brings out the potential of ecotourism in SDGs achievement, particularly SDG 15 (Life on Land), SDG 1 (No Poverty), and SDG 8 (Decent Work and Economic Growth). It is a plea for greater community participation, well considered tourism planning and environmental education in the region. These measures would ensure sound environment and equitable economy in Dima Hasao district of Assam in Northeast India.

Keywords: Ecotourism, Biodiversity Conservation, Indigenous Livelihood, Sustainable Development, Dima Hasao

Abstract ID: ICTACSR 2025/TS5/OP 06

Transforming Environmental Pollution into Resource by Harnessing Naturally Occurring Algal Blooms from Assam for Sustainable Development

Pushpita Nath and Jayashree Rout*
Department of Ecology and Environmental Science, Assam University, Silchar-788011, India
*Correspondence: jayashreerout8@gmail.com

Abstract

The life cycle analysis of high value products derived from a freshwater bloom forming alga *Botryococcus braunii* was done and its bloom forming biomass was evaluated to understand its sustainability as a feedstock for an integrated biorefinery. The algal bloom was collected from natural ponds of Cachar district, Assam, India. So, external or artificial energy, fertilisers and CO□ inputs during growth were null, distinguishing this system from conventional algal cultivation in bioreactors. The process began with natural bloom formation in waterbodies under favourable light, temperature, and nutrient conditions, followed by surface harvesting and low-energy drying, yielding about 4 g L□^{1} of dry biomass from 32 g L□^{1} of wet biomass. This dry biomass was fractionated to produce biodiesel (12.7 mg g□^{1}), hydrocarbons including botryococcenes and squalene, pigments and the biopolymer polyhydroxybutyrate (11 mg g□^{1}). While residual matter can be utilised to produce biochar, biogas, etc. Nutrient recycling and waste minimisation within the process eliminated external fertiliser dependence and greenhouse gas emissions, enhancing sustainability. This integrated approach illustrates a circular bioeconomy model where algal bloom biomass provides renewable energy and high-value co-products with minimal ecological footprint. This highlights the potential of naturally occurring algal blooms to support sustainable energy and material production.

Keywords: Algal bloom, *Botryococcus braunii,* sustainable energy, life cycle analysis, high value products

Abstract ID: ICTACSR 2025/TS5/OP 07

A study of inequality in the educational standard of Assam with reference to Barak Valley

Joyeeta Dey Purkayastha[1] and Niranjan Roy[2*]
[1]Department of Economics, Assam University, Silchar, Assam-788011.
[2]G.C. University, Silchar, Assam-788004.
*Correspondence: dasjoyeeta610@gmail.com, roy_niranjan@yahoo.com

Abstract

Education is the fundamental driving force of socio-economic development and it thus plays a major role in reducing inequalities, boosting up economic growth and empowering societies specially marginalised communities. This research paper examines the inequalities in the educational standards among districts of Assam and special emphasis is given on the gap of educational attainment index between Assam and Barak Valley. The study employs secondary data analysis from Government reports, national surveys, Statistical handbooks etc. focusing on key educational indicators such as literacy rates, enrolment trends, drop out patterns, gross enrolment ratio, net enrolment ratio etc. To bridge the gap in education in between Assam and Barak Valley, policy interventions must focus on improving educational quality, expanding Govt. participation, addressing socio-cultural barriers and strengthening the link between education and socio-economic development.

Keywords: Socio-economic development, policy interventions, Govt participation.

Abstract ID: ICTACSR 2025/TS5/OP 08

Morphological Studies on Pathogenic Fungi Associated with Three Herbaceous Weeds in Cachar District, Assam, India

Debasish Deb*
Department of Botany, Cachar College, Silchar, Assam, India
*Correspondence: debasishdeba11@gmail.com

Abstract

Dispersal of pathogen propagules is a crucial step in determining the occurrence of an epidemic, and collateral plant hosts are one of the primary sources of phytopathogen inoculum dispersal. Weeds in agroecosystems can serve as collateral hosts of phytopathogenic mitosporic fungi. These weeds, while growing next to agricultural fields, promote spatial and long-term dispersal of plant pathogenic fungi. Under favourable environmental conditions, fungi thriving on weeds can disseminate to crops, posing potential risks to crop productivity. Therefore, to assess the pathogenic fungi associated with weeds, periodic field surveys were conducted in Cachar District, Barak Valley, Assam. Field observations and subsequent analysis revealed the occurrence of pathogenic fungal species that infected three herbaceous weeds within the study area. Two erysiphaceous fungal pathogens, *Podosphaera xanthii* (Castagné) Braun & Shishkoff. and *Oidium heliotropii-indici* Sawada., were found to cause powdery mildew symptoms on *Xanthium strumarium* L. and *Heliotropium indicum* L., respectively. Additionally, mitosporic fungi *Cercospora ipomoeae* Winter. was ascertained to cause leaf spot symptoms on *Hewittia malabarica* (L.) Suresh. For each of the three fungal species, the symptoms observed on their hosts were documented, and each species was morphotaxonomically analysed. According to literature survey, this is the first report on the occurrences of these anamorphic fungal species on their corresponding weed hosts in Assam.

Keywords: Powdery mildew, anamorphic fungi, caespituli, morphotaxonomy.

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Response of Crop Plants due to Climate Change

Shwetosmita Nath*
Department of Botany, Cachar College, Silchar
*Correspondence: shetodhope2008@gmail.com

Abstract

In the global context, climate change is affecting plant responses, particularly in the field of agriculture. One of the major responses includes increased yield losses in crop plants (e.g., crop plants such as rice, barley, and wheat), thus affecting food security; it is predicted that CO_2 concentration will reach 730-1000 ppm by the end of the century, which may result in an increase in temperature by 1°-3°C. Precipitation patterns are also changing, resulting in more drought events in many states of India and worldwide. Plants are affected not only in morphological traits but also suffer from developmental and physiological crises. Global warming and higher atmospheric CO_2 concentrations are expected to deepen the global malnutrition crisis in several ways - by making food less nutritious, decreasing overall food quality, and increasing costs. Key food sources like wheat, rice, and soy contain fewer vital nutrients (like iron, zinc, and protein) when grown under these altered climatic conditions. The impact will be most severe in developing countries where people depend on a small number of these staple crops for their nutritional needs. There is a need to focus research on plants' mechanisms to mitigate extreme climate change and maintain nutrient quality across the global platform to achieve sustainability.

Keywords: Climate change, plant, response, stress.

Abstract ID: ICTACSR 2025/TS5/OP 10

Flood Frequency Analysis of South Bank Region of the River Brahmaputra, Assam, India

Abhijit Bhuyan*
Dept. of Commerce, C.K.B. College, Teok
*Correspondence: abhijitckbc@gmail.com

Abstract

In this paper the regional flood frequency analysis has been carried out by using the LH-moment parameter estimation method. For this purpose, we use three probability distributions namely generalized extreme value (GEV), generalized Pareto (GPA) and generalized logistic (GLO) for our study. Screening of data and homogeneity are tested by using discordancy and heterogeneity measure respectively. The two goodness-of-fit tests such as Z-statistics criteria and LH-moment ratio diagrams are used for identification of best fitting distribution and the level of LH-moment. It has been observed that no site is found to be discordant and the region is found to be a homogeneous one. The GEV distribution with level 1 of LH-moment (i.e. L1-moment) is identified as best fitting distribution for our study region. The regional flood frequency relationships are developed for both gauged and ungauged catchment areas of south Brahmaputra region.

Keywords: Probability distribution, LH-moment, Z-statistics criteria, LH-moment ratio diagram

Abstract ID: ICTACSR 2025/TS5/OP 11

Urban Heat Islands and Their Ecological Impact: Effects on Insect Activity, Plant Phenology, and Pollination

Sandeepa Agarwalla*
Assistant Professor, Department of Botany, Gargaon College, Sivasagar, Assam
*Correspondence: sandeepaagar94@gmail.com

Abstract

Urbanization is rapidly transforming natural landscapes, giving rise to the Urban Heat Island (UHI) effect, where cities exhibit significantly higher temperatures than surrounding rural areas. This localized warming alters microclimatic conditions, directly influencing ecological processes. Insects, being ectothermic organisms, exhibit changes in activity, distribution, and life cycles under elevated urban temperatures. Similarly, plants respond to UHI through shifts in phenological events such as earlier flowering, leafing, and fruiting, which can disrupt seasonal synchrony. These alterations have cascading impacts on pollination dynamics, as mismatches between plant phenology and pollinator availability increasingly emerge in urban environments. While some generalist species may adapt and even benefit from extended activity periods, specialists and temperature-sensitive taxa often decline, leading to changes in biodiversity and pollination networks. This review synthesizes current knowledge on the influence of UHIs on insect activity, plant phenology, and pollination, highlighting both ecological risks and potential adaptive responses. Understanding these interactions is crucial for developing sustainable urban planning strategies that support biodiversity, maintain ecosystem services, and ensure resilience in the face of ongoing climate change.

Keywords: Urban Heat, ecological process, phenology, biodiversity

Abstract ID: ICTACSR 2025/TS5/OP 12

Neighboring River Basins Shape Weak Genetic Boundaries of Armorhead Catfishes in the Indo-Burma Biodiversity Hotspot

Angkasa Putra[1], Sang Van Vu[2], Sarifah Aini[1], Hyun-Woo Kim[3,4,5,6,*], Shantanu Kundu[1,7,8,*]
[1]Interdisciplinary Program of Marine and Fisheries Sciences and Convergent Technology, Pukyong National University, Busan 48513, Republic of Korea.
[2]Faculty of Biology, University of Science, Vietnam National University, Hanoi, Hanoi 11400, Vietnam.
[3]Department of Marine Biology, Pukyong National University, Busan 48513, Republic of Korea.
[4]Marine Integrated Biomedical Technology Center, National Key Research Institutes in Universities, Pukyong National University, Busan 48513, Republic of Korea.
[5]Research Center for Marine Integrated Bionics Technology, Pukyong National University, Busan 48513, Republic of Korea.
[6]Department of Biology, Faculty of Science and Technology, Airlangga University, Surabaya 60115, Republic of Indonesia.
[7]Ocean and Fisheries Development International Cooperation Institute, College of Fisheries Science, Pukyong National University, Busan 48513, Republic of Korea.
[8]International Graduate Program of Fisheries Science, Pukyong National University, Busan 48513, Republic of Korea.
*Correspondence: kimhw@pknu.ac.kr, shantanu1984@pknu.ac.kr and shantanu1984@gmail.com

Abstract

The Indo-Burma region is recognized as a global biodiversity hotspot, containing exceptionally high freshwater fish richness and elevated levels of endemism, yet the diversity, systematics, and population genetics of its ichthyofauna remain poorly characterized. This knowledge gap is particularly critical for endemic taxa, as freshwater fishes provide essential ecosystem services and sustain rural livelihoods, while simultaneously being among the most threatened faunal groups due to overexploitation, invasive species, and habitat degradation. Among these, species of the genus *Cranoglanis* (Siluriformes: Cranoglanididae) are confined to Vietnam and southern China, exhibiting persistent taxonomic ambiguities arising from overlapping morphological traits and complex geographic distributions. Specifically, the systematics of *Cranoglanis henrici*, an endemic species of the Red River basin, remain unresolved and subject to ongoing taxonomic debate. To address this issue, the present study employed an integrative framework combining detailed morphological assessment and mitochondrial cytochrome c oxidase subunit I (COI) analysis of *C. henrici* to delineate species boundaries, resolve phylogenetic relationship, identify evolutionarily significant units (ESUs), as well as evaluate genetic diversity and population structure.

Morphologically, the head and snout are long and depressed, while the laterally compressed body shows a dorsal profile that rises toward the dorsal spine before sloping to the caudal peduncle. The supraoccipital and frontal bones are exposed and rugose, eyes are moderately large and lateral, and the subterminal mouth carries villiform teeth in elongate, medially interrupted bands. The body displays silvery-grey to bronze coloration, darker dorsally, lighter ventrally, with fins transparent to reddish-brown, a dark anal margin, and gill membranes free from the isthmus. Conversely, all molecular analyses consistently resolved *C. henrici* as a distinct taxonomic entity from its Chinese congener *C. bouderius* of the Pearl River basin, exhibiting low genetic divergence (1.57–2.28%). The neighbor-joining phylogeny robustly distinguished *C. henrici* from *C. bouderius*, and both species delimitation analyses (Automatic Barcode Gap Discovery and Assemble Species by Automatic Partitioning) uniformly supported the existence of distinct ESUs for each species. The haplotype network analysis also revealed two clearly segregated clusters corresponding to each species, whereas the neutrality tests indicated complex demographic processes driving cryptic diversity and multiple population structures within the Red River basin. This study offered the first molecular insights into *C. henrici* in Vietnam and facilitated a comparative perspective with confirmed *C. bouderius* populations from China. Nevertheless, the detection of shared and unique *C. henrici* haplotypes in Guangxi, China (previously mislabelled as *C. bouderius*) might have reflected misidentification or anthropogenic introduction. This scenario was validated by geological and historical evidence, as the Red and Pearl River basins had never been connected, either in ancient or modern times. Collectively, these findings emphasize the importance of further integrative genomic studies on all *Cranoglanis* congeners, including *C. multiradiatus* from Hainan Island. We also recommend in-depth molecular approaches, encompassing mito-nuclear sequencing and eDNA-based monitoring, to fully elucidate population genetic structures and strengthen evidence-based conservation strategies. Expanding both geographic and genomic sampling will not only refine systematics but also inform sustainable management for endemic freshwater fishes in the Indo-Burma biodiversity hotspot.

Keywords: Endemic catfishes; Systematics; Phenotypic; Matrilineal phylogeny; Conservation genetics

Abstract ID: ICTACSR 2025/TS5/OP 13

A Novel Approach to Cellulose Isolation from Kouna Fibres and Its Physicochemical Characterization

Kshetrimayum Leimalembi Chanu* and Amit Seth[1]
Department of Life Sciences (Botany), Manipur University, Canchipur-795003, Manipur
*Correspondence: leimalembi00@gmail.com

Abstract

The present work reports a novel and sustainable approach for isolating and characterising cellulose from *Schoenoplectus lacustris* (L.) Palla (locally known as Kouna), a wetland plant traditionally utilised in handicraft production in Manipur, India. In this study, the trimmed residual biomass generated during handicraft processing, which is usually discarded as waste, was effectively valorised as an inexpensive substrate for the production of high-quality cellulose. This approach not only adds value to handicraft by-products but also contributes to resource recycling and sustainable material development. The cellulose isolation process involved sequential alkali pretreatment and bleaching steps. Alkali pretreatment efficiently removed hemicellulose fractions, and subsequent bleaching successfully eliminated lignin, yielding cellulose of high purity. The obtained cellulose was comprehensively characterised to confirm its structural and functional properties using multiple analytical techniques. Fourier Transform Infrared Spectroscopy (FTIR) revealed the elimination of non-cellulosic components, as evidenced by the reduction of absorption bands at 1730 cm^{-1} (C=O stretching of hemicellulose), 1508 cm^{-1} (aromatic skeletal vibration of lignin), and 1241 cm^{-1} (C–O–C stretching of hemicellulose/lignin). X-ray Diffraction (XRD) analysis demonstrated a significant increase in crystallinity, with a crystallinity index reaching up to 69.56%, confirming the efficiency of the isolation process. Scanning Electron Microscopy (SEM) micrographs showed clear disruption of the fibre surface, exposing bundles of cellulose microfibrils with diameters in the range of approximately 2–8 µm. Thermal Gravimetric Analysis (TGA) further confirmed the stability of the isolated cellulose, with a distinct degradation peak observed at 345 °C, indicating enhanced thermal resistance. This study highlights Kouna as a novel, eco-friendly, and underutilised alternative source of cellulose. The work demonstrates the potential of transforming agro-handicraft waste into high-value functional materials, thereby supporting environmental sustainability, wetland resource management, and promoting regional economic development through green technology.

Keywords: Kouna fibres, *Schoenoplectus lacustris*, Cellulose, Agro handcraft waste, and Sustainable biomaterials

Abstract ID: ICTACSR 2025/TS5/OP 14

SaffronParts: A Dataset and Model-Agnostic Benchmark for Maturity-Aware Saffron Flower Detection

Heena Mushtaq Bhat*[1], Sajid Yousuf Bhat[1],
[1]Department of Computer Science, University of Kashmir, Srinagar (J&K), India
*Correspondence: hinnabhat321@gmail.com

Abstract

Saffron is one of the most expensive spices in the world. However, manual harvesting of saffron flowers is highly laborious and time-consuming. To facilitate the automatic harvesting of this highly sought-after agricultural product, we must discriminate between closed and open saffron flowers with visible saffron strands. This paper establishes a standardised benchmark for saffron part detection by introducing **SaffronParts**, a fresh annotated dataset comprising 2134 images with 1,2470 saffron flowers and 8920 thread annotations. Seven cutting-edge object detection models (RT-DETR and Yolov8-12 versions) are utilised, showing that general-purpose detectors perform well on this agricultural task. With an 89.3% co-detection rate of 0.847 mAP@50 for flower and 0.763 for thread detection, our top-performing model (YOLOv11n) shows practical viability for maturity evaluation. The model-agnostic method lays the groundwork for automated saffron harvesting systems by enabling instant deployment without needing custom architectures.

Keywords: Object detection, agricultural computer vision, saffron cultivation, benchmark dataset, YOLO, RT-DETR

Abstract ID: ICTACSR 2025/TS5/OP 15

Environmental vulnerability to flood in Cachar district of Barak Valley, Assam, India using Remote Sensing and GIS

Sanjivita Paul and Aparajita De*
Dept. of Ecology and Environmental Science, Assam University, Silchar- 788011
*Correspondence: Aparajita.Dehajra@gmail.com

Abstract

Assam is vulnerable to natural catastrophes, with floods, landslides, and other natural hazards being the state's main threats. Cachar district is located in the southernmost part of Assam. We evaluated the flood parameters of Cachar district using remote sensing (RS) and geographic information system (GIS) technologies. The factors defining flood of the study area were identified, further, the spatial factors have been mapped in Arc GIS. A collection of 8 parameters including- slope, elevation, precipitation, topographic wetness index (TWI), land use land cover (LULC), Normalised Difference Vegetation Index (NDVI), distance from river, distance from road derived from Landsat 8 OLI/TIRS image, Shuttle Radar topographic Mission's Digital Elevation Model data (SRTM DEM) from the United States Geological Survey (USGS) have been used. By weighted overlay approach, the susceptible areas were identified and visualized. High flood zones make up 4.44% of the region, while locations at extremely high risk of flooding make up 0.15%. The result showed the central and western parts of Cachar are susceptible to flood hazards due to heavy rainfall and its topography. Also, due to land use/cover change, road building, unplanned urbanisation, dense population, and other infrastructural developments. The results will help in the better management of these areas. The study generated recommendations supported by data that legislators can use to adopt sustainable development strategies, frameworks for incorporating evaluations of environmental vulnerability into regional development and planning, further, the recommended policy viewpoint is appropriate for presenting cumulative effects of both natural and man-made disturbances, which are essential for decision-makers to set improvement goals. It will also help them design and implement new practices to reduce both natural and man-made disturbances of the environment. Therefore, integrating RS, GIS, can effectively measure and analyse and further help the policy makers, planners and emerging responders in terms of disaster management and preparedness.

Keywords: Cachar, Environmental vulnerability, Remote sensing, GIS, Weighted overlay.

Abstract ID: ICTACSR 2025/TS5/OP 16

Factors Affecting Paddy Yield: An Analytical Study of Tripura

Krishna Shi, Alok Sen*
Department of Economics, Assam University
*Correspondence: aloksen@gmail.com

Abstract

The study entitled **"Factors Affecting Paddy Yield: An Analytical Study of Tripura"** examines the socio-economic and agronomic determinants of paddy productivity in the state. The analysis is based on both primary and secondary data, with primary information collected through a household survey of 370 farmers across eight villages in two districts—Sepahijala and South Tripura. Tripura's agrarian structure is predominantly characterized by marginal farmers, with a small proportion of small and medium farmers, making it essential to assess the productivity challenges faced under such fragmented landholding conditions.

The study covers landholding and tenancy patterns, distribution of farm sizes, and household characteristics such as family size, family workforce, and caste-based variations in farming. Irrigation facilities and cropping intensity are analyzed to understand their influence on land use efficiency and yield outcomes. In addition, the research investigates agricultural marketing practices and the role of marketing channels in determining farm income and reinvestment potential.

Special attention is given to the adoption of modern agricultural technologies, as variations in technology use significantly influence productivity levels. The cost and return structure of paddy cultivation is also examined to evaluate economic viability and profitability under different farm categories.

Overall, the study identifies the critical factors influencing yield variability in Tripura and highlights the interlinkages between resource availability, technology adoption, and socio-economic characteristics. By integrating farm-level evidence with structural analysis, the research provides useful insights for improving paddy yield, strengthening farmer livelihoods, and framing policies for sustainable agricultural development in the state.

Keywords: Paddy Yield, Productivity, Marketing Channels, Cost and Return Analysis.

Abstract ID: ICTACSR 2025/TS5/OP 17

Season–Depth Interactions Drive Variability in Soil Moisture, Available Nitrogen, Organic Carbon, and pH in Arecanut Plantations of Meghalaya

Badeishisha Mawkhiew * and David C Vanlalfakawma
Department of Forestry, Mizoram University, Aizawl 796004, Mizoram, India
*Correspondence: badeishisha07@gmail.com

Abstract

This study investigated seasonal (rainy, autumn, winter, spring) and depth-dependent (0–10, 10–20, 20–30, 30–40, 40–50 cm) variations in key soil properties, moisture content, pH, available nitrogen (N), and soil organic carbon (SOC), in an arecanut plantation situated in the hilly region of Meghalaya, Northeast India. Results revealed strong season–depth interactions. Moisture content peaked in the rainy season and declined slightly with depth (e.g., 8.05% at 0–10 cm vs. 8.69% at 40–50 cm). Available N showed the most pronounced stratification and seasonality, highest in the rainy surface layer (94.78 mg kg□¹ at 0–10 cm) and lowest in deeper autumn layers (19.51 mg kg□¹ at 40–50 cm). SOC decreased with depth and varied by season, with surface SOC highest in the rainy season (1.95% at 0–10 cm) and lowest in deeper spring layers (0.55% at 40–50 cm), indicating stronger organic matter accumulation in the topsoil. Soil pH exhibited minor but consistent seasonal variation, ranging from 3.92 in the rainy season to 4.75, reflecting acidic soil conditions typical of the region. Seasonal differences were most pronounced in the upper 10 cm, while deeper layers showed muted responses. These results underscore the importance of season- and depth-specific management strategies, such as synchronising nutrient application with rainy-season peaks and conserving surface SOC, to enhance soil health, crop productivity, and resilience under the climatic conditions of Meghalaya's hilly terrain.

Keywords: Depth-dependent soil dynamics, Season–depth interactions; Arecanut plantation; Soil organic carbon; Available nitrogen

Abstract ID: ICTACSR 2025/TS5/OP 18

Rice Dependence, Calorie Adequacy and Food Security: Evidence from Rural Assam

Jyotika Hazarika and Ananya Kashyap
Department of Economics, Assam Don Bosco University.
*Correspondence: ananya.kashyap@dbuniversity.ac.in, h.jyotika01@gmail.com

Abstract

Food security has been considering a challenge in rural India, where calorie adequacy is a key indicator of nutritional well-being. This study aims to analyse calorie intake, rice dependence, and the relationship between food expenditure and nutritional adequacy among rural households in Assam. Primary data were collected from 400 ration card-holding households across Kamrup (Rural) and Barpeta districts using a multistage stratified sampling method, complemented by secondary sources such as NSS and NFHS reports. Calorie intake was estimated through both per capita and per consumer unit with adequacy assessed against the nutritional norm of 2325 kcal per CU/day. Results show that average intake in surveyed villages (1891 kcal per capita; 2041 kcal per CU/day) falls below both state and national rural averages. Nearly 40% of households consume less than 1860 kcal per CU/day, far exceeding Assam and all-India averages. The findings show localized nutritional vulnerability and the need for PDS diversification, dietary awareness, and targeted policy interventions.

Keywords: Food security, calorie adequacy, MPCE on food, Rice dependency, PDS

Abstract ID: ICTACSR 2025/TS5/OP 19

Utilization of Bengal Quince Leaf Biomass in Adsorptive Removal of Toxic Methylene Blue Dye: Influence of System Parameters and Kinetic study

Arkojyoti Majumdar[1], Sharmistha Chakraborty [1,2*]
[1]Department of Chemistry, Bodoland University, Kokrajhar-783370, Assam, India
[2]Department of Chemistry, Science College, Kokrajhar-783370, Assam, India
Correspondence: arkojyotiphd@gmail.com

Abstract

Methylene blue (MB) has been identified as harmful to human health, potentially causing various adverse effects, including gastritis, irritation of the eyes, irritation of the skin, leptomeningeal inflammation, neuronal apoptosis, increased heart rate, nausea, vomiting, and diarrhoea. Therefore, the treatment of wastewater that contains such dye is crucial due to its detrimental impact. Herein, in a batch setup, Bengal quince leaf powder (BQLP) was assessed for its capacity in removing MB from aqueous medium along with the impacts of some influential factors. The equilibrium data fit well (R^2: 0.9931) with Langmuir isotherm model, confirming the viability of BQLP as an adsorbent. The maximum monolayer adsorption efficacy, q_{max} was emerged as 175.44 mg g^{-1} with a Langmuir isotherm constant of 41.83 L mg^{-1}, highlighting the efficiency of BQLP in dye removal. The kinetics study indicated that the observed data aligns with Pseudo-first-order kinetics (R^2: 0.9714) and intra particle diffusion models (R^2: 0.9797) with a pseudo-first-order rate constant of 4.2×10^{-2} min^{-1}. The study demonstrates that BQLP as an effective biosorbent in removing MB from aqueous medium. The enhanced is attributed to stronger electrostatic attractions, hydrogen bonding, n-π interactions, and π-π stacking. Hence, the results of the investigation suggest that BQLP can be a facile and eco-friendly substituent material in wastewater treatment, reducing the environmental hazards associated with synthetic dyes like MB. Future studies can explore the regeneration potential and scalability of BQLP for large-scale applications in industrial wastewater management.

Keywords: Bio-adsorbent; Adsorption; Bengal quince leaf; Dye; Methylene blue

Abstract ID: ICTACSR 2025/TS6/OP 01

The Integration of Traditional Knowledge of Medicinal Plants into Medicinal and Cosmetic Market with Special Reference to Northeast, India

Satabdi Dhar* and Partha Pratim Paul
Department of Law, Assam University Silchar, Assam
*Correspondence: shatabdidhar555@gmail.com

Abstract

The territory of India is about 3,288 million sq. km that includes approximately 74.92 million hectares of forest. Northeast India covers 255037 sq. km that is 8 per cent of total area whereas it shares 50 per cent of total flora of the country. Indian forests contain wide range of habitat that includes diverse form of flora and fauna. Forest products of Northeast, India include medicinal and cosmetic products, among others. Plants like Neem, turmeric, sandalwood, etc. have been used frequently in India by indigenous people for medicinal and cosmetical purposes for years. The vast traditional knowledge (TK) found in India in written as well as in oral form used for medicinal, and skin-care purposes has not been fully explored. But after successfully exploring them, there is a possibility that India can achieve a positive growth in international market, especially in pharmaceuticals, beauty, and healthcare sectors. TK of MPs is not a recent phenomenon. However, the recognition of TK as an Intellectual Property Right (IP or IPRs) is relatively new one. IP rights are given to persons over creations of their minds and intellects. The existing IP laws protect only novel inventions by providing the creator an exclusive right over the use of his/her creation for a limited period. In India the preservation and protection of TK against misappropriation comes under the fundamental right under Article 21 of the Constitution of India, 1950. The Traditional Knowledge Digital Library (TKDL) of India has been established to document and preserve TK, and prevent its misappropriation by third parties. The cosmetic market in India is growing gradually. Consumers prefer natural and organic products. A significant shift towards clean beauty, natural, and sustainable products is being seen along with herbal medicine. India has more than 9 million acres of land dedicated to organic farming and is home to 30 per cent of world's organic producers. This article will contain a non-therapeutic research analysis of TK of medicinal plants (MPs) of Northeast, India, the need for legal protection of this valuable knowledge and their application in the modern medicinal and beauty-care sector. Also, a comparative discourse analysis of TK of MPs will be carried out to find their economic and health significance in the sustainable development of rural economy of Northeast, India.

Abstract ID: ICTACSR 2025/TS6/OP 02

Potential Role of *Thoikor* in the Management of Diabetes Induced Cardiac Complications

Swarnali Bhattacharjee[a,b], Prashanta Kumar Deb[b,c], Rajlakshmi Devi[b,*].
[a]Department of Zoology, Gurucharan University, Cachar- 788004, Assam, India.
[b]Life Sciences Division, Institute of Advanced Study in Science and Technology, Guwahati Assam.
[c]Department of Internal Medicine, Nephrology, UTMB Health, Texas, USA.
* E-mail: rajiasst@gmail.com, swarnaligccollege@gmail.com.

Abstract

A lesser-known fruit from the vast repository of Indian traditional medicinal knowledge is *Garcinia pedunculata* Roxb. ex Buch.-Ham (GP), commonly known as *'Thoikor' in* Bengali and *Borthekera* in Assamese. Its well-known antioxidant and hypolipidemic properties have led to the exploration of its cardioprotective activity in this study. Alarming reports from the World Heart Federation (2021) claim that 33% of the global annual deaths result from cardiac complications, and phytochemicals with cardioprotective properties are continuously being analyzed as a safer alternative in the management of these complications. In this study, crude methanolic extract of dried GP fruit was assessed through multiple preliminary antioxidant, biochemical, and phytochemical assays, and its chloroform fraction (GC) was identified as a bioactive fraction. The experiments were designed using free fatty acid-induced lipotoxicity (FFA) in H9c2 cells, and a high-fat-high fructose diet with low-dose streptozotocin model in Wistar rats to mimic diabetic conditions. In the FFA-induced cellular model, the treatment GC fraction showed a dose-dependent, significant ($P<0.01$) decrease in intracellular ROS, a prime mediator of stress-induced damage in cardiac muscles. Moreover, key pathological parameters like HOMA IR, HbA1c, Atherogenic coefficient [(Total cholesterol -HDL-C)/(HDL-C)], Cardiac risk ratio (Total cholesterol/HDL-C) were found significantly elevated in the diabetic group in the animal model. Thus, from these parameters, it was confirmed that insulin resistance, elevated glycosylated haemoglobin, and hyperlipidemia determined from serum lipid profile are still precise indicators for monitoring cardiac health in diabetic patients. In the animal study, of the three GC-treated groups, the GC 150 mg/kg BW group showed a significant lowering of all these markers, thereby confirming its cardioprotective potential of GP fruit. These results were also confirmed using ECG. Therefore, from this study, the potential cardioprotective effect of *Garcinia pedunculata* fruit can be attributed to its antioxidant, mediating insulin resistance, and its lipid-lowering capacity.

Keywords: *Garcinia pedunculata*, Atherogenic coefficient, HbA1c, HOMA IR

Abstract ID: ICTACSR 2025/TS6/OP 03

Influence of Perceived Organizational Support and Mental Well-Being on Job Satisfaction of Employees: A Study on Guwahati Refinery and Numaligarh Refinery in Assam

Bitupon Borah[1], Soumendra Bhattacharjee[2]
[1]Research Scholar, Department of Commerce, Assam University Silchar
[2]Associate Professor, Department of Commerce, Assam University Silchar
Email: soumendrab70@gmail.com, borahb1994@gmail.com

Abstract

This study aims to investigate the influence of *Perceived Organizational Support (POS)* and *Mental Well-Being* on *Job Satisfaction* among executive employees in two major oil refineries in Assam - Guwahati Refinery Limited and Numaligarh Refinery Limited. The research further explores gender-based differences in POS and job satisfaction within an industrial setting.

Employees perceived organizational support, mental well-being and job satisfaction are crucial for an organization as they influence the performance of an organization. In this study, the perceived organizational support and job satisfaction of 300 employees selected through simple random sampling were measured using the Minnesota Satisfaction Questionnaire - 20 items (Weiss et al., 1967) and Eisenberger 8 items Perceived organizational support (Eisenberger et al.1986) instrument and 14-item Warwick-Edinburgh Mental Wellbeing Scale (WEMWBS) and recorded the responses using 5-point Likert scale.

A descriptive, cross-sectional research design was adopted. Primary data were collected through a structured questionnaire comprising validated instruments - Minnesota Satisfaction Questionnaire (MSQ), Warwick-Edinburgh Mental Well-being Scale (WEMWBS), and Eisenberger's POS Scale. The sample included 300 executive employees selected through random sampling using the Taro Yamane formula. Data analysis was conducted using SPSS Version 27, employing descriptive statistics, Pearson's correlation, and Mann-Whitney U tests.

The results revealed no statistically significant relationship between perceived organizational support and job satisfaction, nor between mental well-being and job satisfaction. Additionally, no gender-based differences were found in the levels of job satisfaction and POS. Nonetheless, respondents reported moderately high levels of all three constructs, suggesting a generally positive organizational climate.

Keywords: Perceived Organizational Support, Job Satisfaction, Oil Refineries, Mental Well-being

Abstract ID: ICTACSR 2025/TS6/OP 04

Health, Wellness and Traditional Knowledge System

Suhail Ahmed Barbhuiya and Prasenjit Roy*
Department of Biotechnology, Gurucharan University, Silchar
*Correspondence: drproyindia@gmail.com

Abstract

Health and wellness have always been integral aspects of human society, and their close association with Traditional Knowledge Systems (TKS) continues to play a significant role in contemporary life. TKS encompasses indigenous practices, cultural traditions, and age-old wisdom, which are deeply rooted in communities and transmitted through generations. Such systems provide holistic approaches to health by integrating physical, mental, and spiritual well-being. In recent years, the global focus on sustainable living and preventive healthcare has brought renewed attention to these traditional practices.

The present study focuses on evaluating the relevance of Traditional Knowledge Systems in maintaining wellness and preventing diseases. Various practices such as the use of herbal remedies, dietary patterns, yoga, meditation, and ethnomedicinal approaches are examined for their role in improving quality of life. These practices often rely on locally available resources, making them both accessible and sustainable. Moreover, TKS offers insights into disease prevention and management strategies, which can complement modern medical approaches.

While modern science often questions the evidence base of traditional practices, emerging research has demonstrated the therapeutic potential of several TKS components. For instance, plant-based medicines have shown promising results in treating chronic ailments, and yoga has gained global recognition for its role in stress management and overall health improvement. Documentation, validation, and integration of TKS with contemporary healthcare systems can provide innovative approaches towards community health and well-being. We suggest that promoting awareness, scientific validation, and policy support for Traditional Knowledge Systems can bridge the gap between tradition and modernity, ensuring health and wellness for future generations.

Keywords: Health, wellness, traditional knowledge, herbal medicine, yoga

Abstract ID: ICTACSR 2025/TS6/OP 05

Ethnomedicinal Knowledge of the Tai Khamti Community in Lakhimpur, Assam: Traditional Applications of Medicinal Plants in Disease Management

[1]Jayanta Saikia, [2]**Rajib Ratan Kashyap***
[1]Department of Assamese, Madhabdev University, Lakhimpur, Assam
[2]Department of Zoology, Bodoland University, Kokrajhar, BTR, Assam
*E-mail ID: rajibratankashyap100@gmail.com

Abstract

The Tai Khamti are a Tai-speaking Buddhist community mainly living in the Namsai district of Arunachal Pradesh and parts of Lakhimpur district in Assam. Originating from Myanmar, they are part of the larger Tai ethnic group of Southeast Asia and are known for their Theravada Buddhist traditions and ethnomedicinal knowledge. However, no systematic scientific documentation of their ethnomedicinal practices in the Lakhimpur district has been done. This study was carried out in Borkhamti village, the largest and only Tai Khamti settlement in Lakhimpur district, from July 2024 to July 2025. Door-to-door surveys were conducted among all 35 families in the village (population: 1000), and ethnomedicinal knowledge was collected through interactions. Among the total population, 58 individuals (5.8%) were identified as traditional healers actively practicing the tradition, while others, though not practitioners, possessed knowledge of plant-based remedies. A total of 38 plant species from 26 families and 18 orders were recorded, used to treat conditions like tonsillitis, pneumonia, women's white discharge disease, measles, night blindness, urinary irritation, eczema, jaundice, sinusitis, earache, toothache, and piles. Parts such as leaves, stems, bark, tubers, rhizomes, fruits, and pulps were either applied topically for issues like eczema, toothache, and earache or consumed in diluted forms for internal conditions like piles, pneumonia, and jaundice. Notably, 87% of respondents found these practices effective for managing diseases, while 13% reported combining traditional remedies with modern medicine. The systematic documentation and scientific validation of these ethnomedicinal practices are essential, as they not only help preserve the cultural heritage of the Tai Khamti community but also hold promise for future drug development and integrated healthcare.

Keywords: Ethnomedicine, Tai Khamti community, Lakhimpur, disease management.

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Exploring the Antioxidant and Antimutagenic Potential of a Polyherbal Ayurvedic Formulation in Zebra Fish Test Model

Sutapa Dhar [1], Jyotishman Tamuli[1] and Sarbani Giri[1,*]
[1]Molecular and Cell Biology Laboratory, Department of Life Science and Bioinformatics
Assam University, Silchar-788011; Assam; India
[*]**Correspondence-**dharsutapa629@gmail.com, girisarbani@gmail.com

Abstract

This present study investigates the antimutagenic and antioxidant efficacy of Triphala, a traditional polyherbal Ayurvedic formulation, in mitigating genotoxic effects and oxidative stress induced by mitomycin C (MMC) in *Danio rerio* (zebrafish). Triphala, composed of *Emblica officinalis* (Amalaki), *Terminalia chebula* (Haritaki), and *Terminalia bellerica* (Bibhitaki), is rich in bioactive phytochemicals, which possess significant antioxidant and anti-mutagenic properties. GC-MS phytochemical investigation validated the presence of several phenols, flavonoids, and other pharmacologically significant components. Micronucleus (MN) assay and biochemical assays were performed to evaluate and validate the potential of Triphala. Genotoxicity is induced by dose-dependent treatment with MMC, whereas co-treatment with Triphala significantly reduced the nuclear abnormalities, indicating its potential as an antimutagenic agent. Biochemical assays revealed that MMC induced oxidative stress by lowering hepatic GSH and SOD levels, which were restored upon Triphala administration. The findings from this study indicate that Triphala confers significant protection against MMC-induced genotoxicity by maintaining genomic stability and enhancing endogenous antioxidant defenses, thus supporting its potential role in chemoprotection. These observations support the traditional application of Triphala for the management of diverse ailments, and emphasize its promise as a natural therapeutic agent for genotoxic and oxidative stress-associated conditions.

Keywords: Triphala, Antioxidant, Antimutagenic, Zebrafish (*Danio rerio*), Mitomycin C (MMC)

Abstract ID: ICTACSR 2025/TS6/OP 07

Traditional Plant Ash Lye Prepared Among the Karbi Community of North-East India

Rupjily Beypi
Department of Botany, Cachar College, Silchar, Assam, 788001
Correspondence: dingjangpi@gmail.com

Abstract

Plant ash lye known as *'Khar'* in Assamese and indigenously called '*Phelo'* has long been used as a culinary alkali among the Karbi community residing in the hilly district of Assam. The plant ash lye is traditionally prepared by harnessing the non-edible parts of specific plants by burning and leaching the resulting ash with water, after which the filtrate is collected for use. This age old tradition of plant ash lye preparation exemplifies the practical wisdom and sustainable use of plants which are often discarded as waste. The present study investigates the different species of plants that are employed in preparation and extraction of plant ash lye and the traditional methods adopted by the Karbi community. Beyond the preservation of indigenous culinary practices, the folk technique for plant ash lye production opens possibilities for innovation in food, health and nutrition while promoting sustainable use of plant residues.

Keywords: Traditional knowledge, Plant ash lye, Karbi community

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Contribution of Arabic Scholars in transmitting the Indian Knowledge System to the world

Md Yahiah
Department of Arabic, Cachar College, Trunk Road, Silchar – 01
*Correspondence: mdyahiah@gmail.com

Abstract

The transmission of the Indian Knowledge System (IKS) to the wider world was profoundly shaped by Arabic scholars during the medieval period. Through translations, adaptations, and commentaries, they preserved and disseminated India's advancements in mathematics, astronomy, medicine, philosophy, and linguistics. During the Abbasid era, Indian texts such as the *Siddhānta* and Ayurvedic treatises were translated into Arabic, introducing concepts like the decimal numeral system and zero (*ṣifr*). Scholars such as **Al-Fazārī** and **Yaʿqūb ibn Ṭāriq** transmitted Indian astronomy, while **Hunayn ibn Isḥāq** and others translated medical works. Most notably, **Al-Bīrūnī** documented Indian science, religion, and philosophy in *Kitāb al-Hind*. These contributions ensured the preservation of Indian knowledge, which, through Arabic, spread to Persia, Andalusia, and medieval Europe, ultimately shaping the foundations of modern science and intellectual thought. The translation of seminal Sanskrit works such as Brahmagupta's Brahmasphuṭasiddhānta and medical texts like the Caraka Saṃhitā and Suśruta Saṃhitā into Arabic provided the foundation for further development in Islamic scholarship. Pioneers like Al-Khwarizmi popularized Indian numerals and algebra, while Al-Biruni offered detailed accounts of Indian sciences and philosophy. These Arabic contributions later reached Europe through Latin translations, introducing concepts such as the decimal system, zero, and advanced astronomical methods, which significantly influenced the Renaissance and the Scientific Revolution. Thus, Arabic scholars served as vital intermediaries, ensuring that the intellectual achievements of India became an enduring part of the global heritage of knowledge. Finally, the paper goals to explore the contribution of Indian Arabic Scholars in transmitting the Indian Knowledge System especially Al-Fazārī**,** Yaʿqūb ibn Ṭāriq, Hunayn ibn Isḥāq, Al-Bīrūnī, Al-Khwarizmi, Al-Farabi, Ali ibn Isa Al-Kaahhal, Ibn Sina (Avicenna), Ibn Al-Nafis and Ibn Khaldun.

Keywords: Arabic Scholar; Indian Knowledge System; Renaissance; Scientific Revolution.

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Ethnomedicine Practiced by the Karbi Community for Wound Healing

Hemphi Terangpi* and **Nilima Timungpi***
Department of Botany, Diphu Govt. College, Diphu – 782462
*Correspondence:timungpinilima123@gamail.com; hemphidgc@gmail.com

Abstract

Ethnomedicine is practiced mostly by indigenous people who have little access to modern medicines. The word *ethnomedicine* is sometimes used as a synonym for *traditional medicine.* Ethnomedical systems are closely related to traditional belief and religious practices. Most indigenous people residing in remote hilly areas mainly rely on plants as medicine in their vicinity to heal the cuts and wounds caused while hunting or during foraging or food-gathering. The current paper deals with the plants which have bioactive properties that heal cuts and wounds. Karbi tribe of Karbi Anglong district Assam has been practicing the ethnomedicine method for treatment of various ailments adopted from their ancestors and are preserved only by oral tradition. The objective of the current study is to explore, identify and document some of the plants used in the ethnomedicine practices for healing of wound. A field study was undertaken from March 2024 to July 2025 and consent of informants and ethno practitioners was obtained to collect information following ethnobotanical methods and emperical field work has been adopted. During the survey 51 plant species belonging to 35 families including its scientific names, local name, parts used and mode of treatment for healing the wound has been documented. Among these 35 families Asteraceae (5) has been found to be mostly in use followed by Zingiberacae (4), Euphorbiacae (4), Apocynaceae (3), Amaranthaceae (2), Fabaceae (2), Rubiacaeae (2), Anacadiaceae (2) and the rest families each with one species. Different parts of plants such as leaves, roots, barks, gum, latex, entire plant, seeds, flowers, bulb and rhizome has been used of which leaves were the most used plant part among the other parts. This study highlights on conservation of ethnomedicinal plants and to enhance and restores the traditional knowledge among the people and to adapt it accordingly.

Keywords: Ethnomedicine, indigenous people, wound healing, Karbi tribe.

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Revisiting Ancient Indian Texts in The Light of Modern Physics

Saradi Bora*
Department of Physics, Sadiya College
Correspondence: saradi.bc.bora@gmail.com

Abstract

Historically, India has been a cradle of scientific thoughts and innovations. The Indian knowledge system comprises of Gyan, Bigyan and Darshan which have evolved out of the experiences, observations, experimentations and analysis in India and by Indians through ages. Indian knowledge system has shaped the lives and landscapes of not only the Indian sub-continent but also most parts of Asia for centuries. But this heritage has been over shadowed by the western ways of thinking over hundreds of years. There is a need to bring a change in our public mindset to rediscover the ancient Indian heritage in a scientific manner and create the public awareness regarding IKS. The NEP-2020 has rightly recognises the rich intellectual heritage of this knowledge system which encompasses Mathematics, Astronomy, Philosophy, Yoga, Architecture, Metallurgy, Medicine, Agriculture etc and very much relevant to the contemporary intellectual practices. The ancient Indian texts reveal that Indian scientists have led foundational principle of various field of Vigyan. From the Vedic era various scientific discoveries and developments are carried out in India. As a society we need to realize, that in searching of modern-day education what treasure we have kept in dark for a long period. In this article India's contribution in the field of Physical Science will be discussed.

Keywords: Indian knowledge system, paramanu, atomic theory.

Abstract ID: ICTACSR 2025/TS6/OP 11

Various Dimensions of Healing Practices: A Study in the Karbi Villages of Karbi Anglong

Doloi Im Rongpi and Kh. Narendra Singh
Department of Anthropology, Assam University (Diphu Campus), Diphu, Karbi Anglong-782462, Assam, India,
***Correspondence:** doloiim19@gmail.com

Abstract

Pluralism in health seeking behaviour is the concurrent existence and use of multiple medical systems which shapes the health outcomes and service design in culturally diverse and geographically constrained settings. The aims and objectives of the present study was to understand the various dimensions of health seeking pattern of the Karbi villages of Diphu, Karbi Anglong. In the present study, two areas namely Disama and Taralangso of Diphu were purposively selected for collection of information related to treatment of illness. All relevant information was collected based on household level interviews. The present study observes the existence of the use of multiple patterns of health treatment despite the availability of modern medicine for treatment of diseases in both the rural and urban villages. The traditional healers also play a vital role in the treatment of diseases which includes herbalists, diviners, bone setters etc. and contributes to the general health status of a community. It was also observed in the present study that homeopathic treatment is also popular among the studied population alongside modern medicine and traditional healing. Thus, despite the presence of modern healthcare facility in the region, most people seek multiple medical systems for treatment of diseases and in some cases, traditional or spiritual healers are consulted primarily for treatment of certain diseases.

Key words: Medical pluralism, health treatment, traditional healers

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Relevance and Importance of Vedic Thoughts and Indian Knowledge Tradition: An Observation

Nayana Goswami*
Department of Sanskrit, Cachar College, Silchar
*Correspondence: nayanagoswami17@gmail.com

Abstract

The Indian traditional knowledge is reflected in the Vedas and allied literature, which represents the way of life and socio-cultural aspects of ancient India. The Vedic concepts are observed in different institutions as well as the performing activities that transmit the Indian knowledge traditional heritage. During the Vedic era, the influence of different observances is reflected with their socio-religious values to attain the highest excellence of human life. The Vedic traditional observance transmits the perspective of the values or the moral codes, e.g., unity, charity, *ahiṁsā*, etc., from the ages, which should be explored for the uplift of all the beings as well as the humanity. Traditionally, the four objectives of an individual in his life are the *puruṣārthacatuṣṭaya*, viz., *dharma*, *artha*, *kāma* and *mokṣa*. To attain the ultimate goal of life, one should perform his duties and responsibilities following the good conducts and virtues. In this context, the *Vasiṣṭhadharmasūtra* states thus- *ācāraḥ paramo dharmaḥ sarveṣāmiti niścayaḥ/ iti*. (*Vasiṣṭhadharmasūtra*, 6.1.). The concept of the Vedic teachings covers a wide range of traditional knowledge till date, which has more scope to explore and promote the importance and relevance. The traditional knowledge system of India implies not only the socio-religious value, but also implies more than the ethical as well as philosophical perspectives. Moreover, the Vedic traditional performances are distinctively traced as the token of respect and gratitude to the nature as well as the whole creation for the sustainability, which signify the eco-friendly heritage of Vedic tradition. This research paper is an humble attempted on the traditional concepts of Vedic teachings to highlight the significance and relevance of Indian traditional knowledge system with an analytical point of view.

Keywords: *puruṣārthacatuṣṭaya*, *vedas, purāṇas.*

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Freedom of Speech in the Digital Era: Legal Frameworks for ICTs in India

Ayesha Afsana*
Department of Sociology, Govt. Model College, Borkhola, Cachar, Assam - 788 127,
*Correspondence: ayeshaafsana5@gmail.com

Abstract

The urge to know is the nature of human beings. Throughout ages, the strive to gain knowledge and information has been accelerated by the invention of a host of technological innovations which have not only facilitated the communication process among individuals but also encouraged them to speak fearlessly in front of the world population. When it comes to the case of geographical boundary, every nation of the world has significantly conferred human rights to its citizens. In India, where unity in diversity is the sole motto, its diverse population resides without any alien feeling due to the existence of fundamental rights. Moreover, Article 19(1) of the Indian Constitution stresses on the incorporation of freedom of speech and expression by constitutionally recognising the value of individual liberty. But in this digital era where Information and Communication Technologies (ICTs) play a pivotal role in encouraging such freedom and liberty of the masses, incidents of discrepancies is also not uncommon. Hence, the legislators of India put emphasis on removing eyes of wrong-doers affecting the spirit of national integration. The paper, based on secondary data, throws light on important Acts enacted in India with a view to control the actions of miscreants and wither away the occurrence of cybercrimes.

Keywords: Freedom of speech, expression, ICTs, digital era, cyber crimes

Abstract ID: ICTACSR 2025/TS7/OP 02

The Silent Breakdown: Why Women Centric Transport Initiatives Fail Without Sustainability

Chanda Medhi*
Dept. of Sociology, Government Model College Borkhola, Cachar
Correspondence: chandamdh21@gmail.com

Abstract

The introduction of pink autos in Bongaigaon was a revolutionary move as in guaranteeing safe reliable and women centric transformation. The primary objective of introducing the pink auto services was to provide economic opportunity and security to the women. Although the project started out promisingly, the initiative did not work out. A study was conducted on the pink auto rickshaws which shows that the challenges were more than just operational. Structural, cultural and social barriers were deeply rooted. The stigma for engaging in non-traditional jobs along with ingrained gender roles were another cause for its failure. The societal stereotypes and gendered expectations among the passengers and commuters hampered its acceptance undermining the main purpose of the program. Apart from these, the absence of adequate training financial assistance and lack of proper long term policy strategies resulted in implementation, flaws, rendering the initiatives unsustainable. The case study conducted on the pink autos demonstrates that such projects cannot succeed based solely on symbolic gestures. The research employs both qualitative and exploratory methodologies, analysing both primary and secondary data. Primary data was gathered from local commuters, women drivers, and transport stakeholders in Bongaigaon, while secondary sources encompassed related government policies, academic research, books, and newspaper articles. The findings of this paper indicate that the shortcomings of this initiative offer critical insights for the development of gender-sensitive, inclusive, and sustainable transport policies in India.

Keywords*:* Empowerment, Gendered roles, Women-oriented transport, Social stigma, Structural barriers, Cultural constrains.

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Bio-Social Determinants of Fertility Behavior Among the Kaibarta Mothers in Rural Areas of Assam

Jyoti Hazarika[1] and Sarthak Sengupta[2]
[1]Department of Anthropology, Gurucharan University, Silchar-788004
[2] Department of Anthropology, Dibrugarh University, Dibrugarh-786004
*Correspondence: jyotihazarika1989@gmail.com

Abstract

The fertility behavior of a woman is shaped by multiple biosocial factors. These factors include age at marriage, educational attainment, type of family, short birth intervals, nutritional status and high birth order. Worldwide studies have confirmed that these factors have detrimental effects on maternal and child health. However, very limited investigations have focused on rural women in Assam.

The basic objectives of this study are to analyze the fertility behavior of Kaibarta mothers and to assess the impact of key biosocial determinants on their reproductive performance in the districts of Lakhimpur and Dhemaji, Assam.

This study involved 337 Kaibarta mothers of reproductive age, all of whom had given birth to at least one living child. Participants were selected from three densely populated Kaibarta villages in Assam's Lakhimpur and Dhemaji districts. The study employed a demographic survey with specially designed, pre-tested reproductive health schedules, through in-depth interviews serving as the primary.

The mean age at menarche and marriage was 11.86 and 17.49 years, respectively. A significant proportion of Kaibarta mothers marry before 18. The average number of conceptions per mother was 3.83. Key trends were identified. Mothers experiencing menarche at 12 years had the highest mean conceptions (3.93) and live births (2.93), as did those who married before 18 and those with a normal BMI (3.88 conceptions and 2.97 live births). Overweight mothers reported higher incidence of miscarriage (12.07%), infant mortality (8.89%), and juvenile mortality (2.22%). Fertility was highest at the second birth order (83.74% of live births). Non-literate mothers had the highest conception and live birth rates, which decreased with rising education. Mothers in nuclear families had higher fertility than those in joint families.

This study demonstrates that biosocial factors significantly influence the fertility outcomes, with maternal education being the most influential. Educational attainment is critical for improving reproductive health, which can indirectly regulate other factors,

such as the age of marriage and healthcare decisions. Therefore, the government should lead initiatives to raise awareness and promote female education to improve overall reproductive health in this community.

Keywords: Menarche, Fertility, Mortality, Reproductive Behavior, Kaibarta, Rural Assam.

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The Role of Microfinance in Promoting Employment Generation among Rural Households: A Study of Lakhipur, Cachar District, Assam

Md Sadam Ahamed[1] and Rajat Sharmacharjee[2]
Department of Commerce, Assam University Silchar-788011
*Correspondence: rajatau@rediffmail.com

Abstract

Microfinance has emerged as a critical instrument for rural development and poverty alleviation in India. This study examines the role of microfinance in promoting employment generation among rural households in Lakhipur sub-division of Cachar district, Assam, focusing on business expansion, employment opportunities, job security, skill development, and reduction in low-paying jobs. Both secondary and primary data are considered for the study. Primary data were collected directly from microfinance beneficiaries through a structured interview schedule. These interviews were conducted with respondents who had availed loans during the financial year 2023–2024 from the five selected microfinance institutions operating in the Lakhipur Sub-Division of Cachar district, Assam. A cross-sectional study was conducted with 382 microfinance beneficiaries selected through systematic random sampling from a population of 8,516 beneficiaries. Data was collected using structured interview schedules with employment impact measured on a 5-point Likert scale (1=Very Poor to 5=Very Good). The study reveals a moderate positive impact of microfinance on employment generation.

Keywords: Microfinance, Employment Generation, Rural Development, Lakhipur, Poverty Alleviation

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Situating AI Generated Works Within the Framework of Intellectual Property Rights

Niengngaihlem Chongloi*
Department of Law, Assam University, Silchar
*Correspondence: lemmy.chongloi@gmail.com

Abstract

Technological Advancements have pushed us to the threshold where Artificial Intelligence is no longer a mere tool but hinting at the idea that AI could become a creator in its own right. The eminent evolution of the word "inventor" from the DABUS case and the implications of AI being granted patents poses a disruption to the existing patent laws. The current legal system is built for a world where only humans can invent things; this rule is now tested in an unpredictable manner by AI. The research attempts to construct a bridge between AI generated work and patent laws. Creating a balance between encouraging inventions accelerated by AI while also preventing a system where the brains behind the AI is not disregarded. It attempts to answer the question of how to shelter AI inventions in the Intellectual Property arena. This paper focuses mostly on the patent system in the European Union (EU), United Kingdom (UK) and United States of America (US) given that these are the trend setters in the field and the manner in which they adapt their laws to accommodate AI surge is of utmost importance globally. It analyses how the existing frameworks apply to inventions generated by AI and considers whether the pre-existing laws have become obsolete in the light of technological advancements. The paper investigates the underlying philosophical underpinnings of patent rights, including the incentive theory, personality theory and natural rights. The doctrinal research reveals the importance of mandatory disclosure for inventions aided by AI; The role of the AI and the degree of human intervention expressly declared in the application. This will be determinant in defining who the "inventor" is and clear the confusion between "automation" and "autonomous". The suggestions to create separate laws that will govern such creations by non-human entities to facilitate technological growth and resolve the philosophical dilemma of Natural Rights is addressed.

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Exploring the Interplay Between Digital Transformation and Consumer Behavior: A Systematic Literature Review

Rachna Deb*
Ramanuj Gupta Degree College, Silchar
*Correspondence: debroyrachna@gmail.com

Abstract

The rapid advancement of digital technologies has transformed how organizations design marketing strategies and how consumers make decisions. This paper presents a systematic literature review that examines the dynamic relationship between digital transformation (DT) and consumer behavior, covering studies published from 2015 to 2025. The review organizes existing scholarship into three main themes: (1) digital transformation within marketing strategies, (2) consumer decision-making in digitally mediated environments, and (3) emerging technologies, consumer engagement, and trust. Evidence suggests that DT enables firms to adopt personalized, data-driven, and multi-channel approaches that shape consumer attitudes, purchase intentions, and long-term loyalty. Nevertheless, issues such as data privacy, ethical concerns, and unequal access to digital resources remain significant barriers. The review identifies gaps related to limited cross-cultural perspectives, insufficient longitudinal research, and the need for consumer-centric frameworks that integrate technological, behavioral, and ethical aspects. By synthesizing these insights, the study advances theoretical understanding and provides practical guidance for organizations navigating the evolving digital marketplace.

Keywords: Digital Transformation, Consumer Behavior, Marketing, Trust.

Abstract ID: ICTACSR 2025/TS7/OP 07

Philosophical Foundation of Transdisciplinarity in Contemporary Scientific InquiryLaisom Nongpok Nganbi

Laisom Nongpok Nganbi*
University of Hyderabad, Hyderabad, India
*Correspondence: laisomnongpoknganbi1@gmail.com

Abstract

In contemporary scientific inquiry, trans disciplinarity provides a philosophical and practical framework for addressing complex challenges that cannot be solved within the confines of a single discipline. The philosophical foundations of trans disciplinarity include a focus on multiple epistemologies, the integration of various knowledge systems, and an emphasis on collaboration among diverse stakeholders. Drawing from ideas in postmodernism, and pragmatism, and constructivism, trans disciplinarity advocates for a holistic understanding of problems, recognizing the interconnectedness of social, ecological and technological systems. Despite its potential, trans disciplinarity research faces challenges such as the integration of knowledge institutional barrier and evaluation of research impact. Trans disciplinarity thus serves as a call to rethink how we structure scientific inquiry and engage with the pressing issues of our time, promoting ethical considerations and greater societal relevance in scientific endeavours.

Keywords: Multiple Epistemologies, Holistic understanding, Constructivism

Abstract ID: ICTACSR 2025/TS7/OP 08

Agriculture Marketing in North East India with Special Reference to Horticulture

Kamal Kanti Das*
Dept. of Commerce, Cachar College, Silchar, Assam, India
*Correspondence: www.kamalkantidas@gmail.com

Abstract

The economy of our country is of developing nature. Although the adoption of globalization and liberalization policy has crossed almost three decade, still it has to determine a long route. The industrial development in our country is not satisfactory and although agriculture is having a dominant part in the economy its development is also not upto the mark. This is one of the most important factors responsible for increasing unemployment problem. The Northeast region of India is rich in diverse soil and agro-climatic conditions that are conducive to the growth of a large variety of temperate and tropical horticultural crops. At present the horticulture is recognized as an important sector for potential diversification and value addition in agriculture. Fruits, vegetables, and spices of the region are highly nutritious and have a market within and outside the country. The paper is an attempt to assess the potential of horticulture marketing in the region which can able to create mass employment opportunity as well as sustainability in the region.

Keywords: North-East, Agriculture, Horticulture, Marketing

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Dowry: Still A Reality in India

Arpita Roy*
Department of Political Science, Cachar College, Silchar, Assam, India.
*Correspondence: roya09058@gmail.com

Abstract

Among diverse ills of our Indian society 'dowry' takes a prominent place. It has been resulted to a number of women related crimes and as a result of it large number of women of our country have been getting victimized. Due to this menace women in different parts of our country often face physical, mental and sexual abuse. Many times, for this 'dowry system' women are being killed by their in-laws' family. Although the national and state governments of our country have been making strict laws and regulations for eliminating dowry but its presence and practice in our social life has become a reality still today. In this 21st century when we are in the age of artificial intelligence, often cases are reported by print and digital media where women face dowry related inhuman oppression by their male counterparts and other members of their in-laws' family. It is in this background the present study is an attempt to understand the causes behind the practice of dowry in Indian society. The study also wants to highlight the fact that whether dowry is still practiced in Indian society? The study will also highlight the role of the state in prevention of dowry in India. Further the present work tries to find out some effective measures inevitable for prohibition of dowry system in our country. This current work is a descriptive and secondary one. For data collection secondary sources will be accessed by the researcher and to analyze the data descriptive analytical method will be followed up.

Keywords: Dowry system, Indian society, State's role, Women, Victim, Abuse

Abstract ID: ICTACSR 2025/TS7/OP 10

Digital Financial Transformation through PFMS: Assessing Pre and Post Implementation Efficiency of Fund Flow Management in National Health Mission - A Case Study of Cachar District

[1,2]**Nabarupa Dhar,** [2]Parag Shil[*]
[1]Department of Commerce, Cachar College, Silchar
[2]Department of Commerce, Assam University Silchar.
*Correspondence: paragshil1@gmail.com, nabarupadhar2016@gmail.com

Abstract

The Public Financial Management System (PFMS) represents a landmark digital intervention in India's public financial governance, aimed at enhancing transparency, accountability, and efficiency in government fund management. This study examines the transformative impact of PFMS implementation on fund flow management within the National Health Mission (NHM) framework, focusing specifically on Cachar District, Assam.

The research employs a comparative pre-post implementation analysis using longitudinal financial data from Primary Health Centers (PHCs) across eight blocks in Cachar District. Through a mixed-methods approach combining quantitative financial analysis and operational assessment, the study pursues three primary objectives: (1) analyzing efficiency patterns in fund allocation and utilization before and after PFMS adoption, (2) evaluating the system's impact on transparency, accountability, and reduction in fund flow delays, and (3) assessing operational challenges and effectiveness of digital financial management at the grassroots health administration level.

This research contributes to the growing body of evidence on e-governance effectiveness in India's health sector, offering empirical insights into digital financial management systems' role in strengthening service delivery mechanisms. The findings provide actionable recommendations for policymakers and health administrators seeking to optimize PFMS implementation for improved resource management and health outcomes in district-level health institutions.

Keywords: Public Financial Management System (PFMS), National Health Mission (NHM), Digital Financial Transformation, Fund Flow Efficiency, E-Governance, Health Service Delivery, Pre-Post Implementation Analysis

Abstract ID: ICTACSR 2025/TS7/OP 11

Bibliometric Analysis of Quality of Work Life Research: Trends, Themes, and Emerging Insights

Ankita Ghosh*
Department of Commerce, Cachar College Silchar
*Correspondence: ankitaghosh9411@gmail.com

Abstract

Quality of Work Life (QWL) has emerged as a critical factor influencing organizational performance, employee satisfaction, and retention, especially in service-oriented sectors. This bibliometric study aims to analyze the trend and pattern of research publications on QWL from 2005 to 2025, and to explore the co-occurrence patterns of keywords and bibliographic coupling among relevant documents. Data were retrieved from the Scopus Core Collection database, focusing on peer-reviewed journal articles in English within the Business, Management, and Accounting subject area. The final dataset comprised 370 articles, which were analyzed using VOSviewer software to generate visual bibliometric maps. The results reveal a steady increase in research output over the period, with thematic clusters highlighting organizational commitment, employee engagement, turnover, and human capital as central themes. Bibliographic coupling analysis identifies foundational works and thematic research communities, while co-occurrence mapping uncovers the evolving conceptual landscape of QWL. The study provides a comprehensive overview of the intellectual structure and research trends in QWL, offering insights for future research directions and practical implications for organizations seeking to enhance employee well-being and productivity.

Keywords: Organizational Commitment, Employee Engagement, Bibliographic Coupling, Co-occurrence Analysis.

Abstract ID: ICTACSR 2025/TS7/OP 12

Building Entrepreneurship: MSME Approach

Ranita Banerjee*
Vidyasagar Teachers' Training College, Midnapore, Paschim Medinipur, West Bengal
*Correspondence: ranita.phd.2017@gmail.com

Abstract

Micro, Small, and Medium Enterprises (MSMEs) are crucial in ensuring economic growth, helps in employment generation and source of innovation. In India, MSMEs are motivators which enhance GDP, improve export potential, and boost local entrepreneurship. Ministry of MSME defines Micro Enterprises as those where capital investment in Plant and Machinery is about Rs. 2.5 crore and Annual Turnover is below Rs. 10 crores; Small Enterprises as those where capital investment in Plant and Machinery is about Rs. 25 crore and Annual Revenue is not more than Rs. 100 crore and Medium Enterprises as those where capital investment in Plant and Machinery is about Rs. 125 crore and Annual Turnover is less than Rs. 500 crores.

The objective of this study is to explore how MSMEs drive entrepreneurship, create sustainable business strategies, drive innovation, and socio-economic development, what challenges and opportunities they encounter and how their success relates to policies, market forces, and resource access.

This qualitative research paper is based on secondary sources to gather data such as published research papers, government reports, policy documents, industry analyses, and reputable online databases. A thematic content analysis was done to find trends and perspectives related to MSMEs and entrepreneurship.

MSMEs can help to promote entrepreneurship and ensure progress in rural and semi-urban regions, through inclusion of rural skilled workforce, resulting in employment generation and innovation. Though government initiatives as the MSME Development Act and Start-up India are supporting MSMEs but challenges exist in the form of finance scarcity, technology, competitiveness, less skilled manpower, infrastructural issues and compliance. Empowering MSMEs can usher in economic growth and social development for this purpose institutional aid, digital infrastructure, and public-private collaborations are mandatory.

Keywords: MSMEs, Entrepreneurship, Economic Growth, Innovation, Policy Support, Sustainable Development

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Green Entrepreneurships and Sustainable Practices in MSMEs

Amar Jyouti Boruah, Rohit Das
Dibrugarh University, Dibrugarh, Assam, India
*Correspondence: bhubanjyoutiboruah@gmail.com, rd589811@gmail.com

Abstract

Micro, Small and Medium Enterprises (MSMEs) play a vital role in economic growth, employment generation, and innovation. In recent years, the growing global emphasis on sustainability has drawn attention toward the adoption of green entrepreneurship and sustainable practices within MSMEs. This research focuses on examining the role of green marketing in promoting sustainable business practices, evaluating the economic benefits of entrepreneurship, and analysing the impact of government policies and incentives in fostering green initiatives among MSMEs. The study adopts a mixed methodology, relying on both primary and secondary data. A sample size of 50 respondents has been selected through purposive and convenience sampling techniques to capture insights from entrepreneurs, managers, and key stakeholders engaged in MSMEs. Primary data has been collected through structured questionnaires and interviews, while secondary data has been obtained from academic journals, government reports, and industry publications.

The research aims to identify how green marketing strategies enhance consumer awareness, brand image, and competitiveness of MSMEs while encouraging the integration of eco-friendly practices such as energy efficiency, waste reduction, and sustainable sourcing. It further evaluates the economic advantages gained by MSMEs through green entrepreneurship, including cost savings, increased profitability, and access to new market opportunities. Additionally, the study explores the role of government policies, subsidies, and incentives in enabling MSMEs to overcome financial and technological barriers in adopting sustainable practices.

Preliminary insights suggest that MSMEs embracing green entrepreneurship not only contribute to environmental preservation but also achieve long-term business growth and competitiveness. The findings of this study are expected to provide valuable implications for policymakers, entrepreneurs, and academicians, highlighting the need for greater awareness, supportive policies, and strategic frameworks to promote sustainable development within the MSME sector.

Keywords: Green Entrepreneurship, Sustainable Practices, Eco-friendly, Green Marketing, Government Policies and Incentives

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National Pension System for Unorganised Workers: A Study on Perception and Satisfaction in Cachar District of Assam

Debojyoti Karmakar*
Department of Business Administration, Assam University Silchar
*Correspondence: debojyotikarmakar12@gmail.com

Abstract

The unorganised sector in India employs more than 90 percent of the country's workforce, most of them lack any formal pension or retirement benefits. To ensure old-age financial security, the Government of India introduced the National Pension System (NPS), later extended to unorganised workers. This study aims to understand how workers' perceptions about risk, return, safety and ease of use of NPS influence their satisfaction and intention to continue with the NPS. The study used primary data collected from 100 respondents through a structured questionnaire, applying a convenience sampling technique. Partial Least Squares Structural Equation Modelling (PLS-SEM) was used to analyse the data and test the proposed hypotheses. The findings show that perception regarding return and safety & security of NPS have a positive effect on satisfaction, while perception regarding risk and ease of use do not significantly affect satisfaction. Further, satisfaction was found to have a strong positive influence on the intention to continue with the NPS. The study concludes that financial returns and the safety of funds play a major role in building satisfaction and long-term participation among unorganised workers. Therefore, policymakers can focus on improving awareness about NPS benefits, simplifying operational procedures, and ensuring trust in the system to strengthen social security coverage in India's unorganised sector.

Keywords: Pension, Unorganised Workers, Perception, Satisfaction, PLS SEM

Abstract ID: ICTACSR 2025/TS7/OP 15

Impact of WTO Membership on Agricultural Trade: A Study Based on Gravity Model

Shabana Anjum*
Department of Economics, Cachar College, Silchar
*Correspondence: Shabana.anjum.amu@gmail.com

Abstract

This study examines the impact of World Trade Organization (WTO) membership on India's agricultural trade using an extended gravity model. The model incorporates key determinants of trade flows, including GDP, population, area, distance, bilateral real exchange rate, and geographic and cultural factors such as landlocked status, island status, common borders, and common language. Two WTO-related variables, *Bothin* and *Onein*, are introduced to capture the effects of membership. The findings reveal that when both India and its trading partner are WTO members, agricultural trade increases by **20.8%**, indicating that WTO membership fosters trade by reducing barriers and providing a rules-based framework. Conversely, when only one country is a WTO member, trade decreases by **20.8%** due to trade diversion toward members, adversely affecting non-member countries. These results underscore the positive role of WTO membership in promoting India's agricultural trade while highlighting the risks associated with partial membership. The study suggests that India should strengthen its participation in multilateral trade negotiations and develop bilateral agreements with non-WTO members to mitigate trade diversion and enhance market access.

Keywords: World Trade Organisation, agricultural trade, Gravity Model, bilateral agreement and trade diversion.

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Fintech Adoption and Financial Inclusion: A Cross-Country Comparison in South Asia (2021–2024)

Deepak Ray*
MBA (Finance & Marketing), University of Science and Technology, Meghalaya, India
*Correspondence: dray0210@gmail.com

Abstract

Financial inclusion is now widely acknowledged as a fundamental driver of inclusive growth, economic stability, and poverty reduction. While global studies offer valuable insights, region specific analysis is needed to understand uneven access and adoption patterms. In South Asia which accounts for nearly a quarter of the world's population large segments remain excluded from formal financial systems. The rapid expansion of financial technology (fintech) has created opportunities to reduce these gaps by enabling access to digital payments, savings, credit, and related services, particularly for underserved groups.

This study draws on secondary data from the World Bank's Global Findex Database 2021 (Demirgüç-Kunt et al., 2022) and the forthcoming 2025 release incorporating data through 2024 (Klapper et al., 2025). Unlike global comparisons, the analysis focuses on South Asia's distinctive trajectory of fintech adoption by examining three dimensions: account ownership, digital payment activity, and mobile money use. Persistent inequalities across gender and rural-urban divides are also explored to capture the region's specific development challenges.

Findings suggest gradual but uneven progress between 2021 and 2024. Account ownership increased moderately yet continues to fall short of international benchmarks Digital payments expanded most rapidly in urban centers, whereas rural adoption was constrained by infrastructural gaps and limited digital literacy. In contrast to Sub-Saharan Africa-where mobile money has become mainstream-South Asia's uptake remains nascent, with notable country-specific advances in Bangladesh and Nepal. Gender disparities remain a critical concern, as women are consistently less likely than men to own or actively use financial accounts.

The study positions fintech adoption not merely as a technological shift but as part of a wider socio-economic transformation. Achieving equitable progress will require gender-responsive strategies, investment in rural connectivity, efforts to strengthen financial and

digital literacy, and stronger consumer protection frameworks. By situating South Asia within the broader global debate, the research highlights how technology-enabled solutions can support inclusive development while addressing region-specific inequalities.

Keywords: Financial Inclusion, Fintech, Digital Payments, Mobile Money

Abstract ID: ICTACSR 2025/TS7/OP 17

From Debt Trap to Development: Can Microfinance Deliver Inclusive Growth in Rural India?

Prince Kumar[1], Kranti Singh[2], Saumya Trivedi[3], Nasir Fayaz Shah
[1]Research scholar, Department of Commerce,University of Lucknow
[2]Professor, Department of Commerce,Netaji Subhash Chandra Bose Govt.Girls P.G.College, Lucknow
[3]' Research scholar, Department of Commerce, University of Lucknow
*Correspondence: Kushprince0275@gmail.com

Abstract

This study evaluates the function of microfinance in promoting inclusive growth in rural India, with particular emphasis on Self-Help Groups (SHGs). It seeks to explore whether microfinance initiatives act as an instrument for poverty alleviation and social empowerment or whether they merely reinforce debt dependency among marginalized communities.

The paper draws upon a mixed-method approach by critically reviewing existing literature and policy reports on microfinance in India, while also putting together the knowledge from rural communities in Central Uttar Pradesh. The analysis situates microfinance within the broader framework of rural development, assessing its effectiveness in improving household income, livelihood security, and social empowerment.

Preliminary analysis suggests that microfinance, when effectively implemented through SHGs, can contribute to improved financial inclusion, women's empowerment, and enhanced access to livelihood opportunities. However, structural challenges such as over-indebtedness, inadequate financial literacy, and exploitative recovery practices remain pressing concerns. The findings underline that the success of microfinance is conditional upon supportive institutional mechanisms, capacity-building initiatives, and sustainable financial practices.

The study gives proper knowledge for policymakers, microfinance in promoting inclusive growth in rural India valuable knowledge for policymakers, microfinance institutions, and rural development practitioners. It highlights the need for balancing financial inclusion with borrower protection, thereby ensuring that microfinance serves as a driver of development rather than a debt trap.

By interrogating both the promises and pitfalls of microfinance, this paper contributes to ongoing debates on its long-term sustainability and its potential role in fostering inclusive growth in rural India.

Keywords: Microfinance, Self-Help Groups, Rural Development, Poverty Alleviation, Inclusive Growth

Poster Presentations

Abstract ID: ICTACSR 2025/PP 01

Effect of Seed Priming with Selenium (Se) in the Regulation of Salinity-Induced Stress Responses in Developing Rice (*Oryza sativa* L.) Seedlings

P. Sumitra Singha*, Shuvasish Choudhury
Department of Life Science and Bioinformatics, Assam University, Silchar 788011, India
*Correspondence: sumipaonam@gmail.com

Abstract

Salinity is among the major abiotic stresses that severely limit rice growth and yield, thereby threatening the global food security in a substantial manner. The present study aims to evaluate the role of selenium (Se) seed priming towards the mitigation of salinity-induced stress responses in developing rice (*Oryza sativa* L.) seedlings. The imposition of salinity stress at the concentration of 150 mM significantly inhibited the plant growth by reducing root and shoot elongation, biomass, relative water content (RWC), and altering the chlorophyll levels, while also triggering oxidative stress, as shown by increased ROS accumulation detected through both histochemical and biochemical analyses. Schiff's reagent and Evans blue staining revealed lipid peroxidation and loss of plasma membrane integrity in roots, while in situ detection using diaminobenzidine (DAB) and nitroblue tetrazolium (NBT) staining demonstrated pronounced accumulation of H□O□ and O□□· radicals in root and shoot tissues. Biochemical assays further corroborated these findings, showing elevated malondialdehyde (MDA) content, a key marker of lipid peroxidation. Notably, Se seed priming effectively alleviated these detrimental effects. Se-primed seedlings exhibited significant improvements in growth parameters, water status, and chlorophyll restoration under salinity conditions. Moreover, Se treatment markedly reduced ROS accumulation and lipid peroxidation, as indicated by lower MDA levels and reduced histochemical staining. This ameliorative role was attributed to enhanced antioxidant defense, as Se priming stimulated the activities of ROS-scavenging enzymes, thereby restoring redox balance and limiting oxidative injury. Altogether, these findings reveal Se priming as a promising strategy to enhance rice tolerance and survival under saline environments.

Keywords: salinity stress, selenium, rice, seed priming, ROS

Abstract ID: ICTACSR 2025/PP 02

Prevalence and Determinants of Cancer in the Barak Valley Region of Assam, India

Protik Adhikary, Maharnab Roy, Rudrasish Chanda and Soumitra Nath
Department of Biotechnology, Gurucharan University, Silchar, 788004, Assam, India
*Correspondence: adhikaryprotik07@gmail.com

Abstract

Cancer poses a significant public health challenge in Assam, particularly in the Barak Valley region encompassing Cachar, Hailakandi and Karimganj. This study, based on data from the Cachar Cancer Hospital and Research Centre and Population Based Cancer Registries, evaluates the prevalence, determinants and treatment patterns of cancer in this area. A total of approximately 4000 male and 3500 female cases were recorded. The age specific incidence rates rise after 30 to 34 years and peak at 70 to 74 years in males and 65 to 69 years in females. Among males oesophageal cancer 11.6 % was most frequent followed by hypopharynx and lung cancers, while in females cervical 15.4 %, breast 14.1 % and gallbladder 11.1 % cancers predominated. Tobacco use remains the single most important risk factor, contributing to 54 % of male cancers and 23 % of female cancers, with oesophageal cancer being the leading tobacco related site. Metabolic risk factors further aggravate the burden, with 16 % of men and 15 % of women overweight or obese, 20 % of men and 19 % of women with raised blood pressure, and 16 % of men and 13 % of women with raised blood glucose levels. In addition, 25 % of men and 7 % of women consume alcohol. Environmental risks such as high air pollution levels measured at 3649 DALYs per 100000 population combined with poor health seeking behavior where less than 1 % of women are screened for breast cervical or oral cancers further complicate control efforts. Remedies include tobacco and alcohol control, improved screening and HPV vaccination, lifestyle modification and strengthening multimodal treatment facilities. In conclusion the Barak Valley cancer burden reflects the combined impact of lifestyle, metabolic and environmental factors and requires urgent multisectoral intervention.

Keywords: Cancer; Barak valley; oesophageal cancer; tobacco; metabolic risk; HPV vaccination

Abstract ID: ICTACSR 2025/PP 03

Evaluation of Genetic Damage in Pan Masala and Smokeless Tobacco Exposed Population of Cachar District, Southern Assam Using Buccal Cytome Assay

Roshni Chakraborty, Karishma Dey, Ankita Kurmi, Rajasri Nath, Sagorika Chakraborty, Apshita Paul and Prasenjit Roy*
Department of Biotechnology, Gurucharan University, Silchar
*Correspondence: drproyindia@gmail.com

Abstract

Genotoxicity is one of the important endpoints for risk assessment of various lifestyle factors. The study is the report on the genotoxic effect associated with pan masala and other smokeless tobacco in Barak valley, South Assam. Unlike smoke, they are directly placed in the oral cavity, and the buccal epithelial cells are placed in direct contact with their chemical contents. In the present cytogenetic monitoring study, analysis of micronucleus, and other nuclear abnormality tests were performed in the exfoliated buccal cells. We collected 50 samples from individuals having habit of chewing pan masala and smokeless tobacco and 50 control samples. Significant increase in the frequency of micronucleus was found in pan masala and smokeless tobacco chewers (5.15 ± 0.48, $P < 0.001$), as compared to the unexposed control group (0.20 ± 0.09). And also showed significant increase (4.75 ± 0.52, $P < 0.001$) in the frequency of binucleated cells as compared to the control group (0.40 ± 0.19). We suggest that analysis of other degenerative nuclear changes in addition to micronucleus and binucleated cells can provide valuable information while evaluating potential genotoxic agents.

Keywords: genotoxicity, pan masala, smokeless tobacco, micronucleus, binucleated cell

Abstract ID: ICTACSR 2025/PP 04

Stem Cell Therapy Restores Insulin Independence in Type 1 Diabetes: A Medical Milestone

Sudeshna Das, Aishi Nath, Satarupa Purkayastha, Baibhab Das and Prasenjit Roy*
Department of Biotechnology, Gurucharan University, Silchar.
*Correspondence: drproyindia@gmail.com

Abstract

Diabetes is a group of disorders characterized by the body's inability to adequately make or use insulin, the hormone required to convert food into energy. Type 1 Diabetes is specifically characterized by the body's inability to produce insulin, necessitating daily insulin injections. According to the American Diabetes Association, 7.8% of the total US population (23.6 million adults and children) have diabetes. Current conventional therapy involves supplementing the body's insulin through injections or external pumps. While this is the optimal standard treatment, research is ongoing to discover methods that enhance the body's own insulin production or regulation. A significant medical milestone has been achieved with a 25-year-old woman with type 1 diabetes becoming the first person to successfully receive a transplant of insulin-producing cells derived from her own reprogrammed stem cells. Less than three months post-transplant, she began producing her own insulin and has remained free from insulin injections for over a year. In a pioneering trial reported in Nature, Deng Hongkui, a cell biologist at Peking University, and his team reprogrammed cells from three individuals with type 1 diabetes back into a pluripotent state, allowing them to develop into any cell type. This procedure marks a major advancement in diabetes treatment. These studies highlight the potential of stem cells in treating diabetes by offering a potentially limitless supply of tissue and reducing the reliance on donor organs and immunosuppressive drugs.

Keywords: insulin, reprogrammed stem cells, Type 1 diabetes, pluripotent state

Abstract ID: ICTACSR 2025/PP 05

Molecular Structure Organized by Bent-Core Schiff Base Compound

Rahul Deb*
Assistant Professor, Department of Chemistry
Ramkrishna Nagar College, Ramkrishna Nagar -788166, Karimganj, India
*Correspondence: rdchemaus@gmail.com

Abstract

Bent-core Schiff base compounds are an important class of liquid crystal materials distinguished by their unique molecular architecture, where a central rigid bent core is connected via a Schiff base (-CH=N-) functional group. These compounds exhibit a distinctive "banana-shaped" geometry, differing significantly from conventional rod-like liquid crystal molecules. This structural arrangement imparts both rigidity and flexibility, enabling the formation of various mesophases. The presence of the Schiff base linkage enhances the conjugation, providing significant electronic and optical properties, which make these compounds attractive for advanced applications in optoelectronic devices, sensors, and nonlinear optics. Furthermore, the bent-core geometry induces spontaneous polar ordering, leading to ferroelectric or antiferroelectric behaviour in certain mesophases. Research in this area focuses on tuning the molecular structure by modifying the length of alkyl chains, linking groups, type of aromatic rings, and position of substitution to control phase transition temperatures, mesophase stability, and dielectric properties

The synthesis and characterization of achiral unsymmetrical four-ring bent-core molecules resembling different linking groups are described. In this study, the present compounds bearing disubstituted phenyl-based bent-shaped molecule exhibit the smectic phases. The molecular architecture comprises four phenyl rings interconnected via imine-ester linkages. Our synthetic approach involves various organic reactions, including Williamson etherification and Esterification reactions. The objective of this synthesis is to investigate the impact of long aliphatic symmetrical terminal chain and the linking group between lateral phenyl rings on the physical properties of the materials. Specifically, we explore the influence of double ester (-COO-) groups and one imine group, which induces liquid crystalline property in the molecule.

Keywords: Banana-shaped molecules, mesophase, optical property, high fluorescence property.

Abstract ID: ICTACSR 2025/PP 06

Green Synthesis of Carbon Nanomaterials

Dipankar Das*
Ramkrishna Nagar College, Ramkrishna Nagar-788166, Sribhumi
*Correspondence: dipankardas26@gmail.com

Abstract

The development of carbon nanomaterials (CNMs) such as carbon nanotubes, graphene, and carbon quantum dots has attracted significant attention due to their remarkable electrical, mechanical, and thermal properties. However, conventional synthesis routes often involve toxic chemicals, high energy consumption, and hazardous byproducts, limiting their large-scale and sustainable application. In recent years, green synthesis approaches have emerged as an eco-friendly alternative for producing CNMs, utilizing natural precursors, renewable resources, and energy-efficient methods. Plant extracts, fruit peels, biomass, microorganisms, and other bio-waste materials serve as effective carbon sources, providing an abundant and low-cost pathway for nanomaterial fabrication. Techniques such as hydrothermal treatment, microwave-assisted synthesis, and sol–gel processes enable the conversion of these precursors into functional carbon nanostructures with controlled size and morphology. These green methods not only minimize environmental impact but also enhance biocompatibility, making the resulting CNMs highly suitable for biomedical, environmental, and energy-related applications. For example, carbon quantum dots synthesized from agricultural waste exhibit excellent photoluminescence for bioimaging and sensing, while biomass-derived graphene shows promise in energy storage devices. Furthermore, green-synthesized CNMs offer scalable potential for environmental remediation, catalysis, and drug delivery due to their non-toxic and sustainable origin. Despite notable progress, challenges remain in achieving uniformity, large-scale production, and reproducibility. Continued research into optimizing synthesis conditions and exploring novel bio-resources will be essential for advancing green nanotechnology. Thus, the green synthesis of carbon nanomaterials represents a sustainable pathway toward next-generation materials science, balancing performance with environmental responsibility.

Keywords: Nanotube, biomass, ecofriendly

Abstract ID: ICTACSR 2025/PP 07

How to Use Algorithms in Solving Mathematical Problems and its Need

Pranay Kumar Nath*
Assistant Professor, Department of Bengali, R.K. Nagar College
*Correspondence: npranayk73@gmail.com

Abstract

An algorithm is a well-defined, step by step procedure or set of rules designed to solve a specific class of mathematical problem or perform a computation, much like a recipe provides a finite sequence of instructions to achieve a culinary goal.
In mathematics, algorithms are essential tools that simplify and systematize the problem-solving process, making it efficient, accurate, and reproducible. The fundamental objective of using algorithms in solving mathematical problems is to break down complex task into a series of clear manageable actions that can be performed by humans or automated by Computers. This systematic approach involves clearly defining the problem, identifying inputs and desired outputs and then with extreme care outlining the sequence of operations or instructions required to transform the input into the outputs. Common Mathematical algorithm ranges from fundamental arithmetic, like the standard procedure for long division to advanced computational methods like Euclidean algorithm for finding the greatest common divisor,
Newton-Raphson method for solving equations or matrix algorithms used in Linear algebra.
One of the key benefits of algorithms is their ability to handle repetitive calculations accurately and rapidly, which is especially valuable in computer-based problem solving. Moreover, algorithms promote clarity and structure in problem solving, reducing human error by following predefined steps.
Algorithms play a crucial role in mathematical Problem solving by providing a systematic approach that ensures Precision and efficiency, they serve as the backbone of Modern Computational mathematics and are widely applied in areas such as optimization, numerical analysis, data analysis and computer programming. Understanding and developing effective algorithms is fundamental for students, researchers and professionals dealing with mathematical challenges.
Keywords: Algorithms, Mathematical Problems, Complex task, Input, Output and Error.

Abstract ID: ICTACSR 2025/PP 08

Review of Polarimetric Study on Dark Star Forming Clouds

Dipankar Paul*
Assistant Professor, Department of Physics, Ramkrishna Nagar College, 788166, Sribhumi, Assam
*Correspondence: dippaul_99@rediffmail.com

Abstract

Polarimetric studies of dark star-forming clouds provide essential insights into the magnetic field structures and dust grain properties that play a key role in star formation processes. Dark clouds such as Bok globules and molecular clouds are opaque regions rich in gas and dust where stars are born, but their internal dynamics remain complex and not fully understood. Polarimetry, by measuring the polarization of starlight passing through these clouds, reveals the alignment of dust grains with local magnetic fields and enables mapping of the field morphology in different regions of the clouds.

This review examines key observational results from optical and submillimetre polarimetric studies of several well-known dark star-forming clouds including CB3, CB25, CB54, and CB56. Optical polarimetry probes the less dense outer layers by detecting polarization induced by dichroic extinction, providing two-dimensional maps of plane-of-the-sky magnetic field orientation. Submillimetre polarimetry complements this by tracing the colder, denser inner regions through emission polarization of aligned grains. Combined, these techniques demonstrate the significant influence of magnetic fields on the cloud dynamics, fragmentation, and eventual star formation.

The studies reveal complex but coherent magnetic geometries often aligned with cloud elongation, underscoring the role of magnetism in regulating collapse and supporting cloud structure against turbulence. Correlations between polarization degree and extinction also highlight variations in dust alignment efficiency under different environmental conditions. These findings contribute to understanding of fundamental star formation mechanisms, bridging theoretical models and observed cloud morphology.

This review synthesizes methodologies and highlights major scientific conclusions from polarimetric investigations in dark clouds, emphasizing their value in unveiling the interstellar magnetic environment where stars take shape. It also identifies areas for future research including higher resolution mapping and multi-wavelength polarimetry to further unravel the interplay of magnetic fields, dust, and gas in star-forming regions.

Keywords: Molecular clouds, Dust grain alignment, Interstellar medium (ISM), Polarization mapping, Star formation, Optical polarimetry.

Abstract ID: ICTACSR 2025/PP 09

Deciphering Source and Tectonic Setting of Barail Sandstones, Mizoram, NE India: A Whole-Rock Geochemical Approach

Aribam Puran Sharma*, M. Faruque Hussain
Department of Earth Science, Assam University, Silchar-788011
*Correspondence: puranaribam96@gmail.com

Abstract

Geochemical composition of Barail sandstones of Surma Basin, Mizoram were analyzed to evaluate their provenance, palaeoclimatic condition, tectonic setting and depositional processes. The average values of SiO_2 and Al_2O_3 are 76 wt% and 11 wt% respectively. Al_2O_3 shows strong positive correlations with Fe_2O_3, TiO_2, MgO, K_2O, and Na_2O suggesting the presence of significant proportion of clay minerals (e.g., illite, kaolinite) and fine matrix while a negative correlation with SiO□ indicates compositional maturity and quartz dilution. Enriched patterns of LREEs with flat HREE patterns and negative Eu anomaly reflects contribution from felsic sources, primarily granodiorite to high-K granite. This is supported by the high values of Rb, Ba and Zr. The weathering indices like CIA and PIA have values of 70-80 and 80-95 respectively suggesting moderate to intense chemical weathering in warm, humid climatic conditions. Sandstone classification diagrams like log(SiO_2/Al_2O_3) vs log(Fe_2O_3/K_2O) and ternary diagram of Na_2O–K_2O–Fe_2O_3+MgO classify the sandstones as litharenite with non-marine or deltaic origin. Discrimination diagrams including Th/Sc vs Sc and La-Th-Sc ternary diagrams suggest a felsic to intermediate igneous provenance. The high value of Zr/Sc suggest zircon enrichment due to sediment recycling. Tectonic setting discrimination diagrams like Ti/Zr vs La/Sc and Th-Sc-Zr/10 suggest derivation of sediments from continental island arc and deposition in an active continental margin setting. These findings support derivation of sediments from felsic crustal sources likely from the proximal Indo-Burmese arc during the Oligocene and deposition in a tectonically active foreland basin under conditions of intense chemical weathering.

Keywords: Geochemistry; Barail Sandstone; Mizoram; Weathering; Provenance.

Abstract ID: ICTACSR 2025/PP 10

Pheophorbide A as a CH_3• Radical Scavenger: A DFT Study

Monorama Kalowar, Swarnadeep Biswas
Department of Physics, Assam University Silchar
*Correspondence: monorama.kalowar@aus.ac.in, swarnadeep.biswas@aus.ac.in

Abstract

Studies reported on Pheophorbide a (Phe a) have highlighted its strong antioxidant and radical scavenging properties. Theoretically, mechanism underneath the CH_3• radical scavenging ability of Phe a was studied using Density Functional Theory (DFT). M06-2X/6-311+G(d,p) level of theory available in the Gaussian 09 software suite was used for performing the calculations. Global reactivity descriptors, frontier molecular orbitals, and molecular electrostatic potential analyses were conducted to ascertain its reactivity and stability. Radical Adduct Formation (RAF), Hydrogen Atom Transfer (HAT), and Single Electron Transfer (SET) were investigated to understand its radical scavenging mechanisms. The results obtained indicate that both RAF and HAT reactions are exergonic in gaseous and aqueous phases, whereas SET reactions are endergonic in both the media. Phe a is an efficient CH_3• radical scavenger and its scavenge CH3 radical preferably via RAF and HAT mechanisms.

keywords: DFT, Pheophorbide a, Gaussian 09, CH_3• radical, RAF, HAT, SET

Abstract ID: ICTACSR 2025/PP 11

Distribution and Diversity of Algae and Cyanobacteria in Namdapha National Park, Arunachal Pradesh, North-East India

Abhilash Borgohain[1], Jayashree Rout[2], Dharitri Borah[1]*
[1]Department of Life Science, Faculty of Agriculture and Life Science, Arunachal University of Studies, Namsai-792103, Arunachal Pradesh, India
[2]Department of Ecology and Environmental Science, Assam University, Silchar-788011, Assam, India
*Correspondence:dharitrialgae@gmail.com

Abstract

The diversity of algae and cyanobacteria were explored in different habitats of Namdapha National Park of Arunachal Pradesh, Eastern Himalayas. In the study, wide range of algal/cyanobacterial taxa with 52 species (28 genera) were identified under 3 classes, viz. Cyanophyceae (17), Chlorophyceae (30), Bacillariophyceae (5). Species biomass (Chlorophyll *a*) was found to be negatively correlated with habitat pH. The predominance of Chlorophyceae in different habitats including epiphytes signifies the adaptability of the species (*Trebouxia* sp., *Trentepohlia* sp., *Chlorococcum* sp.) in different ecological niche. The habitat characterization indicated maximum water pH (8.52) and conductivity (246µS/cm) in Anamika waterfall. The soil pH (7.65) and conductivity (153.03 µS/cm^3) were highest in Naharbari area. The soils from rice fields presented highest moisture content (45.44%), bulk density (0.23 g/cm^3) and organic carbon (3.13%). The dominant *Trebouxia* sp. was found to grow on alkaline barks (pH 8.55). Biomass (Chlorophyll *a*) was maximum (31.72 µg/cm^2) for *Spirogyra crassa* with highest total carotenoid content (8.92 µg/cm^2). The study emphasized on the rich algae/cyanobacteria diversity and their habitat ecology in the biodiversity rich region.

Keywords: Algae, cyanobacteria, conservation, diversity, niche

Abstract ID: ICTACSR 2025/PP 12

Spinel Ferrites for Sustainable Remediation: Fundamentals, Synthesis, and Mechanistic Pathways

Sibasish Chakraborty, Saptarshi Roy and Md. Ahmaruzzaman*
Department of Chemistry, National Institute of Technology, Silchar – 788010, Assam, India
***Correspondence:** mazaman@che.nits.ac.in

Abstract

Spinel ferrites (MFe_2O_4), a fascinating class of magnetic nanomaterials, have emerged as highly promising catalysts owing to their unique structural and physicochemical attributes. Their tunable cation distribution, flexible valence states, and adjustable electronic interactions provide an excellent platform for tailoring catalytic activity and surface reactivity. These characteristics enable the generation of abundant active sites, facilitate redox reactions, and support functional modifications, making spinel ferrites ideal candidates for environmental remediation. Furthermore, their intrinsic ferrimagnetism offers the added advantage of simple magnetic recovery and reusability, ensuring both economic and ecological sustainability. A wide spectrum of synthesis strategies has been developed for producing spinel ferrites with controlled morphology and size, ranging from conventional chemical routes such as sol–gel, co-precipitation, hydrothermal, and solid-state methods, to greener approaches utilizing plant extracts. Advanced characterization tools including X-ray diffraction, electron microscopy, and photophysical analyses have been employed to probe their structural features, particle size distribution, and surface chemistry, providing deeper insight into the structure–property relationship. Applications of spinel ferrites in wastewater treatment span the degradation and removal of recalcitrant organic and inorganic pollutants, including textile dyes, pesticides, heavy metals, and pharmaceutical residues such as antibiotics. Their performance in heterogeneous photocatalysis and Fenton-like advanced oxidation processes has demonstrated remarkable efficiency, driven by enhanced electron–hole separation, rapid radical generation, and robust stability under operating conditions. Several factors such as pH, pollutant concentration, light intensity, catalyst dosage, and surface modification strategies critically influence the catalytic efficiency and have been systematically optimized in reported studies. Despite these promising outcomes, challenges persist, particularly concerning the potential toxicity of nanoparticles, metal ion leaching into treated water, and difficulties in scaling up synthesis processes for

industrial applications. Addressing these concerns is crucial to ensure safe and sustainable deployment in real-world systems. Looking ahead, the integration of emerging computational techniques, especially machine learning, holds immense potential in predicting structure–property relationships, optimizing synthesis protocols, and accelerating the design of high-performance spinel ferrite catalysts. In summary, spinel ferrites represent a versatile, cost-effective, and recyclable material platform for next-generation wastewater treatment. Their unique combination of structural tunability, magnetic separability, and multifunctional catalytic activity positions them as a cornerstone for developing sustainable technologies to tackle the pressing global challenge of water pollution.

Keywords: Spinel Ferrites, Heterojunction, Charge transfer, Reactive oxygen species, Recyclable catalyst, Z-scheme mechanism

Abstract ID: ICTACSR 2025/PP 13

Recent Advancements in Geopolymer-Based Materials as Promising Heterogeneous Catalysts in Transesterification Reactions for Biodiesel Production

Sanghita Kangsa Banik, Saptarshi Roy, and Md. Ahmaruzzaman*
Department of Chemistry, National Institute of Technology Silchar – 788010, Assam, India.
*Correspondence: mazaman@che.nits.ac.in

Abstract

The contemporary global energy demands are fulfilled to a large extent through an exorbitant reliance on the conventional non-renewable energy sources like fossil fuels which imparts an adverse effect on the environment causing ecological imbalance. As such, seeking an alternative efficient energy source to meet the world energy demand is the need of the hour. Biodiesel has emerged as a promising sustainable and eco-friendly contestant to replace fossil fuels as the global energy provider. Apart from the wide range of homogeneous and heterogeneous catalysts employed for the synthesis of biodiesel through transesterification reactions, geopolymer-based catalysts have displayed huge potential as heterogeneous catalyst for the transesterification process. Geopolymers are advanced inorganic materials derived from the alkali activation of aluminosilicate binders sourced from industrial waste materials like fly ash, bottom ash, slag, or from clay-based materials enriched with silica and alumina. Geopolymer catalysts contribute meaningfully towards waste valorization through cost-effective biodiesel production. A holistic investigation of the state-of-the-art of geopolymer based catalyst in biodiesel production is presented by thorough evaluation of the synthetic techniques, structural and morphological properties, thermal stability, and the surface properties including acidic or basic site properties. The effect of various reaction parameters on the performance of geopolymer catalyst in the transesterification reaction for biodiesel production is evaluated in-depth with the aid of response surface methodology. Additionally, the kinetic and mechanistic pathways of the transesterification process with geopolymer catalyst is evaluated. Role of some machine learning tools has also been assessed for refining the process optimisation for enhancement of the biodiesel yield. This study underscores the transformative potential of geopolymer materials for a sustainable and energy-efficient advancement of biodiesel production.

Keywords: Geopolymer, Biodiesel, Catalysis, Transesterification, Response Surface Methodology

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Foliar Application of Melatonin Regulated Aluminium (Al^{3+}) and Manganese (Mn^{2+}) Induced Oxidative Stress Responses in Tomato Seedlings

Susmita Nath, Shuvasish Choudhury
Department of Life Science and Bioinformatics, Assam University, Silchar 788011, India
*Correspondence: susmita99tultul@gmail.com

Abstract

The indiscriminate use of inorganic soil amendments and unregulated irrigation practices are one of the major causes of soil acidity, besides its natural causes. Acidic soils largely have toxic levels of aluminium (Al^{3+}) and manganese (Mn^{2+}), which impose a serious impact on plant growth and development. Among stress mitigation approaches, foliar application of stress modulators has emerged as one of the foremost methods. In the present study, we used the foliar application of melatonin (MT) to improve the response of tomato seedlings growing under toxic levels of Al^{3+} and Mn^{2+}. Both Al^{3+} and Mn^{2+} severely affect tomato growth, imparting an inhibitory effect on seedling development and promoting oxidative damage. The foliar application of MT imparted significant mitigation against stress-induced changes, which were clearly observed in terms of substantially improved response compared to those under Al^{3+} and Mn^{2+} stress alone. In the absence of MT application, the tomato seedlings showed stunted growth, such as shorter shoots, roots, and stalks, and fewer leaves. Both Al^{3+} and Mn^{2+} stress resulted in increased levels of ROS along with high malondialdehyde (MDA) content, which were considerably lower in MT applied tomato seedlings. Our findings reveal that MT effectively promotes tolerance against Al^{3+} and Mn^{2+} stress by balancing the growth and oxidative stress responses.

Keywords: Aluminium toxicity, melatonin, tomato, oxidative stress, ROS, Stress tolerance

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The Importance of Digital Detoxification

Aparna Das Dey*
Department of Chemistry, Ramkrishna Nagar College, Sribhumi
*Correspondence: aparnadas4852@gmail.com

Abstract

Digital detoxification is increasingly vital in today's hyperconnected world, offering measurable benefits for mental health, productivity, and emotional resilience. As technology permeates every aspect of daily life, excessive screen time can lead to heightened stress, anxiety, depression, cognitive fatigue, and disrupted sleep.
Digital detoxification, defined as the intentional and temporary abstention from digital devices and online platforms, addresses the growing concerns around technology overuse and its impact on mental, physical, and social well-being.
Digital detoxification can reduce stress, anxiety, depression, and improve focus and emotional regulation, according to multiple studies and meta-analyses, it can reduce digital dependency, reconnect with oneself and others, and promote mindful engagement with the present moment.
Disconnecting from constant notifications and information overload lowers cortisol levels, providing immediate relief from digital-induced mental strain.
Less screen time means a reduction in eye strain, headaches, and sedentary behaviour, limiting screen exposure before bedtime restores healthy sleep cycles.
Detaching from digital media helps break cycles of social comparison and encourages genuine emotional connections, increasing self-esteem and life satisfaction.
Families experience more meaningful conversations and better listening skills when screens are set aside, leading to deeper understanding among members. Shared activities and face-to-face interactions during detox periods help build empathy, trust, and lasting memories, reinforcing supportive family networks.
Without digital interruptions, children show improved attention spans, creativity, and emotional development, with positive effects on behaviour and academic performance.
The core aim of digital detoxification is to recalibrate digital consumption habits, mitigate the psychological strain from perpetual connectivity, and foster overall well-being.
Common strategies for digital detox may include unplugging from all digital devices for set periods, practicing mindful and purposeful use of technology, enjoying physical

activity with rides around the neighbourhood to boost health and social skills. Exploring local parks or trails with a list of natural items to find, encouraging curiosity and fresh air. Planting flowers or vegetables, teaching responsibility and patience. Classic board games that bring laughter and teamwork to all ages. Finger painting, paper crafts, or decorations foster creativity and shared accomplishment. Hosting a dance-off, sing-along, or karaoke session to get active and enjoy music together. Preparing simple recipes or bake treats, engaging kids in hands-on learning and tasty rewards. Shared reading time, regardless of age, nurtures imagination and conversation.

Recent research & systematic reviews highlight that digital detox interventions can lead to improved attention, reduced stress, enhanced self-reflection, and a healthier relationship with technology, though the degree and nature of benefits can vary based on individual differences and the design of the detox program. Key findings indicate a notable reduction in depressive symptoms and the cultivation of mindfulness, emotional regulation, and meaningful offline interactions— making digital detoxification an essential practice for modern well-being, prompting recommendations for regular, personalized periods of disconnection as part of a balanced digital lifestyle.

Keywords: Screen time, cognitive clarity, mindfulness, digital dependency.

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Anthelmintic Effects, Toxicity and GC-MS Study of *Drymaria villosa* Schltdl. & Cham on Swiss Albino Mice

Jasmine Akhtar*, Arun Kumar Yadav
Dept of Zoology, North Eastern Hill University
***Correspondence:** akhtarjasmine60@gmail.com

Abstract

Drymaria villosa Schltdl. & Cham is a medicinal plant traditionally used for its therapeutic potential in the West Jaintia Hills of Meghalaya, for the treatment of intestinal worm infections. The present study aims to investigate the anthelmintic activity of *D. villosa* (whole plant) through both *in vitro* and *in vivo* experiments, evaluate its toxicity and profile its phytochemical constituents using GC-MS against *Syphacia obvelata* in Swiss Albino mice.

Materials and Methods: *In vitro* assays were performed using plant extracts at concentrations of 10, 20 and 30 mg/ml on adult *S. obvelata*, with efficacy assessed by monitoring worm paralysis and mortality. *In vivo* experiments involved infected mice treated with doses of 100, 200 and 400 mg/kg, with effectiveness measured by post-treatment worm burden. Sub-acute toxicity was evaluated at the highest dose (400 mg/kg) through hematological, biochemical and histological analyses.

Results: The extract exhibited a dose-dependent anthelmintic efficacy. At 30 mg/ml, worms showed paralysis and mortality at 8.47 ± 0.27 h and 9.13 ± 0.33 h, respectively, demonstrating activity comparable to albendazole (ABZ), and confirmed by Scanning Electron Microscopy (SEM) observations. *In vivo* treatment with 400 mg/kg reported reduced worm burden by 51.10%. Toxicity studies at the highest dose revealed slight alterations in the histopathological changes. Further, GC-MS analysis detected 34 compounds, among which Phenol, 2,4,6-tri-tert-butyl-, Desmethoxyencecalin and Ethanone, 1-(7-hydroxy-5-methoxy-2,2-dimethyl-2H-1-benzopyran-) were found to be the most abundant.

Conclusion: *D. villosa* demonstrates notable anthelmintic activity, though accompanied by mild toxicity at higher doses. These findings validate its ethnomedicinal use in Meghalaya's West Jaintia Hills and point to its potential for future development as a plant-based alternative to synthetic anthelmintics.

Keywords: Anthelmintic, Jaintia, *Drymaria villosa*, *Syphacia obvelata*, GC-MS analysis

Abstract ID: ICTACSR 2025/PP 17

The Dual Nature of Traditional Curd: A Source of Probiotic Traits and Multidrug-Resistant Bacteria

Mainak Paul*, Puja Paul, Poulomi Chanda and Soumitra Nath
Department of Biotechnology, Gurucharan University, Silchar, 788004, Assam, India
*Correspondence: amit17paul2007@gmail.com

Abstract

This study investigated the microbial composition of traditionally fermented curd prepared with lemon, tamarind, sugar, jaggery, and starter cultures, with a focus on the in vitro screening of presumptive probiotic potential, safety assessment, and technological properties. Two isolates were identified as *Weissella cibaria* strains (GCC_24LM and GCC_24IM), which demonstrated desirable probiotic attributes including tolerance to acidic gastric juice, bile salts, and digestive enzymes, alongside moderate hydrophobicity, autoaggregation, biofilm formation, and a high cholesterol assimilation rate, while remaining non-hemolytic and non-virulent, albeit with variable antibiotic resistance. In contrast, three additional isolates, *Psychrobacter okhotskensis*, *Pasteurella multocida* and *Staphylococcus aureus*, exhibited similar probiotic-like traits but lacked antagonistic activity against pathogens and showed extensive multidrug resistance, particularly to β-lactams, cephalosporins, carbapenems, and macrolides. These findings highlight the dual nature of fermented curd microbiota, serving as a source of promising probiotic candidates as well as multidrug-resistant pathogens, thereby underscoring the critical need for rigorous microbial safety evaluation and antimicrobial resistance surveillance before traditional dairy products are recommended for probiotic applications.

Keywords: Probiotic; curd; *Weissella cibaria*; biofilm formation; multidrug resistance

Abstract ID: ICTACSR 2025/PP 18

Lifestyle and Environmental Predictors of Polycystic Ovarian Disease in North-East India: Insights from Barak Valley, Assam

Puja Paul* and Soumitra Nath
Department of Biotechnology, Gurucharan University, Silchar, 788004, Assam, India
*Correspondence: pujapol294@gmail.com

Abstract

Polycystic Ovarian Disease (PCOD), a leading cause of hormonal imbalance and reproductive dysfunction in women, arises from a combination of genetic, lifestyle and environmental factors. PCOD is closely associated with Polycystic Ovary Syndrome (PCOS), is one of the most prevalent endocrine disorders among women of reproductive age, with multifactorial origins involving genetic, lifestyle, and environmental interactions. Despite its rising prevalence in India, limited evidence exists from the North-Eastern region, where environmental exposures and lifestyle transitions are unique. This cross-sectional study investigated the determinants of PCOD among 222 women (152 diagnosed cases, 70 controls) from Barak Valley, Assam. Data were collected using structured questionnaires, and analyzed through correlation and multiple regression models. Results revealed that frequent junk food intake and alcohol consumption were strong dietary predictors of PCOD, while pesticide exposure emerged as a significant environmental risk factor. Interestingly, the use of plastic containers showed an inverse association with PCOD, suggesting possible local confounders or sociocultural influences. Among biological factors, body weight positively correlated with PCOD, whereas BMI showed an inverse relationship, highlighting the presence of "lean PCOD" cases in the region. No significant associations were observed for age, family history, or comorbid conditions. These findings align with recent global studies emphasizing the roles of diet, endocrine-disrupting chemicals, and phenotype diversity, while underscoring region-specific trends that demand tailored public health interventions. The study highlights the necessity for awareness programs, lifestyle modifications, and future genomic and epigenetic investigations to address the unique burden of PCOD in North-East India.

Keywords: PCOD; hormonal imbalance; pesticide; lean PCOD; Barak Valley, Assam

Abstract ID: ICTACSR 2025/PP 19

A Study on Stress Level and Coping Strategies Among Young Adults Preparing for Competitive Exams

Satabdi Bhattacharjee[1*] and Nanda Gaonkar[2]
[1] M.Sc. Psychology Student, Andhra University Visakhapatnam, Andhra Pradesh, India
[2] Psychologist and Founder Jneya Foundation, Bangaluru, Karnataka, India
*Correspondence: satabdi712@gmail.com

Abstract

Background: Stress is the body's natural response to challenges and demanding situation that can cause mental tension and worry. During preparation for competitive exams, individual faces numerous stresses from familial and societal expectation, intense competition and pressure to succeed. Coping with these stresses requires specific efforts that individual employ to tolerate and reduce stressful situation.
Aim of the Study: The purpose of the study was to explore the stress and coping strategies employed by young adults preparing for competitive exams.
Methodology: This is a cross-sectional study of randomly selected young adults of aged 18 to 30 years old in Silchar, Assam. Informed consent was taken for voluntarily participation and it was assured that identity of the participants will remain confidential. Incomplete questionnaires were not included in this study. The data was collected using demographic variables, survey questionnaire and perceived stress scale for identifying stress and its source. Brief COPE scale was used for assessing coping strategies.
Results: The result of the study indicated that most of the young adults felt stressed worrying about future, parental expectation, peer pressure, and have low self-confidence. Coping strategies were significantly applied that includes seeking advice and help from others, self-distraction, yoga, meditation and finding comfort in religion. Few adults were involved in drinking alcohol occasionally, smoking and chewing tobacco.
Conclusion: Preparing for competitive exams is stressful, but adapting healthy stress coping strategies can promote physical and mental well-being. Moreover, with the right approach of a well-structured study plan, healthy lifestyle choice, self-care, emotional support and a positive attitude can reduce stress.

Keywords: Stress, young adult, competitive exams, coping strategy

Abstract ID: ICTACSR 2025/PP 20

Role of Wild Edible Food Plants in the Livelihood of Tribals of Lakhipur Subdivision, Cachar, Assam

Nirupam Das*
Dept of Botany, Cachar College, Cachar, Assam, India,
*Correspondence: Dasnirupam63@gmail.com

Abstract

The plants which are edible and grow in wild are known as wild edible plants. An inventory of wild fruits, leaves, flowers, tubers, rhizomes, roots, and seeds, used by tribal communities under Lakhipur subdivision of Cachar, Assam was made through interaction with locals and local market survey which reveals numerous plats that can be consumed as foods. Several species of wild edible plants were found to be used by them as food and food additives contributing to their livelihood and earning. The availability of these wild plants are mainly on Thursday followed by Saturday as market day. The enumeration of these wild food plants with correct botanical name, habits, habitats, part used, mode of consumption and market value are presented. The present study showed that wild edible plants play a pivotal role in income generation for the tribal people living under Lakhipur subdivision.

Keywords: Wild edible plants, Lakhipur subdivision, Market value

Abstract ID: ICTACSR 2025/PP 21

Upscaling Oyster Mushroom Cultivation in Cachar District of Assam, India for Agri-Entrepreneurship

[1]**Bishali Choudhury** & [2]Biswajit Deb Roy*
Department of Botany, Cachar College, Silchar-788001, Assam, India.
*Correspondence: bishalichoudhury8@gmail.com, bdebroy6@gmail.com

Abstract

Mushroom cultivation has become popular among the start-up entrepreneurs, leveraging the diverse agro-climatic conditions and substantial agricultural waste across the globe. Mushroom cultivation is not only a profitable mean of livelihood opportunity but also addresses several key issues of 21st century, including resource utilization, circular economy, job creation, sustainability, and nutritional security, while also mitigating the impacts of unpredictable weather. The mushroom industry has the potential to recycle approximately 947 million tons (MT) of agro waste generated in India, positioning it as a key component in the next agricultural revolution after the Green Revolution (Inci et al., 2024). Keeping in view the above facts we have tried to optimize an innovative cultivation process of locally available strain of Oyster Mushroom present in the natural habitats of Cachar district of Assam, India using agricultural and household wastes. The fruit body of the mushroom collected from the natural habits of the study area is longitudinally split open into two halves. A small bit of tissue from the inside of the junction area of the pileus/cap and stalk is taken aseptically with forceps and placed over potato dextrose agar (PDA) media in slants or Petri plates. These are incubated at 25±2°C and after a week's time, the tissue generates mycelium which covers up the entire media surface and the cultures become ready. Substrates (~1kg) were filled in polypropylene bags (28cm × 63cm) and inoculated with 100g of oyster mushroom spawns. The mouth of the bag was tightly tied with rubber band and pin holes were made. Harvesting is done when the cap has the diameter of 8-10 cm. Picking is done by twisting gently so that it is pulled out without leaving any stalk and also the nearby fruiting bodies are not disturbed. When the base of the stipe is deeply immersed within the straw, cutting the base of stipe with Sharpe Blade can be done. It is possible to get 800 grams to a kilogram or more fresh mushrooms fruiting body per kilogram of the dry substrate (combination of rice straw, saw dust, banana leaves in the ratio of weight 4:2:1). This study confirmed that the Oyster mushroom, Pleurotus spp. may be grown

well in a mixture of substrates like rice straw, saw dust and banana leaves when compared with other individual substrates and also it is confirmed that the spawn produced from rice straw have potential to produce spawns of oyster mushroom. Further work in this direction on the use of various agricultural and industrial wastes as substrate for oyster mushroom cultivation, their economic feasibility and other related issues of mushroom cultivation may develop locally optimized cultivation practice of oyster mushroom in Cachar district of Assam, India.

Keywords: Oyster mushroom, Pleurotus spp., spawn, rice straw, banana leaves, saw dust.

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Vertical Farming: Future of Empowering Assam's Agriculture

L. Sonali Devi
Department of Botany, Cachar College, Silchar-788001, Assam, India
*Correspondence: laitonjamsonali@gmail.com

Abstract

Assam population has become approximately 3.73 Crore. Increase of population also exacerbates issues like resource scarcity, particularly in food security. Agriculture in Assam faces problems due to frequent floods, poor irrigation and inadequate infrastructure which leads to low and uncertain yields. Urbanization which increases urban population and decreases farmland demand an innovative solution to food security. Vertical farming offer an innovative solution to food security concern by maximizing production in limited spaces. Many nation including our country have witnessed significant expansion in vertical farming owing its potential in addressing a critical issue like food security. Vertical farming can be established in populous region to provide fresh, nutritious food to people year-round, irrespective of weather conditions. Numerous startups and vertical farming enterprises are already operational in India, striving to supply major urban centers with locally sourced produce. More food production in an area led to more abundant food supply, potentially lowering prices and making food more accessible.

Keywords: Assam, vertical farming, food security, accessible.

Abstract ID: ICTACSR 2025/PP 23

A Novel Catheter Lock Solution for Preventing *Staphylococcus aureus* Biofilm Formation in vascular catheters

Urbi Dhar [1], Ashwini Chauhan [2], Ankurita Bhowmik[1*]
[1] Department of Microbiology, Techno India University, Tripura-799003
[2] Department of Microbiology, South Campus Delhi University, Delhi-112201
[*]Correspondence: ankuritabhowmik@gmail.com

Abstract

Catheter-related bloodstream infections (CRBSIs) pose a major challenge in healthcare, with *Staphylococcus aureus* being one of the most prevalent biofilm-forming pathogens involved. Biofilms enhance *S. aureus* resistance to antibiotics and immune defenses, making treatment difficult. Conventional catheter lock solutions, such as heparin and antibiotic lock therapy (ALT), have demonstrated limited effectiveness, with heparin potentially facilitating biofilm formation. The growing threat of antibiotic resistance highlights the urgent need for alternative, non-antibiotic strategies for biofilm prevention. This study evaluates the efficacy of glycerol as a catheter lock solution in preventing *S. aureus* biofilm formation. In-vitro experiments using static biofilm models were conducted to assess glycerol's impact on *S. aureus* biofilm formation. The results showed that the glycerol completely inhibited *S. aureus* biofilm formation, with no viable biofilm cells detected. These findings highlight the potential of glycerol as a promising catheter lock solution for reducing *S. aureus* biofilms.

Keywords: Biofilms, *Staphylococcus aureus*, non-antibiotic lock solutions, CRBSI

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Repurposing Desmopressin as an AXL inhibitor for targeted therapy in Hepatocellular carcinoma (HCC)

Sudeshna Acharya[1], Malabika Das[1] and Rajat Nath[1*]
[1]Department of Biotechnology and Microbiology, Techno India University, Tripura, India, 799004
*Correspondence: rajatnath17@gmail.com

Abstract

Hepatocellular Carcinoma (HCC) is one of the prominent causes of cancer related deaths, globally affecting around 8.6 individuals per 1,00,000 populations. Since, with a notable rise in annual cases outpacing global averages, HCC incidences in India ranges from 2.7 to 3.9 per 100,000 populations. Therefore, it is crucial to investigate and explore compounds with the potential to inhibit the progression of HCC. Due to subtle nature of symptoms, the cancer often goes undetected until advanced stages, results high mortality rates. In HCC, 'AXL' is a receptor tyrosine kinase have a significant impact accelerating cancer progression & metastasis, it is a type of protein that sits on the surface of the cells & acts like a switch, sending signals inside the cells. Thus, targeting a distinct cell population could potentially inhibit the proliferation of HCC cells. To get a new AXL inhibitor, drug repurposing strategy were applied and 22 drugs used for endocrine disorder were selected and molecular docking were performed. Among them Desmopressin, shows the best interactions with the AXL with the binding affinity of -279.08 & Hbond of about 12.97 higher than others selected drugs as well as the positive control Fostamatinib. These computational findings suggest that Desmopressin has potential as a natural AXL inhibitor and could serve as a lead chemical for future optimisation in HCC therapy. Further in vitro and in vivo experiments is required to determine its efficacy as a viable treatment alternative.

Keywords: Hepatocellular Carcinoma (HCC), AXL, Drug repurposing, Desmopressin, Molecular docking

Abstract ID: ICTACSR 2025/PP 25

Vitamin D Deficiency Links Altered OPG/RANKL Ratio to Primary Liver Dysfunction in Rheumatoid Arthritis: Evidence from Women of Tripura

Debajit Shyam[1], Abhijit Dutta[1], Subhajit Debnath[1], Shukdeb Acharjee[1], Surajit Bhattacharjee[2]*
[1]Department of Biotechnology & Microbiology, Techno India University, Tripura, India
[2]Department of Molecular Biology & Bioinformatics, Tripura University, Suryamaninagar-799022, Tripura, India
*Correspondence: sbhattacharjee@gmail.com

Abstract

Objective: The osteoprotegerin/receptor activator of nuclear factor-κB ligand (OPG/RANKL) ratio plays a pivotal role in hepatic manifestations associated with rheumatoid arthritis (RA). Chronic inflammation in RA induces RANKL overexpression, promoting hepatocyte apoptosis. Vitamin D deficiency has been implicated in heightened pro-inflammatory cytokine release, thereby aggravating hepatic dysfunction. This study aimed to examine whether vitamin D deficiency influences OPG/RANKL-driven primary liver dysfunction in RA.

Methods: A total of 181 women with RA and 60 age-matched healthy controls (HC) free from chronic illness were enrolled. Serum vitamin D, OPG, and RANKL were quantified using ELISA, while liver enzyme activities (SGOT, SGPT, ALP, GGT) were assessed by colorimetry. Pearson's correlation was applied to analyze associations between vitamin D, OPG/RANKL ratio, and liver enzyme activity. Partial correlation analysis was performed after adjusting for vitamin D levels. Data were compared between RA and HC using Student's *t*-test.

Results: RA patients exhibited significantly reduced serum vitamin D and OPG/RANKL ratio, alongside elevated SGOT, SGPT, ALP, and GGT levels compared to HC ($p < 0.05$). No significant changes were observed in serum creatinine. Vitamin D positively correlated with OPG/RANKL ratio, while OPG/RANKL ratio demonstrated a significant negative correlation with liver enzyme activities in RA patients ($p < 0.05$). However, this correlation weakened after adjustment for vitamin D.

Conclusion: The findings indicate that vitamin D deficiency underlies the negative correlation between OPG/RANKL ratio and liver enzyme activity in RA, suggesting a vitamin D–mediated pathogenic axis linking bone metabolism regulators and hepatic dysfunction.

Keywords: Rheumatoid arthritis, vitamin D deficiency, OPG/RANKL pathway, liver dysfunction, bone-liver crosstalk.

Abstract ID: ICTACSR 2025/PP 26

A Review to Explore the Potentiality of Curcumin in Treating Antiphospholipid Syndrome

Ayan Saha[1], Isha Debnath[1], Swarup Paul[1] and Puja Rani Saha[1]*
[1]Department of Biotechnology and Microbiology, School of Natural Sciences
Techno India University Tripura, Maheshkhola, Agartala, Tripura, India, 799004
*Correspondence: pujars4@yahoo.com

Abstract

Antiphospholipid syndrome (APS) is an autoimmune disorder where antiphospholipid antibodies induce a hypercoagulable state, leading to recurrent thrombosis and pregnancy-related complications. Management primarily relies on long-term anticoagulant therapy to prevent further thrombotic events. Antiphospholipid syndrome is rare, with an estimated incidence of around 5 cases per 100,000 people per year. It has been found that approximately 70% of individuals with APS are females. Studies have shown that around 30% to 40% of patients with SLE (Systemic Lupus Erythematosus) develop antiphospholipid syndrome. Curcumin, the principal polyphenol of turmeric, exerts both anti-inflammatory and antioxidant effects by regulating or modifying multiple signalling pathways. It inhibits ROS (Reactive Oxygen Species) and RNS (Reactive Nitrogen Species) production in the body by boosting antioxidant proteins/enzymes such as SOD (Superoxide Dismutase) and Catalase. This reduces oxidative stress, thereby preventing excessive cell damage. Patients suffering from APS generally have activated immunological signalling pathways that increase pro-inflammatory proteins such as TNF-α (Tumor Necrosis Factor-alpha), IL-6 (Interleukin-6), COX-2 (Cyclooxygenase-2, an enzyme causing inflammation). These proteins are typically regulated by NF-κB (Nuclear Factor kappa-light-chain-enhancer of activated B cells), which is an important transcription factor. Curcumin prevents NF-κB from entering the nucleus of the cell, which ultimately reduces inflammation and flare-ups in blood vessels and organs. Antiphospholipid syndrome (APS) promotes anti-β2GPI antibodies, which raise Tissue Factor (TF) levels in blood vessels, resulting in clot formation. Curcumin blocks anti-β2GPI activity and gradually lowers the risk of thrombosis. The potentiality of curcumin may be explored in the grounds of proper and acute scientific investigations.

Keywords: Antiphospholipid syndrome, Curcumin, Inflammation, systemic Lupus Erythematosus, Anticoagulant activity and oxidative stress

Abstract ID: ICTACSR 2025/PP 27

Neuroprotective Potential of Natural Phenolic Compounds as MAO-B and COMT Inhibitors in Parkinson's Disease

Trisha Chakraborty[1], Anishka Bhowmik[1], Partha Sarkar[1] and Rajat Nath[1*]
[1]Department of Biotechnology and Microbiology, Techno India University, Tripura, Agartala, Tripura, India, 799004
*Correspondence: rajat.n@tiut.ac.in

Abstract

Parkinson's disease (PD) is a neurodegenerative condition characterized by dopaminergic neuron loss and elevated oxidative stress, which cause motor and cognitive deficits. Monoamine oxidase B (MAO-B) inhibitors, along with COMT (Catechol-O-Methyltransferase) inhibitors, are beneficial in Parkinson's disease therapy because they lower dopamine catabolism and oxidative stress, improving dopamine availability in the brain. Phenolic compounds, which are widely known for their antioxidant and neuroprotective characteristics, have been identified as MAO-B and COMT inhibitors. The goal of this work is to find such compounds by carrying out a thorough literature review, followed by molecular docking to establish their binding affinity to MAO-B and COMT. 56 phenolic compounds were selected based on their reported biological activities. The BBB permeability was determined, followed by molecular docking to study their interactions with the enzymes' active sites, including key binding residues and docking scores. Docking experiments found that three phenolic compounds interacted efficiently with MAO-B and COMT, in contrast to their positive controls used, resulting in stable hydrogen bonding. These findings indicate that they have the ability to regulate dopamine metabolism and protect neurons against degeneration. This study reiterates the therapeutic value of natural phenolic compounds as MAO-B and COMT inhibitors, providing evidence for their potential application in Parkinson's disease treatment. Additional in vitro and in vivo testing is required to confirm efficacy and safety. The results of this study could lead to the development of plant-derived MAO-B and COMT inhibitors that are safer than current neuroprotective medications for Parkinson's disease.

Keywords: *Parkinson's disease, MAO-B, COMT, Oxidative stress, Natural phenolics, Antioxidants*

Abstract ID: ICTACSR 2025/PP 28

A study on Plant diversity in association with stipule occurrence and herbivore activity in a home garden of Khowai, Tripura

Pamtwi Debbarma and Puja Rani Saha*
Department of Biotechnology and Microbiology, School of Health Sciences and Translational Research, Techno India University Tripura, Maheshkhola, Agartala, Tripura, India, 799004
*Correspondence: pujars4@yahoo.com

Abstract

Home gardens are socioecological systems generally exhibiting rich plant diversity with a wide range of cultivated as well as naturally occurring plants. They are thought to have considerable adaptation towards the local prevailing ecological conditions over a period of time. The existence of diverse plant species in home gardens tends to attract a lot of predation activity through herbivores and pests. Plants protect themselves by various defense mechanisms among which the mechanical defense system is significant which works through the presence of stipules. Stipules are small leaf like appendages found at the base of the leafstalk in many plants species which can differ according to their positions. The structural diversity and modification of stipules are key factors in the adaptive strategies of plants towards the standing ecological condition. Numerous research work has been carried out on documentation of home gardens relating to diversity. However, investigations on the probable relation between the plant community composition and stipule occurrence with a link to general herbivore activity is very scarce. The present investigation is an attempt to document the plant community composition in a home garden situated at North Maharanipura of Teliamura sub-division under Khowai district of Tripura with a view to relate plant diversity with two crucial factors of ecological importance which are stipule occurrence and herbivore activity. The study area covered approximately 8712 sq. ft. where 28 plant families are recorded with presence of stipules and absence of stipules. A total of 40 species has been observed out of which only 17 species possessed stipules and 25 species lacked stipules. Apocynaceae members was found to be more in number followed by Fabaceae whereas the members of other recorded families were less. However, individual count of specific plant species was also documented. Herbivore activity was moderate in the studied area due to its optimum maintenance as a home garden. High number of Apocynaceae members with no stipules can be corelated with the negligible herbivore activity from the present study.

Keywords: Plant diversity, home garden, stipule, herbivore, ecology

Abstract ID: ICTACSR 2025/PP 29

Experimental Design and Analysis of a V-Slotted Semicircular Patch Coupled Circularly Polarized Microstrip Antenna on Graded Composite Substrate

*Debashis Sarmah[1], Lalit Baruah[1] and Arunav Phukan[2]
[1]Department of Physics, Biswanath College
[2]Department of Physics, PDUAM Behali
*Correspondence: debaph09@gmail.com

Abstract

A novel circularly polarized microstrip antenna, incorporating advanced patch geometries and fabricated on a graded LDPE-titania composite substrate, has been experimentally investigated for enhanced broadband performance in the X-band. The design features a coaxially fed rectangular patch capacitively coupled with two V-slotted semicircular patches, whose dimensions were previously optimized by simulation using CST Microwave Studio.

Fabrication employed the patch metallization technique on the custom dielectric substrate, with careful alignment of feed locations and slot parameters. Experimental characterization was conducted to validate the antenna's return loss S11, bandwidth, radiation pattern, and axial ratio performance. Measurements, performed using a standard microwave test setup, revealed a significant match between simulated and measured S11 results, confirming the design's robustness. The introduction of V-shaped slots and hybrid coupling substantially improved the -10 dB bandwidth and broadened the axial ratio performance, enabling efficient circular polarization operation. Detailed radiation pattern measurements in both E-plane and H-plane demonstrated stable polarization characteristics and reduced cross-polarization levels.

The innovative coupling and slot configuration proved effective in overcoming the typical narrow bandwidth limitation of circularly polarized microstrip antennas, establishing its suitability for dynamic wireless communication applications. The comparative analysis further highlighted the broadband advantages of the fabricated geometry over conventional circular and rectangular patch designs.

Keywords: circularly polarized microstrip antenna, graded composite substrate, broadband operation, axial ratio, return loss.

Abstract ID: ICTACSR 2025/PP 30

Electroluminescent of Copper-Doped ZnTe and CdTe Nanoparicles

Lalit Baruah* and Debashis Sharma
Department of Physics, Biswanath College, Assam
*Correspondence: lbaruahbc123@gmail.com

Abstract

Copper-doped ZnTe and CdTe nanocrystals exhibit unique structural and optical properties with potential applications in nano light-emitting devices (nano-LEDs). Both types of nanocrystals were synthesized via simple chemical routes, yielding highly crystalline, monodisperse nanoparticles with sizes typically under 15 nm. Enhanced electroluminescence and fluorescence, ascribed to copper incorporation, were observed in both systems. The quantum confinement effect led to increased band gaps compared to bulk materials, demonstrating strong promise for optoelectronic and photonic technologies.

Keywords: Copper-doped, nanocrystals, optoelectronic, ZnTe and CdTe.

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Effect of KI Redox Additive on the Electrochemical Performance of Reduced Graphene Oxide Based Polyaniline Nanocomposite Electrodes

Madhabi Devi*
Assistant Professor, Department of Physics, Moridhal College, Dhemaji, India
*Correspondence: madhabidevi1992@gmail.com

Abstract

The increasing energy consumption and the dependence on fossil fuels have driven the search for alternative renewable and sustainable technologies [1]. Conducting polymers (CPs) such as polyaniline (PAni), polypyrrole and poly(3,4-ethylenedioxythiophene) have been widely studied in supercapacitors due to their high specific capacitance, energy density, easy synthesis and biocompatibility [2]. However, the repeated faradic reactions of CPs when used as electrodes reduce their cyclic stability and limit their application. The combination of CPs and graphene based derivatives can result in synergistic effects that can be utilized to obtain high performance supercapacitors. In the present work, the effects of chemically synthesized RGO on the electrochemical properties of PAni nanotubes have been discussed. The presence of RGO in the nanocomposites enhances the total capacitance by providing a capacitive double layer for charge storage and simultaneously a high surface area backbone that increases the contact between the coated PAni nanotubes and the electrolyte. The electrode giving the highest electrochemical performance is studied in three different concentrations of KI redox-additive in 1 M KCl electrolyte. The capacitance improvement for the optimized concentration of KI is investigated and a nearly two-fold increase of specific capacitance of RGO-PAni electrodes is obtained for 0.1 M KI concentration.

Keywords: Supercapacitor, Reduced Graphene Oxide, Polyaniline

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Abstract ID: ICTACSR 2025/PP 32

Powder water-borne adhesive formulation: Superiority and sustainability

Samiran Upadhyaya*
Department of Chemistry, Moridhal College, Dhemaji, Assam
*Correspondence: samiranupadhyaya@gmail.com

Abstract

Adhesives are one of the most demanding areas of research, due to their wide range of applications, ranging from small decorative to electronics, automobiles, and space industries. Among the different types of adhesives, water-borne adhesives are easy to handle and safe to use, and are therefore considered the most sustainable. One of the major issues with the commercially available fluid adhesives is that they dry up after a few uses once the seal is opened, thus leading to a shorter lifespan. Adhesives in the form of powder could be a solution to the short lifespan of adhesive fluids. Herein, we present a cost-effective water-borne powder adhesive that can be convenient for our daily use. We observed that our adhesive formulation showed higher lap shear strength (ASTM D-906) than the commercially available adhesive. The adhesive solid was found to be thermally stable up to 300 °C. In addition, the adhesive is fluorescent in nature, which can be detected under UV light, making it applicable for the detection of fractured joints in any specimen, as well as in anti-counterfeiting applications.

Keywords: Water-borne, powder adhesive, lap shear strength, fluorescent, anti-counterfeiting.

Abstract ID: ICTACSR 2025/PP 33

Integrative Morphological and Molecular Insights into the Endemic Freshwater Goby *Glossogobius flavipinnis* from Ancient Lake Towuti in the Wallacea Biodiversity Hotspot

Muhammad Misi Muslimin[1], Angkasa Putra[2], Sarifah Aini[2], Siti Hadijah[3], Jayadi[3], Herianto Suriadin[1], Hyun-Woo Kim[4,5,6,7,*], Shantanu Kundu[2,8,9,*]

[1]Department of Coastal Management and Marine Engineering, Graduate School, Indonesian Muslim University, Makassar, South Sulawesi 90231, Republic of Indonesia.
[2]Interdisciplinary Program of Marine and Fisheries Sciences and Convergent Technology, Pukyong National University, Busan 48513, Republic of Korea.
[3]Department of Aquaculture, Faculty of Fisheries and Marine Sciences, Indonesian Muslim University, Makassar, South Sulawesi 90231, Republic of Indonesia.
[4]Department of Marine Biology, College of Fisheries Science, Pukyong National University, Busan 48513, Republic of Korea.
[5]Marine Integrated Biomedical Technology Center, National Key Research Institutes in Universities, Pukyong National University, Busan 48513, Republic of Korea.
[6]Research Center for Marine Integrated Bionics Technology, Pukyong National University, Busan 48513, Republic of Korea.
[7]Department of Biology, Faculty of Science and Technology, Airlangga University, Surabaya 60115, Republic of Indonesia.
[8]Ocean and Fisheries Development International Cooperation Institute, College of Fisheries Science, Pukyong National University, Busan 48513, Republic of Korea.
[9]International Graduate Program of Fisheries Science, Pukyong National University, Busan 48513, Republic of Korea.
*Correspondence: Hyun-Woo Kim (kimhw@pknu.ac.kr); Shantanu Kundu (shantanu1984@pknu.ac.kr and shantanu1984@gmail.com)

Abstract

The family Gobiidae represents a highly diverse group of teleost fishes, with the genus *Glossogobius* widely distributed and several species endemic to the Malili Lake system, Sulawesi, Indonesia, including *Glossogobius flavipinnis*. Despite its ecological and ornamental significance, the *G. flavipinnis* faces anthropogenic threats and molecular data remain scarce to inform conservation strategies. Hence, this study provided an integrative morphological and molecular characterization of *G. flavipinnis*, generated the first mitochondrial cytochrome c oxidase subunit I (COI) sequences, and assessed its phylogenetic placement within the genus. Morphologically, the *G. flavipinnis* was

distinguished by a uniformly dark body and a conspicuous yellow first dorsal fin. The species exhibited pointed to rounded pectoral fins extending to or slightly beyond the anal fin origin, while the second dorsal and anal fins were of comparable height with rounded tips. The sexual dimorphism was evident in the filamentous second spine of the first dorsal fin in males, contrasted with a shorter spine in females. The cranial morphology revealed a dorsoventrally flattened, laterally elongated head, narrow interorbital width, a pronounced premaxillary protrusion, and a terminal mouth adapted for benthic foraging. The morphometric measurements indicated total lengths of 33.0–54.2 mm (females) and 36.0–54.2 mm (males), with mean standard lengths of 36.7 ± 4.9 mm and 44.0 ± 5.8 mm, respectively. The meristic characters showed consistent fin ray counts, with sexual variation in the second dorsal and pectoral fins, and the scale patterns combined dorsolateral ctenoid and predorsal/ventral cycloid scales. The molecular analyses of partial mitochondrial COI sequences (538 bp) demonstrated substantial interspecific divergence within *Glossogobius* (6.49–32.90%), with *G. flavipinnis* exhibiting the lowest divergence (15.9%) from *G. sparsipapillus* and the highest (26.4%) from *G. olivaceus*. The phylogenetic constructions using Bayesian and Maximum Likelihood approaches distinctly separated *G. flavipinnis* from other congeners, confirming its taxonomic validity. The low intraspecific genetic distances (0.16–0.33%) observed in *G. flavipinnis* suggested high genetic similarity within the ancient Lake Towuti population. Nevertheless, this pattern indicates the necessity for further comprehensive molecular investigations, incorporating additional mitochondrial and nuclear markers, to assess fine-scale population structuring, genetic connectivity, and demographic history. By integrating morphological, meristic, and molecular data, this study reinforces the systematic identity of *G. flavipinnis*, elucidates previously unreported sexual dimorphism, and establishes a baseline for molecular systematics and conservation research. These findings also underscore the value of integrative approaches for delineating species boundaries, resolving phylogenetic relationships, and assessing genetic diversity, with significant implications for the sustainable conservation of endemic gobies within the unique lacustrine ecosystems in Sulawesi.

Keywords: Sulawesi; Freshwater goby; Island ecosystem; Systematics; DNA barcoding

Abstract ID: ICTACSR 2025/PP 34

Molecular Insights into the Freshwater Cyprinid *Cyclocheilichthys repasson* (Bleeker, 1853): Matrilineal Evolutionary Dynamics and Cryptic Diversity across Mainland and Island Ecosystems of the Sundaland Biodiversity Hotspot

Sarifah Aini[1], Ayu Fitri Izaki[2], Angkasa Putra[1], Hey-Eun Kang[3], Ah Ran Kim[4,5], Soo Rin Lee[4,5], Mugi Mulyono[6], Muhammad Hilman Fu'adil Amin[7], Hyun-Woo Kim[2,5,8,9,*], Shantanu Kundu[1,10,11,*]

[1]Interdisciplinary Program of Marine and Fisheries Sciences and Convergent Technology, Pukyong National University, Busan 48513, Republic of Korea.
[2]Department of Marine Biology, Pukyong National University, Busan 48513, Republic of Korea.
[3]Institute of Marine Life Science, Pukyong National University, Busan 48513, Republic of Korea.
[4]Institute of Marine Living Modified Organisms, Pukyong National University, Busan 48513, Republic of Korea.
[5]Marine Integrated Biomedical Technology Center, National Key Research Institutes in Universities, Pukyong National University, Busan 48513, Republic of Korea.
[6]Jakarta Technical University of Fisheries, Ministry of Marine Affairs and Fisheries, Jakarta 12520, Republic of Indonesia.
[7]Advance Tropical Biodiversity, Genomics, and Conservation Research Group, Department of Biology, Faculty of Science and Technology, Airlangga University, Surabaya 60115, Republic of Indonesia.
[8]Research Center for Marine Integrated Bionics Technology, Pukyong National University, Busan 48513, Republic of Korea.
[9]Department of Biology, Faculty of Science and Technology, Airlangga University, Surabaya 60115, Republic of Indonesia.
[10]Ocean and Fisheries Development International Cooperation Institute, College of Fisheries Science, Pukyong National University, Busan 48513, Republic of Korea.
[11]International Graduate Program of Fisheries Science, Pukyong National University, Busan 48513, Republic of Korea.
*Correspondence: kimhw@pknu.ac.kr (H.W.K); shantanu1984@pknu.ac.kr and shantanu1984@gmail.com (S.K.)

Abstract

The family Cyprinidae, the largest lineage of primarily freshwater fishes, includes the ecologically and economically important genus *Cyclocheilichthys*, yet its taxonomic status and phylogenetic relationships remain unresolved. Conflicting morphological and molecular evidence has persistently argued the monophyly of *Cyclocheilichthys*, with *C. repasson* repeatedly undergoing taxonomic reclassification. Although mitogenomic sequences are available for several congeners, the complete mitochondrial genome of *C. repasson* remains uncharacterized, constituting a critical gap in elucidating its matrilineal evolutionary placement and genetic diversity within Cyprinidae. To overcome this limitation, the present study aimed to sequence and analyze the mitogenome of *C. repasson* from its native habitats in Sumatra, Indonesia. The circular mitogenome measured 16,571 bp and consisted of 13 protein-coding genes (PCGs), 22

transfer RNA genes (tRNAs), two ribosomal RNA genes (rRNAs), and a single noncoding control region (CR). Most genes were encoded on the heavy strand, whereas *ND6* and eight tRNAs were located on the light strand. The genome exhibited an overall A+T bias of 57.7%, with 11 intergenic spacers and seven overlapping regions largely conserved across congeners. All PCGs initiated with the canonical start codon ATG, except *COI*, which began with GTG, and several genes terminated with incomplete stop codons, presumably completed via post-transcriptional polyadenylation. The polymorphism analysis identified *Cytb* and *ND2* as the most variable genes, while *COI* remained highly conserved. The ratio of nonsynonymous to synonymous substitutions was below one across all PCGs, indicating that these genes were subject to purifying selection and reflecting functional constraints. Most tRNA genes retained canonical cloverleaf structures, with variations in the DHU arm and G–U wobble base pairs contributing to structural flexibility. The anticodon sequences were fully conserved across all 22 tRNA genes, reflecting functional stability within *Cyclocheilichthys*. The comparative analyses of the CR detected four conserved sequence blocks (CSB-D, CSB-1, CSB-2, CSB-3) with species-specific variations, whereas the tandem repeats were present in only 11 of the 24 analyzed species. The Bayesian and Maximum-likelihood phylogenetic analyses based on 13 concatenated PCGs confirmed that *Cyclocheilichthys* is closely related to *Albulichthys*, with congeners forming a well-supported monophyletic clade. The partial *COI* analyses further revealed a genetic divergence of 1.06% between *C. repasson* populations from the mainland (Laos) and island (Sumatra, Indonesia) regions. Overall, *C. repasson* exhibits a **conserved teleost mitogenomic organization** with matrilineal lineage-specific variations in nucleotide composition, codon usage, and regulatory motifs reflecting evolutionary constraints and adaptive divergence. The *COI*-based phylogenetic analyses indicate potential cryptic diversity in Southeast Asia, likely shaped by historical Sundaland paleogeography, including eustatic sea-level fluctuations and dispersal barriers during the Last Glacial Period. Although *C. repasson* is currently classified as 'Least Concern' on the IUCN Red List, the genetic information obtained in this study can inform evidence-based conservation strategies. The limitations of this study comprise the small number of available mitogenomes and *COI* sequences, highlighting the need for broader genomic sampling to illuminate the population structure, gene flow, and demographic history of this cyprinid species in Southeast Asia.

Keywords: Freshwater fish; Mitogenome; Matrilineal phylogeny; Conservation genetics; Southeast Asia

Abstract ID: ICTACSR 2025/PP 35

An Assessment of State Action Plan on Climate Change in Indian Himalayan region

Govind Ram Sankhala, Durairaj Balasubramanian, Dharitri Borah*
Faculty of Agriculture and Life Science, Arunachal University of Studies, Namsai-792103, Arunachal Pradesh
*Correspondence: dhbtna@gmail.com

Abstract

The Indian Himalayan region (IHR) is broadly classified into Western and Eastern Himalayas extending up to 2500 km presenting 18% of the subcontinent. Forest being the primary resource for food, agriculture, timber, firewood, medicine and many other minor forests produces (MFP), the region supports a large population (~50 million) in 13 states/Union territories. The Indian climate is primarily influenced by the Himalayas with characteristic tree line of tropical, temperate, and alpine vegetation. Notably, increase in anthropogenic pressure has influenced on climate of the region in many ways like faster warming, glacier melting, erratic weather pattern, loss of productivity, tree line shifting, extreme weather/climatic events (flood/drought/cyclone/monsoon), habitat fragmentation/degradation and loss of biodiversity creating a more fragile ecosystem. In the context, National Action Plan on Climate Change (NAPCC) is the strategic initiative of India to combat climate change by ecological sustainability primarily focusing on climate, energy, natural resource conservation and other deliverables integrated with science and technology (S & T). National Mission for Sustaining the Himalayan ecosystem (NMSHE) is the 5th mission of NAPCC for developing sustainable Himalayan ecosystem. In this context, the State Action Plan on Climate Change (SAPCC) is the follow up to the NAPCC adapted by the states/union territories supported by different policy instruments and programs to resolves issues of priority areas of climate change at a level of state/union territory. However, implementation of bottom-up approach of SAPCC across IHR is of cross sectoral policy concern, and depends upon policy acceptance, participation of trained stakeholders and implementation cost. Hence, the present study aims at assessing the effective implementation of SAPCC in the states/union territories of IHR region towards climate action (SDG 13).

Keywords: Climate change, Himalayas, NAPCC, SAPCC, policy

Abstract ID: ICTACSR 2025/PP 36

Sustainable Development Goals and Climate Diplomacy: India's Role in Global Climate Negotiations

Sumi Das*
Student, Gauhati University
*Correspondence: sumudas142@gmail.com

Abstract

Since the last few decades, the world has been combating its most dangerous threat global warming, which ultimately poses a serious threat of climate change to the world. For almost a quarter-century, the world has placed its faith in international agreements to address the threat of climate change and global warming. A binding global treaty, is the best way to ensure that greenhouse gas emissions are limited at a level low enough to prevent dangerous climate change. The United Nations has adopted many actions to deal with it, and Sustainable Development Goal 13, 'Climate Action', is one of them. Sustainable Development Goals (SDGs) and global climate diplomacy are closely interlinked, since climate change directly affects the achievement of several developmental targets, from poverty eradication to food security and public health, etc. India, as one of the world's fastest-growing economies and a significant producer of greenhouse gases, plays a vital role in shaping global climate negotiations to protect the planet. This paper seeks to examine India's approach to balancing developmental imperatives with climate responsibilities within the framework of the Sustainable Development Goals and how it is contributing to the global climate action. It emphasizes India's negotiating strategies in multilateral platforms such as the United Nations Framework Convention on Climate Change (UNFCCC) and Conference of the Parties summits (COP), and its leadership in initiatives like the International Solar Alliances, and its emphasis on equity, common but differentiated responsibilities, and climate justice for all nations. By situating India's climate diplomacy within the larger context of sustainable development, the research explores how India seeks to position itself as both a leader of the Global South and a responsible global actor. The research also brings up the challenges and opportunities India faces within developmental goals with international climate initiatives, offering a vision into the future route of India's role in global climate governance and negotiations.

Keywords: sustainable development, climate diplomacy, UNFCC, India

Abstract ID: ICTACSR 2025/PP 37

Documentation and Preservation of Plant Based Remedies from Debbarma Community of Tripura

Chumui Debbarma[1], and Rajat Nath[1*]
[1]Department of Biotechnology and Microbiology, Techno India University, Tripura, Agartala, Tripura, India
*Correspondence: rajatnath17@gmail.com

Abstract

For community healthcare, particularly among indigenous groups, traditional knowledge of medicinal plants is an invaluable resource. In most cases, this knowledge is not properly documented, posing a risk of permanent loss. The present study highlights unique ethnomedicinal practices of the Debbarma community in the Sepahijala District of Tripura, India. Field interactions with traditional healers revealed the therapeutic use of three plants in treating common yet significant health conditions. *Canarium pilosum* was reported for the treatment of bone fractures, *Spermacoce alata* for treating warts, and *Achyranthes aspera* for ringworm infections. The absence of these specific therapeutic uses in existing scientific literature makes this study a novel contribution. Such community-based practices demonstrate the potential of traditional healing systems as reservoirs for future pharmacological exploration and drug discovery. To preserve indigenous knowledge systems and provide a foundation for systematic drug discovery approaches, documentation of these practices is essential. In the present era of rapid socio-cultural transitions, indigenous practices are at risk of extinction, accentuating the urgent need to record and conserve them. This report, therefore, contributes to bridging the gap between traditional wisdom and modern scientific research, while also acknowledging the role of the Debbarma healers in sustaining cultural heritage and community health.

Keywords: Traditional knowledge, Debbarma community, ethnomedicine, Canarium pilosum, Spermacoce alata, Achyranthes aspera,

Oral Presentations (Spot Registration)

Abstract ID: ICTACSR 2025/SR/OP-01

A Study of In-Plane and Out-of-Plane Vibrational Fundamentals in Monodeuterated Benzene (C_6H_5D) using Algebraic Analysis

Rupam Sen*, Ashim Kalyan, **Subha Gaurab Roy**
Department of Physics; Srikishan Sarda College, Hailakandi, Assam, India-788151
*Correspondence: rupamsen@sscollegehkd.ac.in

Abstract

The vibrational properties of the benzene molecule (C_6H_6) are changed when a single deuterium atom is substituted, reducing the molecular symmetry from $D6h$ to $C2v$. A group-theoretical approach using the $U(2)$ Lie algebraic framework has been used to systematically analyse these modifications. Each covalent bond in the C_6H_5D molecule is algebraically mapped onto a suitable Lie algebraic representation in this formulation, which models the intramolecular interactions using a local Morse potential Hamiltonian. Interacting Casimir invariants and Majorana operators are then used to construct the global vibrational Hamiltonian, which together take into account symmetry-adapted interactions and anharmonic coupling effects. Then, using this algebraic framework, the thirty in-plane and out-of-plane fundamental vibrational modes of monodeuterated benzene (C_6H_5D) are assessed and carefully calibrated against the tight-binding potential model's spectral predictions. This approach provides a strong algebraic framework for understanding the vibrational behaviour of carbon-based nanostructures with complex bonding topologies and high symmetry. The accuracy and dependability of the suggested algebraic method are validated by the strong agreement between the vibrational frequencies predicted by this model and theoretical computations as well as experimental observations.

Abstract ID: ICTACSR 2025/SR/OP-02

Revisiting the Raj Committee's Recommendation for Additional Agricultural Taxes in Light of Recent Technological Advancements

Duhuidi Terang
Department of Economics, Cachar College, Silchar, Assam
Correspondence: terangduhuidi@gmail.com

Abstract

India's agricultural sector, like other developing economies, bears a significant share of the cost of economic development but is under-taxed and contributes less to overall development costs. However, agricultural taxation has always been a debatable subject in India's fiscal structure. The 1972 Raj Committee on Taxation of Agricultural Wealth and Income, led by Dr K N Raj, was one of the earliest and most comprehensive attempts to integrate agriculture into direct taxation. Despite support from the Planning Commission and other economists, the Committee's recommendations had been turned down by the Chief Minister of States. This study looks into the Raj Committee's recommendations considering the recent development in the agricultural sector. In this study, it is discussed how technological progression and digital practice, from small to large farmers, leads commercialization in several segments of the agriculture agricultural sector. The fruits from progression of technology such as mechanization, biotechnology, precision farming, artificial intelligence and digital platform for agricultural marketing like e-NAM, ONDC, etc. have benefited all farmers. Simultaneously the technology advancement also improved government administrative capacity by enabling digitizing land records, access to e-market transactions and satellite mapping. This study contends that the rationale of being "under taxed" of agricultural sector appears less valid under the purview of these developments. The findings suggest a well-designed technology-driven tax framework could achieve the Raj Committee's recommendation of fiscal equity while protecting smallholder farmers.

Keywords: Raj Committee (1972); Agricultural Taxation; Technological Transformation; Fiscal Equity; Digital Agriculture

Abstract ID: ICTACSR 2025/SR/OP-03

Nighttime Ionospheric Scintillation study from the North-Eastern part of the Indian Sector

Krishna Sarkar[1], Atri Deshamukhya[1]
[1]Department of Physics, Assam University, Silchar, 788011, India
*Correspondence: krishna.sarkar@aus.ac.in

Abstract

As the magnetic equator passes through the tip of the Tirunelveli of the Indian sector, the electron density should be higher over the ionosphere of the equatorial region of Indian sector. But, due to the fountain effect, electron diffuses from the equator to the off-equator by forming a high electron density at $\pm 15°$ geomagnetic latitude known as Equatorial Ionization Anomaly (EIA) crest and tough. With rising electron density over EIA crest like Northeast India, the occurrence of nighttime ionospheric irregularities like, Travelling Ionospheric Disturbances (TIDs) and Equatorial Plasma Bubbles (EPBs) increases. Study of such irregularities is beneficial for better radio communication as it causes degradation of the radio signal intensity. To study such scintillation over the Northeast region, we will use the space-based GPS and GNSS data of IGS station. In our study, we include Total Electron Content (TEC) variation over the Northeast region. Also, with the help of ROTI index (Rate of TEC Index), we will study the characteristics of nighttime ionospheric scintillation over the North-Eastern part of Indian sector. The results reveal enhanced scintillation activity predominantly during the post-sunset to midnight period, often associated with the development and drift of equatorial plasma bubbles.

Keywords: TEC, ROTI, Scintillation, Plasma Bubbles

Abstract ID: ICTACSR 2025/SR/OP-04

A Next-to-Leading Order (NLO) analysis of Gluon Energy Distribution Function at small-x and its relevance with Neuton Star Density

Saiful Islam*
Department of Physics, Darrang College (Autonomous), Tezpur-784001, Assam, India
*Correspondence: s.phys.gen@gmail.com

Abstract
A general form of gluon distribution function in Next-to-leading order (NLO) by solving Dokshitzer, Gribov, Lipatov, Altarelli, Parisi (DGLAP) equation at small-x is obtained. Variation of gluon Energy distribution function with small x has been predicted graphically. Sharp and exponential growth in gluon energy can be attributed to the tremendous matter density of neutron stars.

Keywords: Gluon Energy Distribution Function; small-x physics; DGLAP equation.

ABOUT CACHAR COLLEGE, SILCHAR

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