Bhagalpur National College, Bhagalpur

(A Constituent unit of Tilka Manjhi Bhagalpur University)

NAAC ACCREDITED

Multidisciplinary International Seminar On

Ecosystem Restoration: Challenges and Opportunities in Indian Perspective

7&8 MARCH

ERCOIP 2025

Souvenir

ORGANISED BY:- FACULTY OF SCIENCE

Bhagalpur National College, Bhagalpur

T.M.Bhagalpur University, Bhagalpur - 812007 (Bihar)

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सत्यं ज्ञानं अनन्तं

Truth is Knowledge and Infinity

प्रो० (डॉ०) जवाहर लाल
कुलपति
Prof. Dr. Javahar Lal
Vice-Chancellor

तिलका माँझी भागलपुर विश्वविद्यालय,
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Letter No..... **Date:- .....**

Message

It is with great enthusiasm and commitment to environmental sustainability that I extend my support to Bhagalpur National College, Bhagalpur, the only constituent college under T.M. Bhagalpur University (T.M.B.U.) with active NAAC accreditation for the organisation of an Two-Day International Seminar on **"Ecosystem Restoration: Challenges and Opportunities in the Indian Perspective."** This seminar will be a prestigious platform to bring together renowned scholars, researchers, and environmental experts to discuss innovative approaches and solutions for restoring our ecosystems.

As India faces critical environmental challenges, from deforestation to climate change, this seminar will provide a unique opportunity to explore sustainable restoration strategies and inspire future generations to take action. I encourage each of you to participate actively, share your research and insights, and make this event a landmark in our academic and environmental journey.

Together, let us drive impactful discussions, create meaningful collaborations, and contribute to a greener, healthier planet. I look forward to the success of this important event and congratulate the organizing team for their dedicated efforts.

Best wishes for a productive and inspiring seminar!

Warm regards,

(Prof. Jawahar Lal)
Vice- Chancellor

BHUPENDRA NARAYAN MANDAL UNIVERSITY
MADHEPURA-852113 (BIHAR)

Prof. B.S. Jha
Vice-Chancellor
M.Sc. (Gold Medalist); Ph.D.
FZSI, FSESc., FBBS, FAPPI, FABS

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MESSAGE

I am delighted to note that the Bhagalpur National College, Bhagalpur is organizing two-day International Seminar on a very relevant theme, **"ECOSYSTEM RESTORATION: CHALLENGES AND OPPORTUNITIES IN THE INDIAN PERSPECTIVE."** on 7th & 8th of March, 2025.

This event presents a remarkable opportunity for our institution to lead vital discussions on one of the most pressing global concerns—restoring and preserving our ecosystems for a sustainable future.

India, with its diverse landscapes and rich biodiversity, faces unique environmental challenges. This seminar will bring together eminent scholars, researchers, policymakers, and students to share insights, explore innovative solutions, and chart a path toward effective restoration strategies. It is a golden chance for us to contribute meaningfully to environmental conservation while showcasing our institution's commitment to academic excellence and sustainability.

I urge each one of you to actively participate, collaborate, and make this seminar a grand success. Let us come together to ignite meaningful discussions, inspire action, and pave the way for a greener, healthier planet!

I take this opportunity to congratulate the Chief Patron of the Seminar, Prof. Jawahar Lal, the Hon'ble Vice-Chancellor and other members of the organizing team more especially, Prof. Ashok Kumar Thakur, the Patron, Prof. (Dr.) Ramashish Purvey, the Co-Patron, Dr. Baliram Prasad Singh, the convenor, organising secretaries and other members of the organizing committee.

Looking forward to an enlightening and impactful event.

I wish the Seminar a great success.

(Prof. B.S. Jha)

Prof. A.K. Roy
Former Vice-Chancellor
B.N.M.U. Madhepura

MESSAGE

It gives me immense pleasure to extend my heartfelt congratulations to the Faculty of Science, B.N. College, Bhagalpur, for organizing the International Seminar on **"Ecosystem Restoration: Challenges and Opportunities in Indian Perspective."** This seminar is a timely initiative, aligning with global efforts under the UN Decade on Ecosystem Restoration, and addresses a critical need to rejuvenate our natural ecosystems.

India, with its rich biodiversity and diverse landscapes, faces significant challenges such as deforestation, wetland loss, and soil degradation. However, these challenges also present opportunities for innovation and collaboration. Restoration not only enhances biodiversity but also strengthens ecosystem services and improves livelihoods, especially for rural communities. Initiatives like the Bonn Challenge and Green India Mission highlight India's commitment to restoring millions of hectares of degraded land, underscoring the importance of integrating local knowledge and community participation into restoration strategies.

I am confident that this seminar will facilitate meaningful discussions, inspire actionable strategies, and contribute to a sustainable future. Let us all commit to protecting and restoring our ecosystems for the benefit of current and future generations.

Best wishes for the success of this seminar!

Warm regards,

(A. K. Roy)

Former Vice-Chancellor

Prof. Ashok Kumar Thakur
University Professor
Univ. Dept. of Zoology, T.M.B.U. Bhagalpur
Principal
B.N. College Bhagalpur

Mob.7004137826
Email. drashokthakur1963@gmail.com

Letter No. :-…….. **Date:- ……..**

MESSAGE

I am delighted and honored to be a part of this significant initiative on *"Ecosystem Restoration: Challenges and Opportunities in the Indian Perspective."* This topic is of immense importance, not only for environmentalists and policymakers but for every individual who cares about the future of our planet.

Ecosystems are the foundation of life on Earth. They provide us with clean air, water, food, and countless resources that sustain human civilization. Unfortunately, rapid urbanization, deforestation, pollution, and climate change have put immense pressure on our natural ecosystems. India, with its vast biodiversity and unique landscapes, faces both challenges and incredible opportunities in restoring its degraded ecosystems.

Ecosystem restoration is not just a choice—it is a necessity. It goes beyond planting trees; it involves reviving rivers, restoring soil fertility, conserving wildlife, and ensuring sustainable livelihoods for communities dependent on nature. A healthy ecosystem is key to combating climate change, preventing natural disasters, and securing a better quality of life for future generations.

The good news is that we have the knowledge, technology, and human will to bring positive change. Community participation, scientific innovations, and sustainable policies can pave the way for a greener, healthier, and more resilient India. Every effort, big or small, contributes to this mission, and together, we can make a lasting impact.

I sincerely congratulate the organizers, researchers, and participants for bringing attention to this critical issue. Your dedication and commitment to restoring ecosystems will shape a brighter and more sustainable future. Let this event be a source of inspiration, knowledge, and action, driving us all toward a world where nature and humanity thrive together.

With great enthusiasm and best wishes,

(A.K. Thakur)

Prof. (Dr.) Ramashish Purbey
Registrar
T.M.B.U. Bhagalpur

Letter No…….. **Date:- ……**

MESSAGE

It is an honor to share my thoughts on the crucial theme of ecosystem restoration, a challenge that defines our present and shapes our future. As India strides toward development, the delicate balance between progress and environmental conservation demands urgent attention.

Our nation, endowed with diverse ecosystems, faces multifaceted challenges in restoration efforts. Deforestation, land degradation, water pollution, climate change, and habitat loss threaten not just biodiversity but also the livelihoods of millions who depend on natural resources. While policies and programs exist, the implementation gap, financial constraints, and lack of widespread awareness hinder large-scale success. Additionally, balancing the demands of a growing population with the need for ecological rejuvenation is an ongoing struggle.

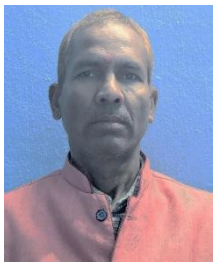
Yet, amid these challenges, India holds immense potential for transformative change. Our rich heritage of sustainable living, combined with scientific advancements and community-driven initiatives, creates powerful opportunities for restoration. Programs like Namami Gange, the Green India Mission, and the National Biodiversity Action Plan highlight India's commitment to reviving degraded landscapes. Moreover, the integration of traditional ecological knowledge with modern conservation strategies offers a unique pathway to sustainable restoration.

I commend the organizers for bringing this critical issue to the forefront and fostering meaningful discussions. Let this gathering inspire action, innovation, and a shared commitment to rebuilding nature for a resilient and thriving India.

Best wishes for the success of this seminar!

(Ramashish Purbey)

Message from the Convenor



Dear distinguished guests, delegates, and contributors,

It is my honor to welcome you to this international seminar on "Ecosystem Restoration: Challenges and Opportunities in Indian Perspective" (ERCOIP-2025). As the convener, I am delighted to see the seminar come to fruition, thanks to the tireless efforts of our organizing team and the support of our institution.

This seminar serves as a vital platform for exchanging ideas and fostering collaborations that can address the pressing challenges in ecosystem restoration. I am confident that the knowledge shared and connections made here will pave the way for innovative solutions and sustainable practices in India and beyond.

I extend my heartfelt appreciation to all participants for their valuable contributions and look forward to the impactful outcomes of this event.

Thank you for your presence and support.

Warm regards,
Dr. Baliram Pd. Singh
Convener (Head and Associate Professor, Dept. of Chemistry)
Faculty of Science, B. N. College, Bhagalpur

Message from the Organizing Secretaries

Dear esteemed guests, participants, and contributors,
We extend our warmest gratitude to each of you for being part of this momentous occasion, the international seminar on "Ecosystem Restoration: Challenges and Opportunities in Indian Perspective" (ERCOIP-2025). It has been a privilege to organize this event, bringing together experts and scholars from diverse backgrounds to share insights and experiences on this critical topic.
The seminar's success is a testament to the collective efforts of our team. We appreciate the support from our institution, sponsors, and all who have contributed to its success. We hope that the discussions and collaborations fostered here will lead to meaningful outcomes, benefiting our environment and society.

Thank you for your participation and contributions.

1. Dr. Ambika Kumar, Assistant Professor, Dept. of Chemistry
2. Dr. Amit Kishore Singh, Assistant Professor, Dept. of Botany
3. Dr. Rajesh Kumar, Assistant Professor, Dept. of Zoology
4. Dr. Kundan Kumar, Assistant Professor, Dept. of Physics
5. Dr. Golak Mandal, Assistant Professor, Dept. of Mathematics

Organizing Secretaries, Faculty of Science, B. N. College, Bhagalpur

Role and Responsibilities for the Scheduled International Seminar

On the topic: **Ecosystem Restoration: Challenges and Opportunities in Indian Perspective**.

scheduled on **7th and 8th March 2024**

Venue: College Gallery (Room No.-3)

Chief Patron: Prof. (Dr.) Jawahar Lal, Hon'ble Vice-Chancellor, TMBU Bhagalpur

Patron: Prof.(Dr.) Ashok Kumar Thakur, Principal, B. N. College, Bhagalpur

Co-Patron: Dr. Ramashish Purvey, Registrar, TMBU Bhagalpur

Convenor: Dr. Baliram Pd. Singh

Organising Secretaries:

1. Dr. Ambika Kumar
2. Dr. Amit Kishore Singh
3. Dr. Rajesh Kumar
4. Dr. Kundan Kumar
5. Dr. Golak Mandal

Co-organising Secretaries:

1. Dr. Brajnandan Kumar,
2. Dr. Kiran Kumari
3. Dr. Sanjeev Kumar Choudhary
4. Dr. Sanjay Kumar
5. Dr. Md. Tauhid Alam

Name of the Committees and their responsibilities:

- **Core Committee**

  Dr. Arti Kumari
  Dr. Baliram Pd. Singh
  Sri Bijendra Kumar Yadav
  Dr. Ambika Kumar
  Dr. Amit Kishore Singh
  Dr. Rajesh Kumar
  Dr. Kundan Kumar
  Dr. Golak Mandal

- **Accommodation Committee**

  Prof. (Dr.) Bijendra Kumar Yadav, DSW, TMBU, Bhagalpur
  Dr. Indu Kumari, Hostel Warden, TMBU, Bhagalpur

This committee is responsible for securing and managing lodging arrangements for attendees, ensuring that accommodations are comfortable and accessible. They will coordinate with various hostel authorities inside the university campus, as per university norms and regulations.

- **Food Committee**

  Dr. Baliram Pd. Singh
  Sri Bijendra Kumar Yadav
  Dr. Manoj Kumar
  Dr. Pawan Kumar
  Mr. Dilip Kumar
  Mr. Amit Kumar

  Tasked with planning and overseeing all catering needs, this committee will select menus, arrange for meal service during the conference, and accommodate dietary restrictions. They will also coordinate with vendors to ensure timely delivery and quality service.

- **Welcome and Reception Committee**

  Dr. Divya Kumari
  Dr. Richa Kumari
  Dr. Antara Choudhary
  Dr. Kiran Kumari
  Dr. Kanchan Singh
  Dr. Sujata Kumari

  This committee will organize the opening ceremony and welcome activities for participants, ensuring a warm reception. They will prepare all the welcome formalities as per university culture. They will manage registration desks, and facilitate networking opportunities during initial events.

- **Purchase Committee**

  Dr. Baliram Pd. Singh

  Dr. Ambika Kumar

  Dr. Amit Kishore Singh

  Dr. Rajesh Kumar

  Dr. Kundan Kumar

  Dr. Golak Mandal

  This committee will handle all procurement needs for the conference, including supplies, equipment, and materials necessary for sessions. They will work within a recommended budget to ensure all purchases are made efficiently and effectively.

- **Correspondence Committee**

  Dr. Ambika Kumar

  Dr. Amit Kishore Singh

  Dr. Rajesh Kumar

  Mr. Pinku Kumar

Tasked with managing all communication related to the conference, this committee will handle invitations, confirmations, and follow-ups with speakers and participants. They will also maintain records of correspondence for future reference.

- **Registration Committee**

  Mr. Pinku Kumar
  Dr. Atul Samiran
  Mr. Sujit Kumar ‘Lucky’
  Miss Varsha Anand

This committee will oversee the registration process (online/offline) for attendees, both online and on-site. They will manage registration systems, create name badges, and ensure a smooth check-in process during the event.

- **Kit and Certificate Distribution Committee**

  Dr. Atul Samiran

  Mr. Sujit Kumar ‘Lucky’

  Miss Varsha Anand

  Mr. Anant Ritwik (Prepare Final Income & Expenditure Report)

Responsible for preparing and distributing conference kits containing materials for participants. This committee will also manage the issuance of certificates of participation or presentation at the end of the conference.

- **Press media and Printing Committee**

  Dr. Md. Firoz Alam
  Dr. Antara Choudhary
  Dr. M Wasiqul Khair

This committee will handle all printing needs for promotional materials, programs, and press releases. They will ensure that all printed materials are high-quality and distributed in a timely manner.

- **Editorial Committee**

  Dr. Ambika Kumar
  Dr. Amit Kishore Singh
  Dr. Rajesh Kumar
  Dr. Shashi Kapur Das

Charged with overseeing the publication of souvenir, this committee will review submissions of abstract, manage peer reviews, and ensure that all content meets academic standards.

- **Stage and announcement Committee**

  Dr. Md. Firoz Alam
  Miss Varsha Anand (Announcement & Anchoring)
  Miss Padmja
  Miss Snehlata Gupta
  Miss Anjali Rani
  Miss Sanskriti

Tasked with managing the stage setup for sessions and events, this committee will ensure that audio-visual equipment is functional. They will also be responsible for making announcements during the conference.

- **Technical Committee**

  Dr. Ambika Kumar

  Dr. Amit Kishore Singh

Dr. Rajesh Kumar

Mr. Sujit Kumar ‘Lucky’

Dr. Atul Samiran

Miss Varsha Anand

Mr. Nitish Kumar Choudhary

This committee will oversee all technical aspects of the conference, including audio-visual setups, internet access, and technical support during presentations. They ensure that all technology functions smoothly throughout the event.

- **Discipline and Protocol Committee (Campus & Seating Arrangements)**

  Dr. Rajesh Kumar
  Dr. Md Irshad Ali
  20 NCC Cadets and 20 NSS Volunteers
  Dr. Ashutosh Kumar Singh

  Responsible for maintaining order during sessions and ensuring adherence to conference protocols. This committee will manage attendee behaviour and assist in conflict resolution if necessary. Ensure proper seating arrangements, directions for guest and participants.

- **Media and Reporter Committee:**

  Dr. Md. Firoz Alam

  Dr. Antara Choudhary

  Dr. M.Mosharraf Hosain

  This committee will handle relations with media representatives covering the event. They will coordinate press access to sessions, prepare press releases, and facilitate interviews with key speakers or organizers.

- **Cultural Committee**

  Dr. Indu Kumari
  Dr. Md Irshad Ali
  Dr. Divya Rani

  This committee will organize cultural events or entertainment during the conference to engage attendees. They will plan performances or activities that reflect local culture or theme-related entertainment.

CONTENTS

Karnal Bunt of Wheat (*Triticum aestivum*).

Ashutosh Kumar
University Department of Botany, Tilka Manjhi Bhagalpur University, Bhagalpur -812007
Email: ashutoshkumar993100@gmail.com

Karnal bunt of wheat also known as partial bunt or Indian bunt**,** is a fungal disease caused by a smut fungus *Tilletia indica Mitra*. In our country this disease has been reported from the UP, Punjab, Haryana, Rajasthan, Gujarat, Bihar and Madhya Pradesh. The symptoms of Karnal bunt disease are only visible on mature seeds or kernels. The infected kernels may look like a boat or dugout canoe and smells like fish. The teliospores of *Tilletia indica* are globose to sub-globose. This disease of wheat spreads through the movement of infected plants parts (seeds and straw). The teliospores can be carried on machinery (Truck, plowing machine), animals, and anything that moves the soil. The teliospores also can be carried via wind or water. The control measures of this disease include deep plowing, planting cover crops, early sowing, crop rotation, mulching (because the Spores germinate at suitable temperature 15–25^{0}C), treating seeds with *Tilt* (*propiconazole*, 25% EC) & *Controll* (*hexaconazole*, 5% EC) and Foliar spraying with *propiconazole*, *triadimefon & carbendazim* can help.

Keywords: Karnal bunt, Partial bunt or Indian bunt, Tilletia indica, Smut fungus.

Community Forest Conservation and Carbon Sequestration: Estimating Tree Above-Ground Biomass & Carbon Stock in an Indigenous Village of Reiek, Mizoram, India

Nick Lalrinmawia[1,2*], PC Vanlalhluna[2,3], Zomuanpuii[2], F. Lalnunmawia[1]
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Forests and their ability to store carbon is becoming increasingly important in current times and the socio-ecological interaction between forest and community varies across regions. This study, therefore, proceeds by exploring the tree above-ground biomass (AGB) and carbon stock between a protected forest and an open-access forest of Reiek, Mizoram, India. Socio-ecological interaction and perception among the indigenous community was studied using survey, questionnaire and focus group discussions (FGDs). Within the forest, various biomass components including stem, branch, and leaf biomass followed by total AGB and carbon stock was estimated using standard allometric equations and the results showed that protected forest demonstrated significantly higher AGB and carbon stock compared to open-access forest. The findings show the importance of community-driven conservation initiatives in enhancing forest carbon sinks. As different communities have different interactions with the forest, it, therefore, becomes necessary to suggested grassroot-level research for understanding the effectiveness of community conservation in different forest landscapes.

Keywords: Forest conservation; Socio-ecological interaction; Carbon sequestration; Community engagement; Biodiversity

Quantum Dots as Sensors for Monitoring Environmental Pollutants

Ambika Kumar[1*]
[1]Department of Chemistry, Bhagalpur National College, Bhagalpur (A Constituent Unit of TMBU Bhagalpur)
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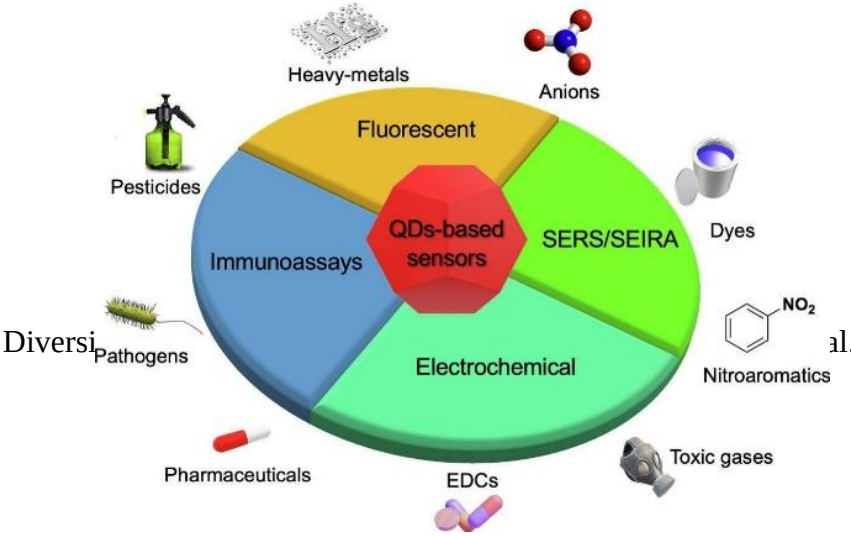
Water contamination is a significant ecosystem threat with worldwide consequences, exacerbating global water scarcity. Several anthropogenic activities, including urbanization and industrialization, have laden different types of contaminations in the aquatic environment. Currently, the predominant techniques that have been employed for monitoring and quantifying these pollutants are mostly liquid or gas chromatography combined with mass spectrometry (LC/GC–MS). Although these approaches facilitate selective and sensitive analysis at very low detection limit (ultra-trace level detection), they necessitate expensive mechanisms and skilled experts, which are unsuitable for field use. In this regard, Quantum Dots (QD)-based sensors have exhibited as the most efficient, accessible, practical, and portable tools for aqueous environmental monitoring. These nanomaterials have exhibited excellent features, revealing adaptability across multiple sensor categories, including fluorescence, electrochemical, plasmonic, and colorimetric sensors. This tool holds noteworthy potential for addressing the worldwide issue of monitoring heavy metal pollution in the aquatic environment.



Diversi al., 2024)

The Impact of Climate Change on Animal Behaviour and Migration Patterns

Rajesh Kumar[1*], Sipu Kumari[2], and Sheela Kumari[3]
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Climate change is significantly altering animal behaviour and migration patterns. As global temperatures rise, ecosystems undergo changes that directly impact wildlife, affecting its natural behaviour and migration routes. Many species, particularly migratory birds and marine animals, are reporting changes in the time of their journeys. As temperatures rise, animals may be pushed to shift their migration paths. Climate change can cause animals to modify their mating seasons and localities. If these cycles are interrupted, there may be a mismatch between birth timing and food availability. Climate change causes habitat loss and fragmentation,

forcing animals to relocate or adjust their behaviour. Some creatures are adapting to deal with climate change. However, these adaptations often take time, and many species are evolving too slowly to keep up with the rapid speed of climate change. In such instances, migration patterns may vary irregularly, stranding animals in less-than-ideal locations or leading them to fight for food, water, and shelter. Species' timing and behaviour can influence their interactions with other creatures, such as predators, prey, and competitors. Similarly, animal movement into new areas may result in increased competition for resources, as well as the spread of diseases and exotic species, affecting migration patterns and behaviour. Many species that are already threatened with extinction are especially vulnerable to climate change. Their migratory and behaviour are more susceptible to climate changes, habitat loss, and food scarcity. This review article will provide a wide knowledge to understand the impact of climate change on animal behavior and migration pattern.

Keywords: Climate, Migration, Behaviour, Ecosystem, Population, Extinction, Pollination.

Prospective Electrolytes for Solid-State Battery

Sudheer Kumar Yadav[1*] and Suman Yadav[2]
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All-solid-state batteries (ASSB) have attracted great attention due to its high safety and increased energy density. The key component in the ASSBs is solid electrolyte (SE) which determines the final electrochemical performance of the solid state assembly. In this review, the different classes of SEs material and its integrated structure, properties have been discussed in detail. The challenges with different SEs in attaining good ionic conductivity and electrode compatibility has been explained. The promising next generation SE materials and state of art research scenarios and challenges to be addressed has been narrated in the final part of the article**.**

Keywords: Solid electrolyte, Ionic conductivity, All-solid-state batteries, Solid state assembly

Comparative study of selected parameters in freshwater ponds of Murshidabad, West Bengal

SK Jasim Reja[1*], Kiran Kumari[1], Rajesh Kumar[1]
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[*]Email: skjasimreja@gmail.com

The study of aquatic ecosystem constitutes a crucial aspect of ecology, given that the environmental conditions within these ecosystems are dynamic and subject to temporal variations. Such fluctuations directly or indirectly impact aquatic life, which in turn, influences human well-being. Among aquatic ecosystems, stagnant (lentic) freshwater habitats, such as ponds and lakes, exhibit more complex and fragile ecological dynamics compared to running water habitats, such as rivers. Consequently, key ecological parameters, including pH, dissolved oxygen, dissolved carbon dioxide, water temperature, exhibit seasonal variations, often displaying significant fluctuations throughout the year. This project presents a comparative analysis of the aforementioned four ecological parameters in four distinct ponds located in Murshidabad, West Bengal. Data were collected over a three-month period,

extending from mid- monsoon to the post- monsoon season, with measurements taken at approximately 20-day intervals. To ensure the reliability and accuracy of the results, meticulous precautions were taken to minimize potential errors during data collection and analysis. Additionally, the study also provides insights into the pollution level of the selected ponds, acknowledging its critical role in shaping the overall health and sustainability of aquatic ecosystems.

Keywords: Aquatic ecosystem, Lentic freshwater habitats, Fragile Ecosystem, Dissolve O_2, Dissolve CO_2, Water temparature.

The Role of Invasive Species in Biodiversity Loss due to Climate Change

Tasarrun Nazreen[1] and Bibekananda Sarkar[2]
[1]Department of Zoology, B.N. Mandal University, Madhepura
[2]Department of Zoology, B.S.S. College, Supaul
Email: tasarrun234@gmail.com

Climate change and invasive species are two of the most significant drivers of biodiversity loss globally. As climate change alters ecosystems, it creates favorable conditions for invasive species to thrive, often at the expense of native species. Invasive species, introduced intentionally or accidentally by human activities, can outcompete, predate, or introduce diseases to native species, leading to population declines and even extinctions. The interplay between climate change and invasive species exacerbates biodiversity loss, as rising temperatures, shifting precipitation patterns, and extreme weather events weaken the resilience of native ecosystems. This paper explores the mechanisms by which invasive species contribute to biodiversity loss in the context of climate change, highlighting case studies and potential mitigation strategies. Effective management of invasive species, coupled with climate adaptation measures, is crucial to preserving global biodiversity in the face of ongoing environmental changes. Understanding the interaction between invasive species and climate change is critical for biodiversity conservation and ecosystem management. Effective mitigation strategies require early detection, control measures, and adaptive policies to reduce biodiversity loss.

Keywords: Climate change, invasive species, biodiversity loss, ecosystem disruption, native species, competition, predation, disease.

One-Pot Green Synthesis of CaO Nanoparticles From Waste Chicken Egg Shell and its Multifunctional Application

Ashutosh Kumar, Abhay Kumar Aman, Rakesh Kumar Singh*, Ajitendra Kishor Singh, Niraj Kumar, Siddhant Shivam
School of Nanoscience & Nanotechnology, Aryabhatta Knowledge University, Gyan Parisar, Mithapur, Patna, Bihar (800001), India
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This study explores the green synthesis of calcium oxide nanoparticles (CaO NPs) from waste chicken eggshells, offering a sustainable, cost-effective, and eco-friendly approach.

The synthesized CaO NPs were characterized using various techniques. X-ray diffraction (XRD) and Fourier Transform Infrared Spectroscopy (FTIR) confirmed the successful conversion of $CaCO_3$ in the eggshells to CaO, revealing a crystalline cubic structure. The average nanoparticle size was determined to be 56 nm by XRD and 84.5 nm by Nanoparticle Tracking Analysis (NTA). Thermal Gravimetric Analysis (TGA) and Differential Thermal

Analysis (DTA) showed a 45-50% mass loss between 600-900°C, corresponding to $CaCO_3$ decomposition to CaO. A Zeta potential of -5.71 mV suggested low colloidal stability. Ultraviolet-Visible (UV-Vis) spectroscopy further supported the characterization of the CaO NPs, and Transmission Electron Microscopy (TEM) confirmed nanoparticle formation. These results demonstrate the successful synthesis of high-purity CaO NPs from waste chicken eggshells, highlighting their potential for applications in nano-fertilizers, environmental remediation, catalysis, and other industries.

Keywords: Green synthesis, XRD, FTIR, NTA, Nanoparticles, Nano fertilizer, Remediation

Bees as bioindicators: A Review

Nirmala Tripathi[1], Anupma Kumari[2], Rittika Pandey[3]
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[2]Department of Zoology, H.D. Jain College, Ara
[3]University Department of Zoology, Patliputra University, Patna
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Bioindicators are species or communities that provide information about the overall condition of the environment, and bees are well-suited for this role due to their sensitivity to various biotic and abiotic stressors such as climate change, habitat loss, and exposure to pesticides. Population dynamics, species richness, and foraging behaviour of bees can provide valuable insights into the overall health of an ecosystem. For instance, changes in bee community composition and diversity can signal shifts in plant communities, land-use patterns, or the presence of environmental contaminants. Quantitative data on the nutritional characteristics of plant-provided resources, such as nectar sugar concentrations, can also contribute to the use of bees as bioindicators. This information can be used to assess the suitability of the environment for bee populations and inform conservation efforts. While the use of bees as bioindicators is a promising approach, there are still several challenges and knowledge gaps that need to be addressed. For example, understanding the complex interactions between bees, their environment, and other environmental stressors is crucial for developing effective bioindication systems.

Keywords: Bees, bioindicators, environmental stressors, plant community, pesticides

Smart Restoration: AI-Driven Approaches to Revitalize Natural Habitats

Maya[1*] and Raj Kumar Singh Yadav[2]
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Artificial Intelligence (AI) is revolutionizing ecosystem restoration by providing innovative tools to monitor, analyze, and revitalize natural habitats. By integrating AI-driven technologies, conservationists can enhance the efficiency and effectiveness of restoration efforts across diverse ecosystems. One significant application of AI in ecosystem restoration is the use of machine learning algorithms to analyze ecological data, enabling precise identification of areas requiring intervention. For instance, AI supports ecosystem restoration efforts by analyzing ecological data and recommending appropriate restoration techniques. Moreover, AI facilitates the monitoring of ecosystem health through advanced data collection and analysis. Unmanned Aerial Vehicles (UAVs) equipped with AI-powered sensors can capture high-resolution images of restoration sites, allowing for detailed assessments of vegetation growth and species diversity. Techniques like the SLIC-UAV method utilize UAV imagery and machine learning to

map early-successional species, providing insights into successional stages within tropical forest restoration areas. Incorporating AI into restoration projects also promotes community engagement by integrating traditional ecological knowledge with data-driven approaches. Adaptive frameworks that combine local insights with machine learning models can enhance the relevance and success of restoration initiatives, ensuring they are tailored to specific ecological and cultural contexts. However, the deployment of AI in ecosystem restoration must be approached responsibly, considering potential ethical and environmental implications. Ensuring transparency, inclusivity, and sustainability in AI applications is crucial to align technological advancements with conservation goals. In summary, AI-driven approaches offer transformative potential for revitalizing natural habitats. By enhancing data analysis, monitoring capabilities, and community collaboration, AI serves as a catalyst for more effective and resilient ecosystem restoration efforts.

Keywords: Artificial Intelligence, Ecosystem Restoration, Machine Learning, Biodiversity Monitoring, Community Engagement

Effect of Thiourea on Germination and Seedling Growth of Sesame Varieties

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Seed germination is the initial step in the life cycle of plants, which begins when the inactive dry seed imbibes water and is completed with the protrusion of the radicle from the seed coat. Seed germination is a complex process, which is influenced by both intrinsic and extrinsic factors. Intrinsic factors include seed dormancy and available food stores, while water, temperature, oxygen, light, relative humidity, and chemicals in the seed environment constitute extrinsic factors. Substances that inhibit germination are called inhibitors. An inhibitor suppresses germination by increasing the osmotic pressure. In the present investigation, the effect of different concentrations (0.125%, 0.25%, 0.5%, 1% and 2%) of thiourea on the germination percentage and early seedling growth of sesame varieties (GT-10 and JTS-8) has been studied. Thiourea caused retardation in both varieties at all concentrations. JTS-8 shows more germination tolerance to thiourea in respect to seedling length and fresh weight than GT-10.

Keywords: Germination, Sesame, Thiourea, Inhibitor, Tolerance

Modified Zinc Oxide Nanoparticles for Textile Wastewater Monitoring in Bhagalpur, Bihar

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Increased inhabitants, metropolitanism, and industrialization have majorly contributed to environmental pollution in India. Particularly, improper disposal of chemically synthesized dye from the textile industry has imposed a life-threatening concern among the locals. Bhagalpur silk industry, renowned for its superior *Tussar silk*, is confronting significant environmental issues stemming from the release of chemically polluted and dye-infused effluent. The

limitations of conventional wastewater treatment have assigned researchers to explore novel and suitable techniques that can minimize pollutants without any possible secondary contamination in wastewater to provide an aquatic environment free of contaminants. In this context, nanotechnology has emerged as a promising tool that can utilize nanoscale materials with exceptional properties such as large surface area, and specific and selective surface properties to remove contaminants in the aqueous environment. Several nanoscale-based metal oxide nanoparticles have been reported as fascinating options for dye degradation due to their remarkable characteristics and synthesis approach. Among the various metal oxide nanoparticles, modified Zinc Oxide nanoparticles (ZnO NPs) have emerged as one of the most promising candidates for photocatalysis due to their significant optical properties, as it has high photocatalytic ability, tunable bandgap properties, no secondary contamination, non-toxic, biocompatible, cost-effective, synthesized effortlessly and stable under harsh environment conditions. By integrating modified ZnO nanomaterials into the Bhagalpur silk industry's wastewater monitoring framework, researchers can promote a sustainable cleaner production process while preserving the region's traditional silk-weaving heritage with sustainable silk manufacturing practices in Bhagalpur.

Keywords: Zinc oxide nanoparticles, Textile wastewater, Bhagalpur silk industry, photocatalysis, sustainable practices

Diversity of Order Chlorococcales in Wetlands of Bhagalpur District, Bihar, India

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Green algae are aquatic plants and act as the pioneer photosynthetic organism or producer in the World of ecosystem. The Chlorococcales or Sphaeropleales is an order of green algae in the class Chlorophyceae. They are non-motile, single cell, colonial or filamentous algae with definite shape of green algae. They are composed of wide variety of species which may be found sometime in soil, but mostly in fresh and marine waters. The order consists of approximately 780 species in the world. Most of the members are microscopic in nature but some may be macroscopic, constitute a major part of the phytoplankton of the freshwater habitats and plays an important role in food chain and used as food by fish and zooplankton (Prescott, 1962; Philipose, 1967). This work was aimed to undertake a morphological and taxonomical investigation of order Chlorococcales seasonally occurring in the Bhagalpur district, Bihar (India) from Dec 2020 – Nov 2022. The phytoplankton samples were collected seasonally for qualitative analysis from the selected wetlands from all the 16-community development blocks (2 wetlands in each block) of Bhagalpur district with the help of plankton net of 65µmesh size and the filtered contents was immediately preserved in 4% formaldehyde using standard method prescribed by APHA (2009). The identification of the taxa were done with the help of pertinent literature and monographs on algal taxonomy. The paper deals with the taxonomical enumeration of 65 taxa of order Chlorococcales recorded from different wetlands of Bhagalpur district. All these species belong to 16 genera like *Micractinium* (1- species), *Schroederia* (2- species), *Hydrodictyon* (1- species), *Sorastrum* (2- species), *Coelastrum* (3- species), *Chlorella* (3- species), *Oocystis* (4 -species), *Dactylococcus* (1- species), *Selenastrum* (1-species), *Kirchneriella* (1-species), *Tetraedron* (1-species), *Crucigenia* (3-species), *Actinastrum* (2 - species), *Ankistrodesmus* (5- species), *Scenedesmus* (26 - species) and *Pediastrum* (9 - species).

Among all these taxa *Scenedesmus quadricauda* Var. *westii*, *S. quadricauda* Var. *parvus*, *S. dimorphus*, *S. acuminatus*, *Pediastrum simplex*, *P. duplex*, *P. ovatum*, *Coelastrum microsporum*, *Chlorella vulgaris*, *Oocystis solitaria*, *Ankistrodesmus falcatus*, and *Actinastrum hantzschii* were present frequently and commonly reported from all the investigated wetlands. According to Palmer (1969), species like *Scenedesmus quadricauda*, *S. obliquus*, *S. dimorphus*, *S. acuminatus*, *Pediastrum duplex*, *Ankistrodesmus falcatus*, *Chlorella vulgaris*, *Actinastrum hantzschii*, and *Coelastrum microsporum* were the most pollution tolerant species of order Chlorococcales in the wetlands of Bhagalpur district which are indicatives of the trophic status of the wetlands and suggests that these wetlands are in a state of pollution and are proceeding towards eutrophication.

Keywords: Chlorococcales, Green Algae, Pollution tolerant, Taxonomy

Existence of non-axial liberation points in the kite configuration

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This paper deals with the Existence of non-axial libration points not lying on the axis of symmetry of the kite configuration. By establishing two equations of motion of an infinitesimal mass moving in the gravitational field of the four primaries of masses $(1-\mu)/2,\ \mu, (1-3\mu)/2, \mu$ forming cyclic kite configuration of the first kind. Now on vanishing velocities and acceleration of the infinitesimal mass and solving the equation, we get the position of axial and non-axial libration points. Following the work of Hassan, M.R. (2023) and Khatun M. et al., (2024) the equation of motion of the infinitesimal mass moving in the gravitational field of the kite of the first kind have been established first then the existence of non-axial libration points have been discussed by using Python.

Keywords: Kite configuration, Cyclic kite configuration, Mass parameter μ , Mean motion, Rotating frame, Libration point.

Antifertility Effect of Aqueous Fruit Extract of *Piper longum* on Seminal Profile of Male Swiss Albino Mice Based on Dose and Duration

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Herbal medicine has gained significant attention as potential source of natural contraceptive. *Piper longum* (long pepper) a well-known medicinal plant, has been traditionally used for various therapeutic potential, including reproductive health. In this study observed that the effect of aqueous fruit extract of *Piper longum* on seminal parameters. Total 48 mice were selected for this research and divided into two groups: group I (as treated group) were fed 0.1ml of fruit extract of *Piper longum* at the dose of 10 mg/kg body weight and group II (as control group) were fed same amount of distilled water during the 10, 20, 30 and 40 days of exposure. After the exposure of fruit extract of *Piper longum* from 10 to 40 days of treatment, 6 mice from each group were sacrificed and samples were collected from cauda epididymis. Physical parameters (sperm count, seminal pH, sperm motility, sperm mortality and abnormality of spermatozoa) of seminal fluid were studied. Treated group of mice shows

highly significant decrease (P<0.001) in sperm count, seminal pH, and sperm motility while significant increase (P<0.001) in sperm mortality and abnormality of spermatozoa as compared to control group of mice. Result of research suggest that the fruit extract of *Piper longum* significantly changes the seminal parameters of male Swiss albino mice, changes in seminal parameters leads to antifertility. Hence, *Piper longum* could be as a natural antifertility agent which is cheaper, easily available, indigenous, reversible and without any side effects, highlighting its potential role in developing plant based male contraceptive.

Keywords: Piper longum, antifertility, sperm count, seminal pH, sperm motility, sperm mortality and abnormality of spermatozoa.

Antilipidemic study of *Ocimum sanctum* leaves extracts after alloxan-induced diabetic mice

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Antilipidemic drugs, also known as lipid lowering agents or antilipidemic agents. They are pharmaceutical that means lower blood lipid (fat) levels, primarily triglycerides and cholesterol. They aid in the prevention of heart attacks, strokes and other cardiovascular conditions. The study investigates the effect of aqueous extract of *Ocimum sanctum* commonly known as green Tulsi on biochemical parameter in diabetic mice. The experiment involved 40 albino mice, divided 4 groups, a control group, a diabetic group diabetic with low dose of Tulsi, diabetic with high dose of OS. The result suggested that aqueous extract of *Ocimum sanctum* has a beneficial effect on the biochemical parameter of diabetic mice, it reduce the level of high cholesterol. So we can say that Tulsi is an antilipidemic agent. It can be concluded that OS leaf extract provided the liver and cardiac tissue with protection from hypercholesterolemia. plant-based diet rich in fruit, vegetables, and legumes and low in saturated fat is an effective prescription for anyone with more severe atherosclerosis. In addition, there are few herbs available that provide some protection for persons with the above disease.

Keyword: Pharmaceutical, Cholesterol, Investigates, Biochemical.

Evaluation of Metallic Contaminants in Freshwater Ecosystem through Monitoring Haematological Changes in Common Carp *Labeo rohita*

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Fish production and aquaculture is the fastest growing sector to fulfil the need of dietary protein and fish oil. The complete blood cell count (CBC) is an important and powerful diagnosis tool which can be used to monitor the health status of fish in response to changes in nutritional pattern, water quality, effect of pollutant present in water and their effects . The assessment of blood Parameters in fish is done by using Burker haemocytometer. The common haematocytometer used for mammals cannot be used in fishes as their RBC is nucleated. Climatic changes and pollution in water causes haematological changes. In complete blood count, the haematological profile of a fish can indicate its physiological

status and health. Haematological changes in fish due to pollution include a reduction in RBC count, haemoglobin levels, and haematocrit, indicative of anaemia. Leucocytosis (increase in WBCs) reflects an immune response, while changes in blood proteins, electrolytes, and glucose levels indicate metabolic disturbances. Pollutants also induce oxidative stress and genotoxicity, leading to further cellular damage and compromised health. Monitoring these changes helps assess the pollutants on aquatic life so haematological, combined with other diagnostic tools can be used to assess the effect of pollutant on fish production. The haematological changes in fish due to pollutants reflect the physiological and immune stress caused by exposure to toxic substances in the environment.

Keywords: Haematological changes, RBC, WBC, Pollution

Role of Mankind in Environmental Conservation

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Conservation movement focused on preventing the species form extinction, maintaining and restoring habitats, enhancing ecosystem services and protecting biological diversity. Man creates crime against himself (E.P. Odum). Man destructs the environment whereas Nature constructs it. We destructed the environment, we have to construct it. Hence, it becomes utmost important to conserve the environment. Land may be conserved by growing more and more trees, growing grasses on land surfaces and use of organic fertilisers in place of inorganic fertilisers . Water may be conserved by recharging groundwater and reducing over exploitation of water. 70% groundwater used in agriculture practices may be compensated by Rain Water Harvesting. Quality of air may be improved by selective replantation, following environmental laws and participation in mass awareness programme. Pollution may be reduced by its dilution. Global warming and climate change may be diminished by global dimming, conservation of natural resources and reducing greenhouse gases. Wetland may be conserved by changing consumption habits on the one hand and sustainable farming on the other hand. By saving it we can save the entire earth. This is least but not last, "THINK GLOBALLY BUT ACT LOCALLY"

Keywords: Greenhouse gas, Diversity, Selective replantation, Rain Water Harvesting, Global warming, Global dimming, Organic farming

Effect of Silk Dye waste on Reproductive Ability of Female Swiss Albino Mice *Mus musculus*

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Bhagalpur is silk city in Bihar. Health hazards due to pollution by textile dye waste water is an alarming issue in Bhagalpur. It is very toxic as it contains large quantities of dyes (azoic, indigo and aniline), bleaching agents, salts, acids/alkalies and heavy metals in high concentration. The present study research the adverse effects of silk dye waste on reproductive ability of female albino mice. The reproductive toxicity has been assessed using some parameter like no. of implantation site, no. of corpora leutea, Gestation Length, Litter Count, Percent Survival of Litter count and percent pre implantational loss. For reproductive toxicity study, mice were divided into four groups each group having ten mice. The group I (control group) received 1 ml distilled water as suggested by Chaurasia (2005). The group II to IV was administered with 1 ml of different concentrations of silk dyeing effluent (i.e. 25%, 50% and 100%). The different

concentrations of silk dye waste were prepared with effluent and distilled water. Ingestion of different concentration of silk dye waste for 60 days along with control female mice had adverse effect on female reproductive system and fertility. There is elongation in length of estrous cycle. The number of corpora leutea and implantation site was significantly reduced 12±0.61 to 5±0.84 while the percent pre implantation loss were increased 7.87±0.94 in control increased to 36.74±8.69percent pre implantation loss in 100% effluent treated group.
Keywords: Silk dye waste, Corpora leutea, implantation, Litter count. Estrous-cycle

Impact of Pesticides on Human Health

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The biggest challenge that arises due to the ever-increasing population is the increasing pressure on agriculture resources. As agriculture decreases, the state of starvation increases. Pesticides are used to avoid food shortage. But these are made with harmful chemicals that are intended to be discharged into the environment with some purpose. Even though the purpose of each pesticide as chlorpyriphos is to kill a specific bug, a very high proportion of pesticides end up somewhere but other than their intended target. They find their way into the water, air, sediments, and even our food. Pesticides have been connected to a number of health risks for people, ranging from immediate effects like headaches and nausea to long-term effects including cancer and reproductive damage. Additionally, using these reduces the soil's overall biodiversity. Higher soil quality, which results from the absence of pollutants in the soil, permits more water retention, which is essential for plant growth. At larger levels, exposure to chlorpyrifos may result in acute poisoning. Acute poisoning or prolonged exposure to low dosages can result in persistent health impacts, and even at extremely low doses, fetuses and young children might have developmental abnormalities.
Keywords: Resources, Proportion, Immediate, Chlorpyrifos, Persistent

Phytochemicals and the synthesis of Organic Compounds

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Phytochemistry is the branch of chemistry that deals with the study of the chemical compounds produced by plants, known as phytochemicals. These compounds play essential roles in plant metabolism, defense mechanisms, and ecological interactions. Phytochemistry is closely related to botany, pharmacology, and biochemistry, and it is fundamental in drug discovery, food science, and agriculture. Phytochemistry is particularly important in medicinal plant research, as many pharmaceuticals are derived from plant-based compounds. For example, morphine (from *Papaver somniferum*), quinine (from *Cinchona* spp.), and taxol (from *Taxus brevifolia*) are plant-derived drugs widely used in modern medicine. Advances in phytochemical analysis techniques, such as chromatography and spectroscopy, have enabled the isolation and structural elucidation of bioactive compounds. Plants produce a wide variety of organic compounds, which can be broadly classified into primary metabolites and secondary metabolites. These compounds play crucial roles in plant growth, development, defense, and ecological interactions. The diversity of organic compounds in plants has significant

applications in medicine, agriculture, and industry. Modern phytochemical studies involve qualitative and quantitative analysis of plant constituents using techniques like high-performance liquid chromatography (HPLC), gas chromatography-mass spectrometry (GC-MS), and nuclear magnetic resonance (NMR) spectroscopy. These methods help identify active plant compounds that have potential applications in pharmaceuticals, cosmetics, and nutraceuticals.

Keywords: Phytochemistry, Metabolites, Chromatography, Spectroscopy, Pharmaceuticals.

A Discourse of Climate Change and its Impact on Agriculture Sector in Rural Bihar

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Climate change has emerged as a critical global issue, significantly impacting agricultural systems, particularly in developing economies like Bihar, India. This study explores the intricate relationship between climate change and agricultural development in Bihar, emphasizing its effects on crop production, rural livelihoods, and the state's economy. Bihar's agriculture sector, which employs a significant portion of the population, faces multiple climate-related challenges, including rising temperatures, erratic rainfall, droughts, and floods. These climatic variations affect crop yields, soil fertility, water availability, and pest infestations, further exacerbating the vulnerabilities of small and marginal farmers. The study critically examines the role of climate change in shaping agricultural sector reforms in Bihar and highlights the state's efforts to mitigate its adverse impacts. Government initiatives, including the **Jal-Jeevan-Hariyali** program and the **Bihar State Action Plan on Climate Change**, have been analyzed to assess their effectiveness in promoting climate-resilient agriculture. The research also reviews the role of policy frameworks, technological advancements, and sustainable farming practices in ensuring long-term agricultural sustainability. This study is based on **empirical, and exploratory research methodologies**, the study draws insights from primary and secondary data sources. The findings of the study is that while Bihar has made notable strides in addressing climate-related agricultural challenges, significant gaps remain in policy implementation, farmer awareness, and infrastructural development of rural Bihar. There is a need of **comprehensive, multi-stakeholder approach**, incorporating government support, scientific innovation, and community participation, is crucial for mitigating climate change's impact on Bihar's agriculture and ensuring long-term food security and rural development.

Keywords: Climate Change, Agricultural Reforms, Bihar, Rural Development, Climate Resilience, Policy Implementation, Incorporating

Bioremediation of heavy metal: A sustainable approach

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Ever increasing population has strengthened to meet the requirement for food demand and consequently leading to extensive agricultural practices that contribute heavy metal on different habitats. Various anthropogenic activities such as industrialization, mining have significantly elevated the load of heavy metal concentrations in terrestrial and aquatic environments. Heavy metals likes cadmium, lead, arsenic, copper, and mercury may persist in soils for longer time periods and bio-accumulate through various food chain and adversely affecting the crop yield and food quality. Heavy metal contamination also affects the soil microbial communities likes diversity, metabolic processes, and biomass production. Bioremediation is cost-effective, eco-friendly alternative to traditional remediation practices. However, its efficiency is influenced by environmental factors such as microbial strain specificity, and metal

bioavailability. Several microbial strains, including *Pseudomonas aeruginosa, Bacillus sp., Aspergillus niger* etc. have shown effective bioremediation potential in metal accumulation. A synergistic and sustainable approach integrating microbial and phytoremediation strategies may enhance heavy metal detoxification.

Keywords: Heavy metal, bioaccumulation, Microbial bioremediation, sustainable, toxicity

Challenges and opportunities in the context of adding "Indian values" in India to restore the world's ecosystem.

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Problems have always played a pivotal role in shaping the future of the individual, society, nation, and universe. Westernization and materialism have destroyed the world's ecosystem, endangering humanity and causing the Ukraine-Russia war, global warming, climate change, and other environmental problems. Presently, India is a country with a vast population of one and a half billion, or 18% of the world's population. Therefore, the westernization and materialism of India in the last three or four centuries have led to a deterioration of Indian values, costing a loss of humanity within India's ecosystem. Indian values originated from its religion, Sanātana Dharma. "Sanātana" means having three instincts in its followers: freedom, naturality, and openness. Therefore, the behaviour and character of Indians were shaped according to the changing dimensions of the climate and nature of India and the Indian subcontinent. The climate and nature of this area are diversified; thus, diversification was the mainstay of Indian values and culture. The value of diversification existed in the ecosystem based on cooperation, coordination, and tolerance. The Mahakumbh, celebrated in Prayagraj in 2025, will open a gateway to accepting Indian values, but will create various challenges like population growth, resource availability, increased social and economic inequality, and decreased environmental standards. It also enhances opportunities for economic development, social justice, and environmental protection. The objective of this research is to understand the impact on the whole world of adding Indian values in India. Several related questions can be tested using available past literature and qualitative research methodology. Data can be collected through interviews, observations, focus groups, and document analysis, while data analysis techniques such as coding, thematic analysis, network analysis, and narrative analysis will be used.

Keywords: Westernization, Materialization, ecosystem, Indian values, MahaKumbh, Sanātana, freedom, naturalness, and openness.

Change in Immunological Responses in Relation to The Bacterial Infections on Tasar Silkworm *Antheraea mylitta* Drury

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This study investigates the dynamic changes in immunological responses of *Antheraea mylitta* Drury, a commercially significant tasar silkworm, subjected to bacterial infections. Understanding these alterations is crucial for developing effective disease management strategies in sericulture. Bacterial infections pose a significant threat to silkworm health, impacting silk production and economic stability. This research focuses on characterizing the hemolymphatic immune parameters, including total hemocyte count (THC), differential hemocyte count (DHC), phenoloxidase (PO) activity, and antimicrobial peptide (AMP) expression, in response to challenge with pathogenic bacteria. Larvae were experimentally infected with selected bacterial strains, and hemolymph samples were collected at various time intervals post-infection. Changes in THC and DHC were assessed to determine the

recruitment and differentiation of hemocytes, the primary cellular components of the insect immune system. PO activity, a key indicator of melanization and humoral immunity, was measured spectrophotometrically. Furthermore, quantitative real-time PCR was employed to analyze the expression profiles of specific AMP genes, providing insights into the molecular mechanisms of antimicrobial defense. The results reveal significant fluctuations in hemolymphatic parameters following bacterial challenge. Notably, a rapid increase in THC and a shift in DHC towards granulocytes were observed, indicating an active cellular immune response. Elevated PO activity suggests enhanced melanization, contributing to pathogen encapsulation and destruction. Moreover, significant upregulation of AMP genes confirms the activation of humoral immunity. These findings provide a comprehensive overview of the immunological adaptations in A. mylitta during bacterial infections, highlighting the intricate interplay between cellular and humoral defense mechanisms. This research contributes to the development of sustainable disease control measures, ensuring the health and productivity of Tasar silkworm rearing.

Keywords: Antheraea mylitta, Bacterial Infection, Immunological Response, Hemolymph, Antimicrobial Peptides

Ethnobotanical Aspect of Common House Hold Plants

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Ethnobotany is an interdisciplinary field that combines botany, anthropology, ecology, and pharmacology to explore the traditional knowledge and practices of indigenous and local communities. The term "ethnobotany" first coined by American Botanist John William Harshberger in 1895 to describe the study of plants used by indigenous peoples. Ethnobotanists conduct fieldwork to document traditional to document traditional plant knowledge, often collaborating with indigenous communities to preserve cultural heritage and biodiversity. Ethnobotany has gained importance in conservation efforts, indigenous knowledge help in sustainable resource management and biodiversity protection. It also plays crucial role in bioprospecting, ethical research, and intellectual property rights concerning indigenous knowledge. In various fields, including medicine, agriculture, environmental conservation, and cultural heritage. Many pharmaceutical drugs are derived from traditional plant-based remedies used by indigenous cultures. For example, aspirin (Salix species) and quinine (Cinchona species) were first used in traditional medicine. Traditional farming practices, informed by ethnobotanical knowledge, promote biodiversity and soil health. Traditional plant knowledge is often passed down orally and is at risk of disappearing with modernization. With increasing interest in herbal medicine and bioprospecting, ethnobotany has gained prominence in pharmaceutical and biotechnology industries. This knowledge contributed to industries such as cosmetics, perfumery, and food production. Many commercially valuable plant-based products, like essential oils and herbal supplements, have their origins in traditional plant use. Indigenous knowledge of plant species that thrive in harsh conditions can help communities adapt to climate change. Understanding traditional drought-resistant crops and medicinal plants may provide solutions to future environmental challenges.

Key Words: Ethnobotany, Pharmacology, Bioprospecting, Biodiversity, Food Production.

Etiology and Disease management of the Bacterial spot of tomato.

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Bacterial spot of tomato was firstly identified in the early 1900s which affects tomato in both commercial fields and residential gardens. This disease results in poor fruit set, fruit blemishes, and defoliation. Once introduced into a planting, bacterial spot is difficult to control and can result in major fruit losses. Symptoms appear on the leaf, fruit and stem, Spots are slightly raised on leaf undersides and depressed on top sides typically located along leaf margins. Fruit lesions are initially water-soaked spots that become blister-like, rough, and tan to brown in colour. The bacterial spot of tomato is caused by multiple species of *Xanthomonas*, a genus of Gram-negative, rod-shaped bacteria. The four main species responsible for bacterial spot are *Xanthomonas vesicatoria, Xanthomonas euvesicatoria, Xanthomonas gardneri, Xanthomonas perforans.* The bacteria typically enter the plant through stomata or wounds on the plant's surface and can survive in plant debris or soil between growing seasons. The control measures of this disease include Spacing, Pruning, Crop Rotation, Sanitation, we can also use Bacterial Antagonists such as species of **Bacillus* and *Pseudomonas*, that can outcompete the pathogenic *Xanthomonas* for space and resources on plant surfaces. Copper sprays are most effective when applied preventatively, before bacterial symptoms become widespread. Regular applications, especially during periods of high humidity or wet weather can reduce bacterial population.

Keywords: Solanum lycopersicum, Bacterial Disease, Xanthomonas sp, Gram-negative and rod-shaped Bacteria.

Extraction methods under the light absorbance of natural photosensitizer dyes for Dye Sensitized Solar cell (DSSC)

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Dye Sensitized Solar Cell is third generation new photovoltaic technology to be converting the solar energy into electrical energy for the future energy resources by using extracted dyes from flowers and leaves of the plant sample. The cells were fabricated mainly using TiO_2 nanoparticles as a semiconducting layer deposited on transparent fluorine doped tin oxide (FTO) conducting glass with the help of doctor blade method. The absorption efficiency of the extracted dye was performed in the spectral range in between 400 nm to 750 nm. The I-V characteristics curves of fabricated cell was measured and analysis for the better performance in future. All the relating parameters for its fabrication was used for the better performance in optical absorption consistently then other. Further, the impedance spectroscopy of the cell has been investigated in future.

Keywords: Renewable energy (Sunlight), Dye-sensitized solar cell (DSSC), Natural extracted dyes, TiO_2-Nanoparticles, UV-visible spectroscopy etc.

Faecal sludge valorization: Potential opportunities in agriculture and energy sector

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Globally, the faecal sludge containing varied pathogens, organic materials, and inorganic constituents including heavy metals is major challenge to the environmental safety. Therefore, different on site treatment facilities have been designed for the management of faecal sludge. In this context, the treatment product of faecal sludge can be considered for multifarious application in agriculture and energy sector. The solid product remaining after faecal sludge treatment holds the potential to be used as soil conditioner. Alternatively, the solid part of treated sludge can be amalgamated with the soil to produce fertilizer for agricultural applications. Being rich in organic materials, faecal sludge revamp the water retention characteristics of soil and minimize the risks of soil erosion. The inorganic nutrients linked to the solid portion of the faecal sludge are released slowly, thereby suggesting employment as slow release fertilizers. On the other hand, owing to nutrient abundance, the water originated from faecal sludge processing can be subjected to nutrient recovery and reclaimed to fulfill the demand in water stressed regions. Nevertheless, the sludge and treated water should be comprehensively investigated for the presence of hazardous heavy metals, salinity, nutrient toxicity, and pathogenic microorganisms. Apart from opportunities in agriculture, the faecal sludge can be harnessed for energy production through biological and thermal processes. The biogas and heat generated from the anaerobic digestion of the faecal sludge can be captured using suitable technologies to meet the energy requirements. Furthermore, the pyrolysis under defined conditions can be considered for the fabrication of biochar, gaseous products, and oils with considerable application in energy sector. The compressed carbonized block prepared from treated faecal sludge can be employed as promising material for cooking energy, advocating reduced dependency on traditional fuels and the mitigation of green house gas emission. However, despite of multiple opportunities, the plausible risks of faecal sludge to environmental complexes and human health must be taken into consideration before commercial application.

Keywords: Biochar; Nutrient recovery; Pathogens; Environmental risks, Biofuel; Pyrolysis

Assessment of Fluoride Induced Genotoxicity in Swiss Albino Mice (*Mus Musculus*) Using the Micronucleus Test and its Stimulation by *Cinnamon zeylanicum* (Cinnamon)

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In the modern world, employing herbs as medication appears to be more advantageous than using synthetic drugs because the former has less adverse effect. One of the oldest plants used as a spice an in medicine is cinnamon. Genotoxicity is a feature of chemical compounds that causes alteration in a cell's genetic code. Fluoride being non - biodegradable and is one of the long lasting Genotoxicity causing genetic effect. In present work the protective effect of cinnamon where evaluated against the genotoxic damage induced by fluoride on PCEs an NCEs in mice bone marrow cells by using micronucleus test. The test reveals that incidence of micronucleus formation in fluoride treated group where significantly higher than the control. While concurrent treatment of cinnamon with fluoride shows value lower than fluoride treated group and almost equivalent up to the control level. Acentric chromosomes, chromatic fragments or entire chromosomes that lag behind in anaphase and are excluded from the daughter nuclei in telophase as some of the potential mechanisms that results in dividing cells.

Accordingly, the findings indicated that cinnamon has a protective effect against the genotoxicity caused by fluoride in mice bone marrow cells.

Keywords: Medication, Genotoxicity, Chromosomes, Potential, Fluoride

Contraceptive Efficacy of Aqueous Flower Extract of *Hibiscus rosasinensis* (Linn.) on Seminal Profile of Male *Mus musculus*.

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Hibiscus rosasinensis is a widely available plant throughout India and is well known for its antifertility properties. This experiment includes 30 adult male Swiss albino mice to show the antifertility efficacy of *H. rosasinensis* on male *Mus musculus*. The mice were divided into control and treated groups. 0.1 ml of aqueous flower extract of *H. rosasinensis* at the dose 500 mg /kg body weight was administered orally with gastric catheter to the treated group of mice for 15, 30, 45 and 60 days while control group was fed with 0.1 ml of glass distilled water for same exposure days. The mice were sacrificed through cervical dislocation method. The physical parameters like sperm count, sperm mortality, sperm motility, sperm abnormality and seminal pH were assessed during this investigation. The result showed a significant decrease ($P<0.001$) in sperm count, sperm motility and seminal pH in the treated group as compared to the control group of mice, while a significant increase ($P<0.001$) in sperm mortality and abnormal sperm morphology was also observed in treated group of mice. These observations suggest that *H. rosasinensis* has a pronounced antifertility effect in male Swiss albino mice, primarily through its impact on spermatogenesis and hormonal balance. Thus, *H. rosasinensis* can be used as cheap, reversible, herbal, safe contraceptive agents for males.

Keywords: *Hibiscus rosasinensis*, Antifertility, Sperm count, Sperm motility, Sperm mortality, Sperm abnormality, *Mus musculus.*

Investigating the Reproductive Toxicity and Protective Potential of *C. roseus* on Testicular Health in Male Mice

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The medicinal plant *C. roseus* is widely recognized for its therapeutic properties, primarily its anticancer and antidiabetic effects. However, its potential impact on male reproductive health, particularly testicular function, remains underexplored. This study aims to evaluate the protective effects of *C. roseus* on testicular functions in male *Mus musculus*. Male mice were administered various doses of *C. roseus* extract over a specified period to evaluate testicular morphology, histopathology and sperm count. The testes had substantial structural damage, according to histopathological study, which included increased apoptosis, decreased sperm-producing cells and degeneration of seminiferous tubules. Significant abnormalities were found in the sperm, such as decline in sperm count, decreased motility and a high frequency of morphological defects such as head and tail malformations. Moreover, high doses of *C. roseus* may lead to death while it depends on preparation of extract and their time period. These findings show that *C. roseus* causes serious reproductive abnormalities in male *Mus musculus*, mostly by altering the shape and function of sperm, which may have an effect on fertility. Additionally, the study emphasizes the importance of plants and their part used having antifertility action which are helpful for today.

Keywords: *C. roseus*, toxicity, antifertility, histopathological, testicular and morphological.

Alginate Nanocomposites for Sustainable Arsenic Removal in Ganga River Water

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The Ganga, a sacred river, encompasses about 26% of India's territory in its northern basin and absorbs 25% of its yearly runoff, making it a lifeline for many. Rapid anthropogenic activities e.g., urbanization, industrialization, and huge water consumption have degraded Ganga water quality. Ganga river water contaminated with several pollutants, imposes adverse health impacts on living organisms. Particularly prolonged exposure to heavy metals not only leads to skin cancer but also has the potential to induce malignancy in several organs, including the lungs and bladder, among others. Several investigations surveyed the concentration of various pollutants in drinking water and the health risks attribute to Arsenic (As) in Ganga river water belonging to Bhagalpur, India. According to World Health Organization (WHO) the permissible limit of Arsenic is 10 µg/L (or, 10 parts per billion (ppb)) in drinking water, while the Indian standard drinking water Specification 1991, has recommended a maximum desirable limit of As in water as 50 µg/L (50 ppb). In this context, numerous remediation techniques have been reported for the decontamination of Ganga River Water, including UV treatment, Reverse Osmosis, Membrane Filtration, Flocculation, Adsorption, etc. Among them, adsorption is a prominent method because to its simplicity and efficacy. Biopolymers derived from biological sources provide a natural solution that may be readily modified for the elimination of arsenic. In this context, alginate is used as a promising polymer substrate that effectively adheres to hazardous substances, functioning like to magnets. When enhanced with nanomaterials, they exhibit improved efficacy in arsenic capture, configured as diminutive particles or beads. This modification makes biopolymers a viable option for the remediation of arsenic in water.

Keywords: Alginate, nanocomposite, arsenic removal, Ganga River, water remediation.

Impacts of Bisphenol A Exposure on Biochemical Parameters in Swiss Albino Mice (*Mus musculus*)

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Bisphenol A (BPA) is a widely used industrial chemical found in plastic consumer products including baby bottles, toys, lining of food cans, thermal papers, dental devices etc. The present research work was carried out to examine the effects of two different doses of bisphenol A on biochemical parameters (blood glucose and serum cholesterol levels). For this study, healthy adult mice weighing 30.0 ± 5.0g were taken in four groups (control, control vehicle, low dose of BPA and high dose of BPA). Mice were administered with daily oral doses of BPA for 28 continuous days. Blood samples were collected from tail vein of mice after the completion of doses & were analysed. The findings revealed that exposure to BPA resulted in significant alterations in blood glucose and serum cholesterol levels. This implies that BPA exposure could impact the biochemistry of *Mus musculus*, likely due to its impact on metabolism through endocrine interference & associated with potential health risks.

Keywords: Bisphenol A, BPA, Mus musculus, blood glucose, cholesterol, albino mice

Pesticide application and its impact on the environment through agriculture development in India.

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India's Green revolution in agriculture has made a significant contribution on aggregate supply of food grains ensuring food security to the growing population. However, the momentum gained during the period of green revolution has slowly declined. Now the agricultural growth faces a serious challenge in terms of sustainability. Our agriculture is still technology deficit as far as world agriculture is concerned. Yields per hectare of food grains, fruits and vegetables in our country are for below global averages. Our rice yields are one third of China's, and about half of Vietnam's and Indonesia's. Supplemental irrigation based on rain water harvesting will help to increase yields further. A second area needing immediate attention and action relates to improving the productivity of wheat, rice, pulses and oilseeds in the Indo Gangetic plains eastern India, particularly in Bihar, Jharkhand, Chhattisgarh, Orissa, eastern Uttar Pradesh, West Bengal and Assam. According to a report of Chambers of Indian Industries (CII) and Mckinsey, the country's agricultural output 2030 could reach Rs 29.28 lakh crore level and food could jump to over Rs 7 lakh crore.Today, the main problem in agriculture pertains to sustainability of resources, use and indiscriminate use of chemical fertilizers and pesticides. These problems have led to increasing awareness and a felt need for moving away from the input intensive agriculture pursued during the green revolution phase, to sustainable farming in different parts of the world. The development is a slow process. It has brought away changes during the past 50 years in rural areas.

Keywords: Revolution, Sustainable, Fertilizer, Pesticide, Technology

Pharmaceutical Sciences and Therapeutics: A Sustainable Approach to Ecosystem Restoration

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Pharmaceutical sciences and therapeutics have a profound impact on ecosystem restoration, bridging human health and environmental sustainability. The increasing pharmaceutical pollution from drug residues, antibiotics, and synthetic compounds poses significant ecological threats, affecting aquatic and terrestrial biodiversity. This study explores sustainable pharmaceutical practices, including green chemistry principles, biodegradable drug formulations, and biopharmaceutical advancements that minimize environmental footprints. A major focus is on eco-friendly drug synthesis, leveraging plant-based and microbial resources to develop therapeutics with reduced toxicity. Additionally, the safe disposal of pharmaceutical waste through advanced bioremediation and waste treatment strategies is crucial for preventing environmental contamination. The role of pharmacovigilance in monitoring ecological impacts is also emphasized. Furthermore, advancements in nanomedicine and targeted drug delivery systems contribute to precision medicine, reducing overuse and subsequent environmental accumulation of pharmaceuticals. The study highlights policy interventions and regulatory frameworks essential for sustainable drug development and disposal. By integrating pharmaceutical sciences with ecological consciousness, this research underscores the need for a holistic approach to therapeutics that aligns with global ecosystem restoration goals. The

findings advocate for interdisciplinary collaboration to ensure that pharmaceutical advancements contribute to both human well-being and environmental health.

Keywords: Pharmaceutical pollution, green chemistry, biopharmaceuticals, eco-friendly therapeutics, ecosystem restoration.

Psychological effects of environmental pollution

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In today's modern age of science, where man has got some blessings in the name of global village and development, he has also got some curses. Pollution is a curse which is now not local but global. Its effect falls on the mood of a person in the form of not only physical illness but also mental illness. It is said that "a healthy mind is created in a healthy society". What we feel after seeing pollution can have a negative effect on our mental health and well-being. Depression is a common, but serious condition that results from the complex interactions of social, biological, environmental, and psychological factors. Depression related to pollution and climate change is called “eco-depression,” which is also associated with higher overall feelings of anxiety and stress. Although many studies on pollution-related depression rely on self-reporting of emotional state, neuroscience findings also link air pollution to physical changes in the brain, such as inflammation and oxidative stress, which can manifest as depression. The presence of air pollution may discourage people from spending time outdoors, which may reduce their exercise, social interaction, and exposure to sunlight that aids in the production of vitamin D—all of which can increase negative psychological effects. Long-term exposure (interestingly, perceived exposure) to both air and noise pollution increases annoyance, and decreases cognitive function, decision-making, and memory. Noise pollution, such as from airplane and motor vehicle traffic, can reduce the efficiency of complex tasks and disrupt sleep, which has a negative impact on mental health. We can mitigate the adverse psychological impact by implementing some useful practices in our life including adopting improved indoor air quality, managing noise pollution, creating green spaces that can filter air pollutants, Using biodegradable products, replacing various food products with organic food items, avoiding using plastic and use paper or cloth bags, etc.

Keywords: Environment, mental health, pollution.

Effect of Imidacloprid Exposure on Sperm Count and Morphology in Albino Mice

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Neonicotinoid insecticides are thought to be a good substitute for organophosphate pesticides, although some data suggest that they have negative effects on male reproductive health . This study investigates the effects of Imidacloprid (IMI) exposure on sperm parameters- including sperm count, motility, viability, and morphology in male Albino mice . Male mice were orally administered four significant doses of imidacloprid (Control group , control vehicle, low dose -25mg/kg b.wt. , high dose 50mg/kg b.wt.) for over specified period , to evaluate sperm parameter. Results revealed a significant reduction in sperm count ,sperm mobility and viability, and an increase in percentage of sperm abnormalities in treated groups as compared to control in male Mus *musculus* following IMD exposure. These findings highlight the potential reproductive risks associated with IMD that may impair male fertility by inducing sperm toxicity. These findings suggest that imidacloprid exposure may impair male fertility by inducing sperm toxicity. Further research is essential to investigate the mechanisms underlying

these reproductive alterations and investigate the broader implications for environmental and human health.

Keyword:- Neonicotinoid , imidacloprid, implication , viablity

The Complex Interplay Between Urban Metabolism and Climate Change in Indian Cities: Comprehensive Strategies for Achieving Sustainable Urban Development

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Population growth and the accompanying environmental issues, such as urban expansion and climate change, are posing a growing threat to cities. Furthermore, variations in urban metabolism, which is represented by energy and matter, are a contributing factor to the changing climate due to varying patterns of urbanization. To determine the scope and possible impacts of the many environmental issues that the world is currently confronting, urban metabolic studies that examine energy and material inputs, outflows, and stocks can be linked with conventional assessment methods. Therefore, in light of evolving urban planning scenarios, more sustainable approaches must be used, especially with regard to better waste management techniques and sustainable resource utilization. This manuscript explores the intricate relationship between urban metabolism and climate change in Indian cities, addressing the challenges posed by rapid urbanization and the increasing demand for resources. The paper discusses the key components of urban metabolism—energy consumption, waste management, water management, transportation, and green spaces—and their impacts on climate change. It proposes comprehensive strategies for achieving sustainable urban development, including integrated urban planning, technological innovations, policy interventions, public-private partnerships, and resilience planning.

Keywords: Energy flow, Circlular Economy, Material flow, Urban Sustainability, Urbanization

Ethnomedicinal Plants Used by Indigenous Communities for Digestive Ailments in Valmiki Tiger Reserve, West Champaran, Bihar

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Valmiki Tiger Reserve in West Champaran, Bihar, is home to a rich diversity of ethnomedicinal plants utilized by local communities, including the Tharu tribe, for treating various ailments, particularly those related to the digestive system. Through ethnobotanical surveys and interviews with local healers and villagers, several plant species were identified for treating gastrointestinal disorders such as diarrhoea, dysentery, constipation, indigestion, and gastritis. Notable species include: *Aegle marmelos* (Bael) – for diarrhea and constipation, *Terminalia chebula* (Haritaki) – for constipation, *Azadirachta indica* (Neem) – for gastric ulcers, *Zingiber officinale* (Ginger) – for indigestion, *Asparagus racemosus* (Satavar) – general tonic for

digestive health, *Emblica officinalis* (Amla) – for relieving constipation and promoting regular bowel movement and *Achyranthes aspera* (Chirchiri, Dativan) – the root, stem and twigs are used for digestive issues. The study highlights the significance of preserving indigenous knowledge. Conservation of these medicinal plants is essential to sustain traditional healthcare practices. Further research on the bioactive compounds of these plants may contribute to the development of new herbal treatments for digestive ailments.

Keywords: Ethnomedicinal plants, Valmiki Tiger Reserve, Tharu tribe, Digestive ailments, Indigenous knowledge, Gastrointestinal disorder, Conservation

Effect Of Host Plants on The Feeding Potential of *Micraspis Discolor* Feed on *Aphis gossypii*

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Aphids (Homoptera : Aphididae) are the most universal group of plant feeding insects.Aphids are small soft bodied feed by sucking the sap from their host plants preferably the undersides of leaves and flower buds. They damage the crop directly by drawing sap from plant tissue resulting in 20- 40% yield loss at the time of infestation. *Aphis gossypii* Glover varies in colour and may be light green, dark green, pale yellow or almost white. It is a serious pest of field and glasshouse crops, especially cotton, okra, gourd, melon, chilli, brinjal and several ornamental plants such as chrysanthemums, roses, etc. *Micraspis discolor* (Fabricius) is an important predator in this target area and recorded on several aphid pest. In the biological control program, the study of feeding potential is essential. The feeding potential of *M. discolor* was investigated on *A. gossypii* reared on different host plants viz., *Lablab purpureus*, *Cajanus cajan*. The maximum consumption of aphids by 1st instar (4.6±0.93), 2nd instar (13.8±0.8), 3rd instar (18.6±2.99) and 4th instar (47.2±5.43) larvae of *M. discolor* was observed on *L. purpureus*. The total consumption by the larvea (78.2±4.62) was also recorded highest on *L. purpureus*. However, the minimum consumption by 1st instar (6±1.04), 2nd instar (8.8±1.01), 3rd instar (21.8±4.26) and 4th instar (47.6±4.92) aphids was recorded on *C. cajan*. Thus, it can be concluded that L. *purpureus* is the most favourable host plant for *A. gossypii* and *M. discolor.*

Environment and Sustainable Development through Education

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A particular course of action intended to achieve a result capable of being lengthen or extended in duration or space is sustainable whereas act of making something new by expanding or enlarging or refining is development. Thus, Sustainable development can be defined as those developmental activities that takes time, money and lots of effort over a long period of time. It is a global concern of meeting requirements of the present generations without sacrificing or compromising on the ability of our future generations to sustain them. It can be achieved by

moving away from the conservative model of unlimited and unmonitored growth, consumption and wastage, to an innovative model of monitored usage, savings, wastage and other factors without compromising on growth for a better future. Environment and Sustainable development through education are interlinked for survival and well-being of both present and future generations. This article aims to elucidate the importance, challenges, strategies and recommendations for Sustainable development through Educational Planning in India.

Keywords: Environment, Sustainable development, Education, challenges, Strategies and Recommendations

Assessing the influence of seasonal environmental changes on the growth and feeding behaviour of *Heteropneustes fossilis*.

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Seasonal environmental variations play a crucial role in shaping the behavioural and physiological adaptations of aquatic organisms. These changes significantly influence aquatic ecosystem, altering resource availability, water quality and temperature, which in turn affect fish growth, feeding behaviour, and overall fitness. The present study evaluates the impact of seasonal changes on morphometry, and gut morphometry of *Heteropneustes fossilis* (singhi), a commercially important freshwater species, known for its hardy nature and ecological significance. Fish samples were collected across the freshwater bodies. The morphometric parameters and length-weight relationships were analyzed to assess seasonal growth patterns, while gut morphometry provided preliminary insights into dietary adaptations. The work further aims to explore the correlation between environmental factors, feeding patterns and fish health. The findings are expected to contribute to understanding the adaptive strategy of *H. fossilis* in fluctuating environment. The study holds significance for freshwater biodiversity conservation and climate change impact assessment.

Keywords: seasonal variation, Heteropneustes fossilis, morphometry, climate change, freshwater ecosystem, environmental adaptations.

Deforestation and Afforestation: A World Perspective

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The world population is slight above 6 billion and is expected to double in the next 50 years. Forests, which act as sinks for carbon and other greenhouse gases are threatened with elimination. Forests maintain conditions that make life possible. Globally, forests cover only 30%. Plants are the most important things in our ecology. It plays an important role in maintenance of balance within the ecosystem. They provide oxygen in the earth's environment and utilize carbon dioxide from the environment. Since the Industrial revolution, deforestation has accelerated worldwide and it has adversely impacted our environment. From rising sea levels to global warming and the greenhouse effect, deforestation has had an adverse impact on our planet. One of the best solutions to deforestation is afforestation. The term deforestation refers to cutting down of trees for different purposes of human beings whereas afforestation refers to planting of trees to the places which were devoid of plants earlier. Deforestation is a result of industrialization, globalization and urbanization. The main reason for afforestation is

to control carbon footprint and to ensure the sustainability of the natural environment. Afforestation can ensure balance and survival for all life on earth. The human population has been ever-growing since the 1800s when the recorded population was one billion. It is estimated that the population will touch 8.6 billion by 2030 and grow even more in the next century. These factors suggest that deforestation cannot be completely eliminated but hopefully, be controlled to an extent. Afforestation helps to maintain equilibrium and prevent upsetting the natural forces at play.

This abstract includes the causes of deforestation which contains agricultural expansion, commercial logging, urbanization and infrastructure development, mining resource extraction, population growth and subsistence farming and forest fires. It also includes environmental impacts of deforestation such as climate change, soil erosion, water cycle disruption, desertification and biodiversity loss. Further, this abstracts also includes benefits of afforestation like providing soil conservation, biodiversity conservation, water regulation, air quality improvement and carbon sequestration and it also provide the strategies for afforestation like agroforestry, species selection, community involvement, silviculture practices and monitoring and evaluation. Further, it includes the different safety measures to combat deforestation and advocate for forest protection. To safeguard our planet and future generations, halting deforestation is imperative

Keywords: deforestation, afforestation, population, biodiversity, agriculture, farming, planting, globalization, ecosystem

Student-Centered Participatory Approach for Addressing Environmental Challenges and Advancing Sustainability

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Rivers have been one of the major sources of water for humans. Since ancient times, the Ganga is considered as one of the sacred, perennial and largest rivers in India. In the year 2008, River Ganga was declared as National River of India. The sacred status of the river Ganga has led to its extensive use for various religious practices, resulting in significant pollution issues. The disturbed ecological balance poses severe threat to the riverine biodiversity thereby impacting the livelihood of millions dependent on it. To address these challenges, large-scale data through citizen science initiatives is crucial. Training young minds in environmental awareness and action can play a transformative role in this process. To follow this a study was conducted in three schools of Varanasi- Central Hindu Boys School, Central Hindu Girls School, and International Hindu School. The study aims to improve environmental education practices through questionnaire design, hands-on training, and implementation to engage school students in citizen science activities related to water uality of river. The study simultaneously contributed to scientific understanding and environmental awareness. Different phases and activities were followed in this participatory monitoring – Overview and empathizing, Real time exposure, Ideation and Pre-test, Experimentation and Post-test.

Keywords: Environment, Sustainability, Sustainable Development Goals, NEP

The Role of Invasive Species in Biodiversity Loss due to Climate Change

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Climate change and invasive species are two of the most significant drivers of biodiversity loss globally. As climate change alters ecosystems, it creates favorable conditions for invasive species to thrive, often at the expense of native species. Invasive species, introduced intentionally or accidentally by human activities, can outcompete, predate, or introduce diseases to native species, leading to population declines and even extinctions. The interplay between climate change and invasive species exacerbates biodiversity loss, as rising temperatures, shifting precipitation patterns, and extreme weather events weaken the resilience of native ecosystems. This paper explores the mechanisms by which invasive species contribute to biodiversity loss in the context of climate change, highlighting case studies and potential mitigation strategies. Effective management of invasive species, coupled with climate adaptation measures, is crucial to preserving global biodiversity in the face of ongoing environmental changes. Understanding the interaction between invasive species and climate change is critical for biodiversity conservation and ecosystem management. Effective mitigation strategies require early detection, control measures, and adaptive policies to reduce biodiversity loss.

Keywords: Climate change, invasive species, biodiversity loss, ecosystem disruption, native species, competition, predation, disease.

Bihar Has a Significant Potential for Aquatic Bioresources

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Rivers and its tributeries providing essential water resources for agriculture, communities and biodiversity. The river's fish diversity is vital for maintaining local ecological balance and supporting livelihoods. Ichthyofaunal diversity refers to variety of fish species and their abundance. Altogether 28,500 fish species have been so far recorded worldwide out of these 22 hundred fish species are known to occur in different aquatic habitats of India. Over the past few decades, riverine ecosystems have been subjected to intense anthropogenic pressure resulting in its degradation and habitat loss for the fishes. As a result, many fish species have become highly endangered. Fish species diversity in river is dependent on the combined interaction of different ecological variables like temperature, size and surface area, annual discharge, depth, flow velocity, topography, substrates nature and climate. Biodiversity is essential for ecosystems to provide goods and services like nutrient cycling and clean water and it also impacts the capacity of biological systems to adapt to changes in their environment. Bihar has great potential for the development of aquaculture and inland fishing and it also has a significant potential for aquatic bioresources.

Keywords: Biodiversity, Ecological, Ichthyofauna, Anthropogenic, Pressure, Endangered.

Antioxidant Activity of *Momordica charantia* in Albino Mice (*Mus musculus*): Superoxide Dismutase (SOD) and Catalase (CAT)

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Momordica charantia (bitter melon) is known for its medicinal and antioxidant properties. This study examines its effect on superoxide dismutase (SOD) and catalase (CAT) activity in albino mice (*Mus musculus*). SOD activity was measured using Kono's (1978) method, and CAT activity by Sinha's (1972) method. Four groups (10 mice each) were studied: control, control + *M. charantia* (100 mg/kg BW), alloxan-induced diabetes (450 mg/kg BW), and alloxan + *M. charantia*. SOD neutralizes superoxide radicals, converting them into hydrogen peroxide, which CAT further breaks down into water and oxygen. The enzyme activity in *M. charantia* helps combat oxidative stress linked to chronic diseases like diabetes, cardiovascular disorders, and neurodegeneration. The results showed a significant reduction in antioxidant enzyme activity in the diabetic control group compared to the normal control. Catalase activity (µmol/min/mg) was 4.8 ± 0.3 in NC, which decreased to 2.1 ± 0.2 in DC. However, treatment with *M. charantia* significantly restored catalase activity in DM (4.5 ± 0.3**, **p < 0.01 vs. DC**). Similarly, SOD activity (U/mg protein) was 9.6 ± 0.5 in NC, reduced to 4.2 ± 0.4 in DC, but significantly increased to 9.0 ± 0.4** in DM (**p < 0.01 vs. DC**). No significant differences were observed between NC and NM groups, indicating that *M. charantia* did not affect antioxidant enzyme levels in normal mice.
These findings suggest that *M. charantia* enhances antioxidant enzyme activity in diabetic mice, reducing oxidative stress. Its potential as a natural antioxidant for diabetes management warrants further investigation into its bioactive compounds and mechanisms.
Keywords: **Momordica charantia, *albino mice,* Mus musculus, *antioxidant activity, superoxide dismutase, catalase, oxidative stress, alloxan-induced diabetes.***

Sustainable strategy to control Panama wilt of Banana

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The cultivation of bananas faces significant threats from various plant diseases that are proliferating worldwide, including bunchy top of banana, banana blood disease, bacterial wilt of Moko, *Xanthomonas* wilt, yellow sigatoka, freckle black leaf streak, and Panama wilt. Among these, Panama disease, caused by *Fusarium oxysporum* f. Sp. *cubense* (FOC), stands out as one of the most destructive afflictions affecting banana crops. It has been referred to as 'Banana Covid' and 'Banana Pandemic'. A more sustainable alternative to chemical treatments is the use of biocontrol agents to address Panama wilt. These agents not only suppress pathogens but also promote plant growth through the production of phytohormones and enzymes that break down complex substrates. The application of biocontrol agents is eco-friendly and advantageous for farmers. The utilization of fungal biological control agents to combat plant pathogens has increased significantly, owing to the numerous beneficial traits of antagonistic fungi. These organisms possess a relatively rapid reproductive rate, both sexually and asexually, and have short generation times, enhancing their effectiveness. Furthermore, they are target-specific. In the absence of a host, antagonistic fungi can adapt by shifting their mode of parasitism to saprotrophism, thus contributing to sustainability. Many fungal species have evolved mechanisms that allow them to effectively protect plants from diseases caused by

pathogenic fungi. In the past century, these diseases have already devastated the Gros Michel banana variety in Central America and currently pose a threat to all major banana-growing regions globally. This study aims to assess the current status of Panama disease worldwide and explore its management through eco-friendly strategy.

Keywords: Banana; Panama wilt; Antagonistic fungi; Sustainable

वनों की कटाई रोकने और वानरोपण में ग्रामीण महिलाओं का योगदान: एक समाजशास्त्रीय अध्ययन

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ग्रामीण महिलाएँ पर्यावरण संरक्षण में महत्वपूर्ण भूमिका निभाती हैं। वनों की कटाई रोकने और वानरोपण में उनका योगदान न केवल पारिस्थितिक संतुलन बनाए रखने में सहायक होता है, बल्कि आजीविका और सामाजिक सशक्तिकरण का माध्यम भी बनता है। महिलाएँ परंपरागत रूप से जंगलों से ईंधन, चारा, और औषधीय जड़ी-बूटियाँ प्राप्त करती हैं, जिससे उनकी आजीविका जुड़ी होती है। अतः वे वनों के संरक्षण के प्रति अधिक संवेदनशील होती हैं । चिपको आंदोलन इसका ऐतिहासिक उदाहरण है, महिलाओं ने पेड़ों को बचाने के लिए संघर्ष किया। वर्तमान में, स्वयं सहायता समूह और सरकारी योजनाओं के माध्यम से महिलाएँ वानरोपण अभियानों में सक्रिय भाग ले रही हैं। मनरेगा जैसी योजनाओं के अंतर्गत भी महिलाएँ वृक्षारोपण और वन संरक्षण के कार्यों में संलग्न हो रही हैं ।

निष्कर्ष: ग्रामीण महिलाओं की भागीदारी वनों की सुरक्षा और पारिस्थितिकी संतुलन में योगदान देती है, साथ ही उनके सामाजिक और आर्थिक सशक्तिकरण को भी प्रभावित करती है।

मुख्य शब्द: वनों की कटाई ,ग्रामीण महिलाएं, पर्यावरण संरक्षण, पारिस्थितिकी संतुलन इत्यादि।

Electric Vehicle Battery Waste and its Effect on The Environment

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The rapid adoption of electric vehicles (EVs) as a sustainable alternative to fossil fuel-powered vehicles has led to a growing concern regarding EV battery waste. With the increasing number of EVs on the road, managing end-of-life batteries has become an urgent environmental issue. This paper explores the environmental impact of lithium-ion battery disposal, the challenges of recycling, and potential mitigation strategies. The composition and lifecycle of EV batteries are analyzed to understand the risks associated with hazardous materials such as lithium, cobalt, and nickel. Additionally, this study discusses the contribution of battery waste to environmental degradation, including soil and water pollution, air contamination, and resource depletion. Sustainable solutions such as second-life applications, advanced recycling technologies, and policy interventions are critically examined. By addressing the economic, technological, and regulatory challenges in battery recycling, this paper emphasizes the need for a coordinated approach to minimize environmental damage while maximizing resource recovery and reuse.

Emission Of Green House Gases (Ghgs) in India Sweden and China: A Comparative Legal Study

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In the context of climate change, it is crucial to examine the contributions of leading countries in greenhouse gas (GHG) emissions. Countries like the United States, China, India, Russia, Brazil, Indonesia, Japan, Iran, Mexico, and Saudi Arabia collectively account for approximately 64% of GHG emissions. This paper aims for giving a comparative idea for emission of greenhouse gases (GHGs) in India China and Sweden. China being the most emitter of GHGs, Sweden being the least emitter and India being the citizen of the country. Most of the world's planet-heating pollution comes from just a few countries. The top 20 global climate polluters — dominated by China, India, the United States and the European Union — were responsible for 83% of emissions in 2022. China is the world's largest emitter of greenhouse gases. As of the latest data, China's GHG emissions are over 10 billion tons of CO2-equivalent per year (around 28% of global emissions). This is largely due to its status as the world's manufacturing powerhouse, with high emissions from coal combustion, industry, transportation, and energy production. China has committed to peak emissions by 2030 and achieve carbon neutrality by 2060. Sweden, in contrast, emits much less in absolute terms, with total emissions around 50 million tons of CO_2-equivalent per year. However, Sweden has committed to being carbon neutral by 2045, and its emissions are much lower on a per capita basis. Sweden is one of the world leaders in climate action, with a legally binding target to become carbon neutral by 2045. Sweden's carbon tax, introduced in 1991, is one of the highest in the world and has been a major driver of emissions reduction.

India is the third-largest emitter of GHGs globally, with emissions reaching around 2.8 billion tons of CO_2-equivalent annually, which accounts for about 7-8% of global emissions. India's emissions are growing rapidly due to increased energy consumption, urbanization, and industrial expansion. India relies heavily on coal for electricity generation, which is a significant source of emissions. India is in a phase of rapid industrialization, and its emissions are growing. However, the country is investing in renewable energy and sustainable technologies, with a focus on improving energy access and tackling poverty.

Keywords: India ,Sweden, China ,Green House Gases, Kyoto Protocol, UNFCC, CoP

Circular Economy: Reducing Waste for a Sustainable Future

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The circular economy is an innovative approach to sustainability that aims to minimize waste, optimize resource use, and promote environmental resilience. Unlike the traditional linear economy, which follows a "take-make-dispose" model, the circular economy emphasizes recycling, reusing, and regenerating materials to create a closed-loop system. This model helps reduce pressure on natural resources, lower carbon emissions, and enhance economic efficiency. Key strategies such as eco-design, extended producer responsibility, industrial symbiosis, and sustainable consumption patterns play a vital role in advancing circularity across industries. In the context of rapid urbanization, rising waste generation, and environmental degradation, the adoption of circular economy principles is crucial for achieving sustainable development. Countries worldwide, including India, are implementing policies to

promote waste reduction, green manufacturing, and resource efficiency. However, challenges such as lack of awareness, inadequate infrastructure, and financial constraints hinder large-scale implementation. This paper explores the significance of the circular economy in reducing waste and fostering sustainability, highlighting successful case studies, challenges, and opportunities for global adoption. It also examines the role of governments, businesses, and consumers in transitioning toward a circular economy. By integrating sustainable practices into industries and daily life, the circular economy offers a promising pathway to environmental protection, economic growth, and a sustainable future.

Keywords: Circular Economy, Waste Reduction, Sustainable Development, Resource Efficiency, Recycling

Dying Small Rivers of Bihar: A Case Study of Champa Nala/River (Bhagalpur)

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In the last two decades, 'climate change' and 'global warming' have occupied the centre of environmental debate worldwide. 'Climate resilience' and 'Climate change justice' are reshaping the relationship between the developed and developing countries. With worldwide growing environmental crisis and water crisis as its major component, river research is emerging as a critical area of interdisciplinary research. Rivers as waterbodies are also the repositories of knowledge systems, myths, narratives, folklores to name a few. This paper is an attempt to map the increasing vulnerability of small rivers and its link with climate resilience. This case study of Champa could be seen as a microcosm to understand the worsening condition of small rivers in India. The paper intends to bridge the 'macro' (politics of development, dams, sand-mining, river management/rejuvenation) and micro (everydayness, livelihoods, myths, nostalgia, etc.) dimensions of rivers. It proposes the concept of 'river as a site of knowledge production'. This interdisciplinary paper based on ethnographic research will be divided into three parts – first part will focus on changing nature of debates on climate change viz-a-viz its impact on rivers. The second part will narrate the contemporary significance of small rivers and the urgent need to reclaim 'rivers as commons' in Indian context. The last part will elaborate the socio-historical and cultural significance of Champa Nala/River in Bhagalpur region of Bihar.

Keywords: Small Rivers, Climate Change, Climate Resilience, Collective Consciousness, Rivers as Commons.

Fostering Environmental Responsibility and Sustainable Development for a Greener Future

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This paper explores the critical role that individuals, organizations, and policymakers play in promoting sustainable practices to ensure a peaceful coexistence of development and environmental preservation. Addressing the growing problems of climate change, resource

depletion, and ecological degradation requires environmental responsibility and sustainable development. It examines important aspects like the use of renewable energy, waste reduction, sustainable resource management, and the incorporation of environmentally friendly regulations across a range of industries. It also emphasizes how important awareness and education are in creating a culture of environmental stewardship. Particular focus is placed on how universities can integrate sustainability into their research, curriculum, and outreach programs. This paper also examines local and international sustainability initiatives in an effort to offer practical advice and suggestions for implementing ecologically friendly behaviours. To accomplish the Sustainable Development Goals (SDGs) of the UN, governments, businesses, and civil society must work together. Through this discourse, the paper advocates for a future where economic growth and environmental preservation go hand in hand, ensuring a greener and more sustainable world for future generations.

Keywords: Environmental Responsibility, Sustainable Development, Renewable Energy, Climate Change, Resource Management

Haematological parameters in relation to age sex of domestic fowl (*Gallus gallus domesticus*)

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The haematology parameter of animal is an important indicator of their healthy status. Therefore, it is useful tool in clinical diagnosis. This study aims to investigate the haematological parameter of heathy domestic fowl **(*Gallus gallus domesticus*)**and influence by their age and sex. Blood sample was taken from vein from two- and six-month male and female for six months. The haematological parameter studied was Hb (Haemoglobin), TEC (Total erythrocytes count), TLC (Total Leucocyte Count), PCV (Packed Cell Volume), Mean Corpuscular Haemoglobin concentration (MCHC), Mean Corpuscular Haemoglobin (MCH) and Mean Corpuscular Volume (MCV) and DLC% (differential leukocyte count) Neutrophils, Lymphocytes, Eosinophils, Monocytes, and Basophils. The study show significant age effects($p<0.05$) was observed, with increase in age there is increase in haematological parameter both in male and female. In relation to sex, male haematological parameter is higher than female. This study concluded that, age and sex both effect the haematological parameter of domestic fowl.

Keywords: Haematology, domestic fowl, sex, age, blood

Food and Feeding Habits of *Channa punctatus* (Bloch) in the Water Bodies of Bhagalpur District, Bihar.

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Food plays a fundamental role in the biological processes of fishes, influencing their growth, reproductive success, and migration patterns. Seasonal and daily variations in the availability of preferred food sources significantly affect fish movement and distribution. Understanding the dietary habits of fish species is essential for effective fisheries management and aquaculture practices. Several studies in India have examined the feeding patterns of *Channa* species, focusing on digestive system structure, feeding intensity, dietary composition, and seasonal fluctuations in food preference. However, there is limited scientific data on the feeding ecology

of *Channa punctatus* in the aquatic environments of Bhagalpur district, Bihar. The present study, conducted in the water bodies of Bhagalpur, reveals that the average Relative Length of Gut (RLG) value was 0.76 for *Channa punctatus* in Group I (less than 10 cm in length) and 0.60 for Group II. The Gastro-Somatic Index (GaSI) varied between 2.11 and 4.86 in males and 2.45 to 7.67 in females, with the highest values recorded in April (4.86 for males and 6.67 for females). Seasonal gut content analysis indicated a diverse diet, primarily comprising insects (41%), followed by plant matter (16%), fishes (13%), crustaceans (9%), zooplankton (9%), miscellaneous items (6%), and annelids (3%). These findings highlight a broad dietary spectrum and confirm the carnivorous feeding nature of *Channa punctatus*, with significant seasonal variations in its feeding patterns in Bhagalpur's aquatic ecosystems. This study contributes to the scientific understanding of the species' ecological role and supports the sustainable management of fisheries in the region.

Keywords: Food and feeding habit, Channa punctatus. Gut content analysis.

Impact of climate change and global warming in fungal plant diseases and its emerging threats and adaptive strategies: A review

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The climate change and global warming are significantly impacting fungal plant diseases.It is posing a serious threat to global food security.The rising temperatures,altered precipitation patterns,increased humidity and increased atmospheric CO2 create favourable conditions for fungal growth and infection.**Plant-associated fungus perform key roles in managing nitrogen transformatio in soils, nutrient availability for plants, and plant health and development.**These mechanisms are significantly altered abiotic stresses due to climate change.It present emerging threats such as increased mycotoxin contamination,new diseases and reduced effectiveness of fungicides.Temperature variations produce molecular level alteration in pathogenesis.The adaptive strategies to mitigate impacts on developing resistant crop varieties,implementing integrated pest management and promoting sustainable agriculture.The complex interactions between climate change,fungal plant diseases is crucial for developing effective strategies to protect crops and ensure food security in a changing world.This review examines multifaceted impact of climate change on fungal plant diseases,increased disease incidence,severity,ranges of pathogens,altered host susceptibility and increased pathogen diversity.

Keywords: Climate change, fungal pathogen, pathogenesis, sustainable agriculture, foodsecurity

Assessment of Emerging Agro-Practices for the Sustainability of Land Resources and Food Security

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Climate change has become a major worldwide concern that affects agricultural productivity, food security, livelihood and overall population health. In recent time, there has been a growing recognition for the need to establish resilience, adaptability and sustainability in order to secure food security and promote sustainable development. Here, we report the appropriate agro-

practices adaptation can greatly reduce the impact of climate change. By identifying emerging agricultural practices for various cropping system on seasonal and annual changes and effect of various amendments (e.g.: biochar & industrial residues) on microbial functional diversity and soil carbon stock. Longitudinal/Panel study for analyzing seasonal and annual variation of soil carbon will be observe among various cropping pattern, therefore soil samples will be collected periodically and will be analyzed for Physicochemical properties, Soil enzymes, Glomalin contents and Soil aggregate. Results are accompanied with recommendation and interpretation aids supporting the correct use for practical applications. A more comprehensive understanding of the effects of climate change threats and the identification of coping strategies would advance knowledge of sustainable management.

Keywords: Agro-Practices, Sustainability, Land resources, Food security, Climate change

Role of Government in Universities towards Environmental Cleanliness

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The Natural resources that humans need have their own limitations in many ways. The government of our country, whether it is at the center or the state government, needs to take steps at the university level to determine the limitations and problems of those natural resources. Through this research, an attempt has been made to know and understand the role of government in universities towards environmental cleanliness. Governments play an important role in setting policies and regulations that promote environmental cleanliness within universities. This includes creating laws that set standards for waste management, energy efficiency and emission reduction. By enforcing these regulations, governments ensure that universities follow environmentally friendly practices. The recycling programs, sustainable procurement policies or mandating the use of renewable energy sources on campus. Governments can provide funding (financial assistance) to universities to implement green initiatives. This includes grants for research into sustainable technologies, funding for infrastructure improvements such as energy-efficient buildings or subsidies for renewable energy projects. By investing in these areas, governments help universities reduce their environmental impact and promote a culture of sustainability. The central or state governments of our country play a vital role in environmental governance, including universities, through policies, regulations, and public participation. Governments can control environmental pollution through formal or informal rules if they wish to commit to a clean environment.

Keywords: Environmental Cleanliness, Environmental Pollution, Environmentally Friendly Practices.

Turning Waste into Wealth: Harnessing *Verbesina enceliodes* for sustainable Agriculture

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Agricultural sustainability faces significant challenges due to the excessive utilization of chemical pesticides, which contribute to soil degradation, water pollution, and pest resistance.

The pursuit of environmentally friendly alternatives has led to the investigation of plant-based pesticides derived from agricultural waste and invasive plant species. *Verbesina encelioides* (Golden Crownbeard), commonly regarded as a weed, has garnered attention for its antimicrobial and pesticidal properties. Previously overlooked, this plant contains bioactive compounds such as flavonoids, terpenoids, and phenolics, which exhibit potent antibacterial, antifungal, and nematocidal activities. Through the extraction of these compounds using solvent-based methodologies, *Verbesina encelioides* can be repurposed as a natural pesticide that offers an environmentally sustainable alternative to synthetic agrochemicals. This approach not only reduces dependence on harmful chemicals but also effectively utilizes plant waste, transforming an agricultural burden into a valuable input for organic farming and pest management. This study investigated the potential of *Verbesina encelioides* as a biopesticide, its extraction methods, and its applications in sustainable agriculture to promote environmentally friendly pest control and waste utilization. Its established antifungal properties can be exploited to control fungal plant pathogens. Although naturally occurring antimicrobials present an attractive alternative to synthetic pesticides, careful consideration of their potential benefits and comprehensive risk assessment must be conducted for sustainable agriculture.
Keywords: Agriculture, Pesticides, Antimicrobial, Sustainable, Biopecticide

Agriculture Sustainability and Diversity of Soil Microbes

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Agriculture is a backbone of life without agriculture life can't be imagined and the quality of soil is the most important thing of agriculture, because it directly effects the quality as well productivity of the crop. Present soil ecosystem of all over the country showing degradation in soil quality due to increasing population, deforestation, erosion, low productivity etc. The soil fertility is not only depending upon the minerals, instead of this it also depends upon the microbial diversity, because microbes play a vital role in geochemical cycle as well as N_2-fixation, P- availability, PGP substances etc. Hence it is essential to sustainable agriculture is the maintenance of viable and diverse population of microbes for good functioning of life. The relative abundance (in %) of different soil micro flora like bacteria-aerobic (70%), anaerobic (13 %), Actinomycetes (13%)**,** Fungi (03%) and others (Algae, Protozoa, Viruses) 0.2-0.8%. Keeping these facts in mind emphasis was given to evaluate the distribution of Acinomycetes in different crop fields viz., wheat, maize and paddy of gangatic plane and non-gangatic plane respectively. During study it was observed that gangatic plane crop fields were showing more microbial diversity in comparison to non-gangatic plane which directly effects the fertility of soil as well as crop yield. Some Phosphate solubilising Actinobacteria also found during the study which have the P-solubilizing capacity, hence, it could be make non-available phosphorus to available form for easy utilization of plants. Such type of microbes should be utilized by the agarian community as a bio-fertilizer for sustainable agricultural development as well as safe and healthy environment.
Keywords: Agriculture, Sustainability, Microbial diversity, Soil Fertility, Bio-fertilizer

Environmental Pollution- A Challenge to The Chemists as well as Environmentalists

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Environmental pollution has been a challenging task for both environmentalists and researchers for decades. The municipal sewage consists of human waste, animal waste, domestic waste, industrial waste and sometimes agricultural waste. It is well known that all wastes are the hosts of more than 80% of diseases. Attempts have been made to treat the sewage sludge as a feed material in the experimental biogas plant and the results are encouraging. The reduction in BOD and COD have been found to be 80-92% whereas the percentage reduction in total and volatile solids has been reported to be 80-90%. The reduction in helminths and pathogens during anaerobic digestion having fixed HRT (Hydraulic Retention Time) have also been found to be an average of 94%. These results are important with a view to safe disposal of digested effluent and safe handling of the effluent in non-edible plants as the effluent contains good amounts of plants nutrients. Another important result is that the sewage sludge have been proved to be a good flexible material for biogas digester.

पर्यावरण संरक्षण और सतत विकास में जीविका योजना की प्रासंगिकता

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पर्यावरण संरक्षण और सतत विकास 21वीं सदी की महत्वपूर्ण आवश्यकताएँ हैं। तेजी से हो रहे औद्योगीकरण और शहरीकरण ने प्राकृतिक संसाधनों पर अत्यधिक दबाव डाला है, जिससे पारिस्थितिक असंतुलन उत्पन्न हो रहा है। इसी संदर्भ में, जीविका योजना एक महत्वपूर्ण पहल के रूप में उभरकर आई है, जो न केवल ग्रामीण गरीबों को आर्थिक रूप से सशक्त बना रही है, बल्कि पर्यावरण संरक्षण में भी सहायक है। यह योजना महिलाओं के सशक्तीकरण, जल संरक्षण, जैविक खेती और नवीकरणीय ऊर्जा स्रोतों के उपयोग को बढ़ावा देकर सतत विकास के लक्ष्यों की प्राप्ति में योगदान देती है। जीविका योजना के तहत ग्रामीण समुदायों को आत्मनिर्भर बनाया जाता है, जिससे वे अपने आजीविका संसाधनों का सतत उपयोग कर सकें। यह योजना सतत कृषि, जल प्रबंधन, वनीकरण, और हरित ऊर्जा समाधानों को प्रोत्साहित करके पर्यावरण के प्रति जागरूकता बढ़ाती है। इसके माध्यम से जैव विविधता संरक्षण, प्राकृतिक संसाधनों के विवेकपूर्ण उपयोग और सामुदायिक भागीदारी को बढ़ावा मिलता है। इस अध्ययन के लिए प्राथमिक और द्वितीयक डेटा संग्रहण विधियों का उपयोग किया गया है। सरकारी रिपोर्टों, शोध पत्रों, और केस स्टडी का विश्लेषण किया गया है। इसके अलावा, जीविका योजना से लाभान्वित समुदायों के साथ साक्षात्कार के माध्यम से इसके प्रभावों का मूल्यांकन किया गया है।

जीविका योजना पर्यावरण संरक्षण और सतत विकास के लिए एक प्रभावी रणनीति है। यह ग्रामीण क्षेत्रों में आर्थिक स्थिरता लाने के साथ-साथ प्राकृतिक संसाधनों के दीर्घकालिक संरक्षण में सहायक है। इस योजना का सशक्त कार्यान्वयन सतत और समावेशी विकास के लक्ष्यों को प्राप्त करने में महत्त्वपूर्ण भूमिका निभा रही है।

मुख्य शब्द : पर्यावरण संरक्षण, सतत विकास, जीविका योजना, ग्रामीण सशक्तीकरण, प्राकृतिक संसाधन प्रबंधन

Mushroom Production as a Sustainable Agricultural Waste Management Strategy

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Accumulation of agricultural waste, including crop residues, livestock manure, and processing by-products, poses significant environmental challenges, contributing to greenhouse gas emissions, soil and water pollution, and the spread of plant and animal diseases. Utilizing these waste streams as substrates for mushroom cultivation offers a dual-pronged approach: it alleviates the environmental burden of agricultural waste while simultaneously generating a valuable food source and economic opportunity. This review examines various agricultural wastes suitable for mushroom production, including rice straw, wheat straw, corn stover, bagasse, coffee pulp, and cotton waste. It analyzes the impact of different pre-treatment methods on substrate quality and mushroom yield. Furthermore, the paper discusses the environmental benefits of mushroom production, such as reducing landfill volume, decreasing reliance on synthetic fertilizers, and producing nutrient-rich compost as a byproduct. Finally, it highlights the challenges and opportunities associated with scaling up mushroom production using agricultural waste, including infrastructure requirements, economic feasibility, and market demand. The findings suggest that mushroom production can be a significant contributor to a circular economy by fostering a closed-loop system that transforms agricultural waste into valuable resources, promoting environmental sustainability and economic growth in rural communities.

Keywords: Mushroom production, Agricultural waste management, Sustainable agriculture, Circular economy, Crop residue, Environmental sustainability, Food security.

Assessing Land Use Changes in Bhagalpur Municipal Corporation (1998-2023) Using Remote Sensing and GIS

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Understanding land cover and land use change patterns is crucial for assessing anthropogenic pressure and demographic dynamics in any region. Change detection techniques play a significant role in identifying the driving forces behind these changes. This study aims to analyze the land cover and land use changes within the Bhagalpur Municipal Corporation (BMC) over the past 25 years. Remote Sensing (RS) and Geographic Information Systems (GIS) have been employed to monitor these transformations effectively. Landsat satellite images from the years 1998 to 2023 were used as the primary datasets. Thematic maps were generated using USGS Earth Explorer, Q-GIS, focusing on key land use categories within BMC. The land cover classification was performed using satellite imagery, with ground verification conducted to ensure classification accuracy. The findings of this study indicate significant transformations in the land use pattern of BMC. The urban built-up area has nearly doubled over the last quarter-century, primarily due to population growth and infrastructural expansion. This study underscores the rapid urbanization trends in Bhagalpur and highlights the need for sustainable urban planning and resource management strategies.

Keywords: Anthropogenic pressure, urban agglomeration, Remote Sensing, GIS.

Study on Effect of Cinnamon on Some Histological Parameters in Diabetic *Mus Musculus*

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Cinnamon has been widely studied for its potential antidiabetic properties, particularly in regulating blood glucose levels. This study investigates the effect of cinnamon on selected histological parameters in diabetic *Mus musculus* (Albino mice). Diabetes induces structural and functional changes in various organs, including the liver, kidneys, and pancreas. The study evaluates histopathological alterations and the possible protective effects of cinnamon supplementation on these tissues. Findings suggest that cinnamon may reduce tissue damage, improve pancreatic β-cell integrity, and mitigate renal and hepatic complications associated with diabetes. These results indicate the potential therapeutic role of cinnamon in managing diabetes-related histological abnormalities and emphasize its significance in alternative medicine.

Keywords: ***Cinnamon, Mus musculus, Diabetes, Histological parameters, Pancreas***

Studies on Earthworm Population and Soil Qualities of Differently Manured Crop Fields, to Know the Cropland Health.

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Earthworms are farmers' friend (Darwin, 1881) because they improve soil porosity, aggregation, water and nutrients (Umamaheshwari, 2005; Ellerbrock and Hoen, 1999). Earthworm populations in agricultural lands are related to agricultural practices such as ploughing, crop rotation, use of chemical fertilizers and pesticides (Lee, 1985, Edwards and Bohlen, 1996). In present study, some crop fields were selected for earthworm population count where different types of manures/fertilizers were used since last three years. This work was followed by Farmers survey and Soil test. In study area only a fraction of farmers are using Vermicompost or Farmyard Manure (FYM) or its mixture for growing vegetables. Whereas 66.66% farmers are using Chemical Fertilizers (CF) along with FYM and 83.33% farmers are using only CF for paddy cultivation. Higher earthworm population 150-274.875/M^2 observed in vermicompost used fields, 48.75/M^2 in FYM+CF manure used field, 24.5/M^2 in CF used field and in barren land this population was 16.625/M^2 only, very clearly indicates that CF used field has earthworm population just like barren land. Earthworms Population having 48 to 50 in 1M^2 area showed average soil quality and 150 to 275 in 1M^2 area showed best soil quality in test report. Chemical fertilizers showed negative impact on earthworm population. This finding suggests that any farmer can certainly monitor his cropland through earthworm population count and soil testing via local laboratories.

Keywords: Farmers Survey, Manures, Earthworm Population count, Soil quality, Cropland.

Standing Crop of Vegetable Plants and their Associated Faunal Biodiversity of North-East Bihar (India)

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The paper describes the taxonomic diversity of vegetable crop and the succession of faunal diversity under the agro-climatic conditions of north-east Bihar (India). Extensive field study was done in the period 2005-2010 and an inventory of vegetable crops and their associated fauna has been prepared. The relative abundance of faunal diversity has been determined and categorized into the "abundant", "common", and "uncommon" species. In the Present study more than 75 species of insect pests were found associated with different stages of the life cycle of vegetable crops and more than 25 species of predators were recorded. Interestingly the host –prey –predator complexes have been identified, which has been considered as species rich biotope of the region. The diversity of vegetable crops identified belong to the order in the following sequences Cucurbitales < Cruciales < Leguminales < Solanales < Chenopodiales < Euphorbiales < Umbellales < Dioscoreales < Amaryllidales < Malvales < Moringales. The insect diversity identified as major, minor and stray pests of these vegetable crops belong to the orders Lepidoptera, Coleoptera, Hemiptera, Diptera, Thysanoptera and Isoptera. The major pests associated with almost all life stages of vegetable crops were identified as Spodoptera litura, Helicoverpa armigera, Diaphania indica, Earias vitella, Agrotis ipsilon etc. The predatory species always found associated with pest (prey) were identified as Coccinella transverslis, Coccinella septempunctata, Cholenius circumdatus, Scarites nanus, Cicindela sexpunctata belonging to families Coccinellidae, Carabidae and Cicindellidae of the order Coleoptera. It was inferred observed that agronomic practices in the region favours the allow establishment of host- pest – predator complexes, a species-rich zone for the conservation and Management of the structure and function of the ecosystem.

Keywords: Biodiversity, North-East Bihar, Standing crop, Coleoptera, Pest – Predator complexes

Ecological Consequences of Godda Thermal Power Plant: An Empirical Study of Climate Change

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This paper examines the ecological impacts of the Godda Thermal Power Plant (GTPP) in Jharkhand, India, with a particular focus on its contribution to climate change. Since its commissioning, the GTPP, a major energy infrastructure project, has been operational, and its environmental consequences have become a subject of increasing scrutiny. Employing empirical methodologies, the study analyses data from multiple sources, including local climate studies, air quality monitoring, and environmental impact assessments. The findings reveal significant ecological repercussions, including elevated levels of air pollution, degradation of local water resources, biodiversity loss, and deforestation. The plant's emission of greenhouse gases, primarily carbon dioxide, exacerbates climate change by increasing local temperatures and altering precipitation patterns. The paper also addresses the socioeconomic challenges faced by local communities, such as reduced agricultural productivity, health concerns, and displacement. The ecological effects of the GTPP offer critical insights into the trade-offs

between energy generation and environmental sustainability. Furthermore, the report underscores the need for enhanced environmental regulations, improved monitoring mechanisms, and a transition towards cleaner energy alternatives to mitigate the adverse environmental and climate impacts of thermal power plants. The study advocates for achieving a balance between ecological conservation and economic development to ensure sustainable growth in the region.

Keywords: Thermal Power Plant, Climate Change, Ecological Consequences, Greenhouse Gas Emissions, Environmental Sustainability

Phytotherapeutic Practices among the Baigas of Sonebhadra, Uttar Pradesh, India

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This paper deals with plants of ethnomedicinal importance used by 'Baiga' tribe of district Sonebhadra. 49 plants belonging to 23 families which are the part of 'Traditional medical system' of Baigas have been reported with the help of medicine- men and elderly people of the particular tribe. Alongwith medicinal wisdom of the area, certain steps have also been discussed which may be fruitful in socio-economic upkeeping of the tribals and conservation of medicinally and other economically important plants of the area.

Key words: Ethnomedicinal plants; Baiga; Sonebhadra; traditional; socio-economic

A Green Lifestyle Should be a Part of Everyone Life

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India can undoubtedly reach this extremely ambitious goal being a developed country. Only if we acknowledge our weakness and focus on the various aspect of development, social progress, environmental support along with good governance. The main objective of the day is to aware and inspire people to sustainably manage the fresh water resources and learn more about water related issues like water pollution, water scarcity, inadequate water supply, lack of sanitation and take appropriate difference. Water being the elixir of life from drinking to cleaning and other things which life cannot sustain without it. Ground water quality study have shown the water from deeper aquifer has a greatest potential to get contaminated with geogenic contamination like Arsenic, Fluoride and Iron. India's third largest state Bihar is facing a serious problems of Ground water. Out of 38 districts in 11 district of Bihar Ground water level reportedly have dipped according to the Data of BIHAR ECONOMIC SURVEY (2022-2023). Ground water level at least 10 m below ground in the district Aurangabad, Nawada, Kaimur and Jamui even in the pre monsoon. The quality of Ground water is deteriorating because of increasing pollutant loads from various sources even the climate changes adversity effects the availability and distribution of Ground water. Educational support and capacity building are essential to ensure National Ownership to raise the awareness about the global water crisis and health issues. We believe that our strategical partnership with the local Government, Communities and humanitarian Organisation will help us to collectively achieve this goal.

Keywords: Lifestyle, Aquifers, BIHAR ECONOMIC SURVEY, National Ownership

Challenges in Ecosystem Restoration in India

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Ecosystem restoration is a critical strategy for addressing environmental degradation, biodiversity loss, and climate change in India. As one of the world's most diverse ecological regions, India faces significant challenges such as deforestation, land degradation, water scarcity, and pollution. Unsustainable agricultural practices, urban expansion, and industrial activities have further exacerbated ecological imbalances. However, India's commitment to ecosystem restoration through initiatives like the National Afforestation Programme, Green India Mission, and Namami Gange offers promising opportunities for reversing environmental damage. Despite these efforts, several challenges hinder large-scale restoration. Land-use conflicts, lack of community participation, inadequate funding, and weak policy implementation often slow down progress. Additionally, climate change-induced disasters such as floods, droughts, and cyclones further threaten restoration efforts. However, technological advancements, policy reforms, and traditional ecological knowledge provide significant opportunities for sustainable ecosystem recovery. The integration of agroforestry, watershed management, and carbon sequestration projects can enhance resilience and promote green development. By adopting nature-based solutions, strengthening policies, and promoting sustainable livelihoods, India can successfully restore its ecosystems while addressing socio-economic and environmental concerns. Strengthening these initiatives is essential to achieving long-term ecological balance and contributing to global sustainability goals.

Keywords: Ecosystem Restoration, Biodiversity Conservation, Sustainable Development, Climate Resilience, India.

Study of Mitigating Effect of *Aloe Vera* on Some Biochemical Parameters in Sodium Sulfate Induced *Mus Musculus*

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Sulfur compounds are abundant in nature, with sulfites and sulfates being key components. These substances frequently enter the environment through the sulfur cycle, which is heavily impacted by human activities. This study examined the mitigating effects of *A. vera* on biochemical parameters, including blood glucose, plasma protein, and serum cholesterol in Swiss albino mice exposed to sodium sulfate. Twenty-four albino mice (*Mus musculus*) were divided into four groups of six mice each: a control group and three experimental groups. The control group received a normal diet and distilled water without any treatment. The second group was treated with oral dose of sodium sulfate for 28 days. The third group received freshly prepared aqueous extracts of *A. vera* leaf for 28 days without sodium sulfate exposure. The fourth group received both sodium sulfate and *A. vera* leaf extract concurrently for 28 days. Blood glucose, plasma protein, and serum cholesterol concentrations were measured after the treatment period. The results showed that *A. vera* extract positively influenced the monitored biochemical parameters. In the fourth group (treated with both sodium sulfate and *A. vera*), blood glucose, plasma protein, and serum cholesterol concentrations were significantly lower compared to the second group (only Sodium sulfate treated mice).

Keywords: Mus musculus, Sodium sulfate, Serum cholesterol, Blood glucose, Plasma protein

E –Waste: Challenge for Future Generation

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Electronic and electrical waste, commonly known as e-waste, are posing a serious threat to the global environment-waste is one of the fastest growing solid wastes. The use of electronic equipment has increased dramatically in India due to the rapid expansion of the IT and commutation industries. Because of the increased concern over e-waste, there is greater emphasis on recycling and better e-waste management. The topic of the paper is to evaluate electronic waste (E-waste) pollution and the toxic substances present in the e waste and threat to human life. These toxic substances include heavy metal and substances such as Arsenic, Cadmium, Lead and Mercury. The problem has become acute due to the rapid obsolescence rate of electronic goods. In a country like India, the problem of accumulation of e waste is more acute because the developed countries are exporting the e- waste by using the ambiguity in national and international laws. Even through India has increased e-waste collection and processing by four times in four years, 95% of e-waste is illegally handled by the informal sector.

Keywords - E-waste, Environmental hazard, Toxic metal, Electronic equipment, Informal sector.

Climate Change and Global Warming

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Many scientists, engineers, and environmentalists are raising serious concerns about the ongoing changes in the Earth's climate. The continuous use of fossil fuels for electricity generation is a major contributor to this issue. When burned, these fuels release greenhouse gases such as carbon dioxide, methane, and nitrous oxides, which trap heat in the atmosphere and contribute to global warming. Additionally, widespread deforestation is exacerbating rising temperatures. Global warming is an urgent environmental threat, causing significant harm to the planet. Despite its growing impact, many people remain unaware of its severity and fail to recognize it as an immediate problem. However, the effects of climate change are already evident, disrupting ecosystems and disturbing the delicate ecological balance. To address this pressing issue, effective solutions must be implemented. This paper discusses the causes and consequences of global warming while exploring potential solutions. A key strategy is to invest in alternative energy sources such as solar, wind, hydro, geothermal, and biomass energy. Transitioning to renewable energy is one of the most effective ways to combat global warming and reduce our dependence on fossil fuels.

Keywords: Global warming, Climate change, Fossil fuels, Greenhouse gases, Renewable energy

Micronucleus Test in Swiss Albino Mice Exposed to Cadmium and Ameliorating Effect of *Nyctanthes Arbortristis*

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Cadmium is a major environmental toxicant released into the air, water, and soil in various forms, including cadmium oxide, cadmium chloride, and cadmium sulfide. Its primary sources are industrial activities such as battery and pigment manufacturing, metal smelting and refining, and municipal waste incineration. This study investigates the effects of cadmium exposure on the micronucleus test in mice and the ameliorating effect of *Nyctanthes arbortristis*. Adult male Swiss albino mice were divided into four groups, each consisting of ten animals. Group A served as the control, while Group B was exposed to cadmium chloride only. Group C received *N. arbortristis* leaf extract only and Group D was simultaneously administered cadmium chloride and *N. arbor-tristis* leaf extract for 15 days. The frequency of micronuclei in polychromatic and normochromatic erythrocytes was then evaluated. Results indicated a significant increase in micronucleus frequency in the cadmium chloride-treated group, which reached 476 (7.32% ± 0.47), compared to the control group at 65 (1.01 % ± 0.12). The group receiving only *N. arbortristis* had a micronucleus count of 60 (0.94% ± 0.12), while the group treated with both cadmium chloride and *N. arbortristis* exhibited a reduced micronucleus frequency of 137 (2.22% ± 0.19). These findings suggest that *N. arbortristis* provides a protective effect against cadmium chloride-induced micronuclei formation.

Keywords: Micronucleus, Cadmium, Nyctanthes arbortristis., Metal smelting, Toxicity

Himalayan Musk Deer on Ventilation

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The Himalayan musk deer Moschus chrysogaster is distributed in alpine forest of Himalayan India. Male has musk sac under the abdominal skin. It is strong smelling substance (Methyl androsterone) obtained from musk gland of male. It is used in cosmetic and perfumery industries. So, it has high price value. Although only the male yields musk but thousands of male and female deer are indiscriminately killed by poachers every year in this area. Musk deer is threatened Species. Its threatened status is recognized by the IUCN, which lists the species as vulnerable in Red Data Book. Awareness and active involvement of local people in conservation programs, Effective Control on musk trade through CITES at national and International level, Sustainable exploitation, Habitat protection and In situ conservation are essential for conservation of musk deer. It has also been suggested that the musk could be extracted via the external orifice of glands.

Keywords: Musk deer, Alpine, Ventilation, Methyl androsterone, Red Data Book, Vulnerable. In- situ Conservation.

Biodiversity in India: Recent Challenges

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The term "Biodiversity" refers to the variety of life on Earth at all its levels from genes to ecosystem. It encompasses the evolutionary, ecological and cultural processes that sustain life. India is a megadiverse country having a great variety of plant and animal species. It is the

home to four of the world's biodiversity hotspots. It has over 91,000 animal and 45,000 plant species. India is rich in biodiversity because of its varied topography, climate and soil types. But this rich and vast biodiversity in India is facing several challenges due to various factors. Some of the key challenges include habitat destruction due to deforestation, overexploitation, invasive species, pollution, human- wildlife conflict, agricultural expansion, lack of effective conservation and many more. Addressing these challenges is very necessary for the well- being of both ecosystem and people and for the conservation of biodiversity.

Keywords: Biodiversity, ecosystem, Pollution, Deforestation, Invasive species

Biochemical and Oxidative Stress Responses to Sub-Chronic Exposure of Dimethoate in Swiss Albino Mice (*Mus musculus*)

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Dimethoate (DT) is one of the most widely used organophosphate pesticide which generates Reactive Oxygen Species (ROS) leading to lipid peroxidation (LPO) and many other biochemical alterations in non-target organisms. The toxicity of commercial grade DT on LPO and biochemical parameters in Swiss albino mice (*Mus musculus*) was investigated after administration of 16 mg/kg of DT (LD_{50}/10). Blood samples were analysed for LPO biomarker levels i.e., malondialdehyde (MDA), total protein, albumin and cholesterol levels. The significant increase in LPO levels, 5.23 ± 0.53 nmol MDA/ml (165.48%) and total cholesterol, 158.48 ± 9.18 mg/dL (27.33%) was recorded with respect to control viz., 1.97 ± 0.18 nmol MDA/ml, 124.46 ± 2.88 mg/dL respectively. However, a significant decrease in total protein, 3.32 ± 0.19 g/dL (31.97%) and total albumin, 2.03 ± 0.1 g/dL (30.24%) was observed with respect to control viz., 4.88 ± 0.35 g/dL and 2.91 ± 0.11 g/dL respectively. The findings suggest that exposure to sub-lethal dose of DT is sufficient to induce oxidative stress and other biochemical alterations in Swiss albino mice and might also affect human beings when exposed to these chemicals in agricultural fields. Therefore, its use must be scientifically regulated to minimise the potential risk to human and other species.

Keywords: Dimethoate; Lipid peroxidation; Organophosphate; Oxidative stress; Malondialdehyde

India's Initiatives for Protecting Wildlife and Preserving Biodiversity

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India, known for its incredible biodiversity, faces a significant challenge in wildlife conservation. Spanning from the towering Himalayas to dense tropical forests and arid deserts, the country is home to diverse ecosystems that support a vast array of species. Conservation efforts in India involve a range of strategies, policies, and on-the-ground initiatives aimed at protecting wildlife and their habitats. A crucial aspect of these efforts is the establishment of protected areas such as national parks, wildlife sanctuaries, and conservation reserves. Additionally, flagship conservation programs like Project Tiger, Project Elephant, and Project Rhino focus on safeguarding key species. Community participation, scientific research, and global partnerships further strengthen conservation measures. This article explores India's comprehensive wildlife protection framework, addressing ongoing threats such as habitat

destruction, poaching, climate change, and human-wildlife conflict. It also highlights various government-led conservation programs, including Project Dolphin and vulture conservation initiatives, underscoring the nation's dedication to preserving its rich natural heritage.

Keywords: National parks, Wildlife sanctuaries, Conservation reserves, Project Tiger, Project Elephant

Behavioral Plasticity and Evolutionary Responses in *Drosophila ananassae*

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Living organisms constantly adjust their behavior and physiology to survive in changing environments. This study examines how *Drosophila ananassae*, a species of fruit fly, modifies its feeding behavior in response to different diets. By analyzing multiple genetic lines under varying food conditions, we observed significant differences in food intake patterns. Some populations displayed high plasticity, adjusting their feeding strategies efficiently, while others maintained consistent intake regardless of food availability. Statistical analysis revealed a strong genotype-by-environment interaction, indicating that genetic factors influence how feeding behavior responds to dietary changes. Populations with greater feeding flexibility showed increased survival rates, suggesting an adaptive advantage in fluctuating environments. These findings emphasize the role of environmental pressures in shaping feeding behaviors and demonstrate how behavioral plasticity contributes to evolutionary adaptation. Understanding these mechanisms enhances our knowledge of how species evolve in response to ecological challenges.

Keywords: Behavioral ecology, environmental adaptation, feeding behavior, genetic variation, evolutionary plasticity, adaptation

Ants As Silent Guardians

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Ants play a crucial role in maintaining ecological balance by contributing to soil aeration, nutrient cycling, and pest control. This study explores the diversity of ants in the suburban area of Saraiyahat Block, Dumka, focusing on species diversity, distribution, and habitat preferences. Field surveys were conducted using pitfall traps, hand collection, and baiting methods to document ant species across different microhabitats, including agricultural fields, human settlements, and forest patches by research scholar Neha Bharti. The collected specimens were identified based on morphological characteristics and taxonomic keys by Zoological survey of India, Kolkata. The findings reveal a diverse assemblage of ants, with notable dominance of species from the Formicidae family, including genera such as Camponotus, Trichomyrmex, Oecophylla etc. Variations in species richness were observed across habitats, with forested areas exhibiting higher diversity compared to human-influenced environments. The study highlights the impact of urbanization and land-use changes on ant populations, emphasizing the need for conservation efforts to preserve biodiversity. This

research provides baseline data for future ecological assessments and underscores the importance of ants as bioindicators of environmental health in suburban landscapes.

Keywords: Ants, Ecological balance, Bioindicators, Soil aeration, Nutrient cycling, Urbanization

Bamboo For Land Restoration and Sustainable Development in Bihar: Challenges and Opportunities

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Land degradation results in the deterioration of the productive potential and also it has negative impact on agriculture, biodiversity, gene pool and the environment. Land degradation also effect the livelihood because it hampers land productivity, food security well as it raises the risk of disease. In Bihar the land degradation is mainly due to soil erosion, recurrent flood, deforestation, fly ash dumps, brick kiln, mine contaminated soil, dryland, *Diara* and *Tal* areas and also heavily contaminated areas etc. Bamboo species has the potential for land restoration programme. This plant has also wide acceptability because of socio-religious and economic benefits. Bamboo has dense root network that helps in preventing soil erosion, especially in hilly and flood prone areas of Bihar. It can stabilize the soil and can reduce the risk of landslides. Bamboo plantation along the riverbanks and flood prone areas can help to reduce the impact of floods. Bamboo plants act as natural barrier and help to manage the flow of water. This plant has ability to thrive in diverse soil types and climatic conditions, which make this plant more suitable for land restoration. Bamboo plant grows quickly and has high rate of Carbon sequestration and thereby, forestation of this plant can help to mitigate the effect of climate change by absorbing CO_2 and releasing more oxygen. Bamboo plantation can contribute significantly in reducing greenhouse gas emission. Bamboo also helps to retain water in the soil and can contribute to the restoration of water tables in drought prone areas. The Cultivation of bamboo requires relatively less water compare to other crops and so this plant is ideal for plantation in water scarce regions. In addition, bamboo can be a source of income for the rural communities. There is high demand of biodegradable products of bamboos such as furniture, handicrafts, paper, construction materials and even bamboo made textile. However, there are certain challenges of bamboo for land restoration and sustainable development which include lack of awareness, knowledge and training, absence of bamboo based industries, inadequate policy support and also supply and chain issues.

Key words: Bamboo, Land restoration, Sustainable development, Carbon sequestration, Biodegradable products.

Integrative Approaches to Biodiversity and Ecosystem Restoration

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The environment is an intricate web of life, where biodiversity and wildlife conservation play a crucial role in maintaining ecological balance. Ecosystem restoration in India presents both significant challenges and promising opportunities, as the nation grapples with environment

degradation while striving for sustainable development. Biodiversity and wildlife conservation remain critical, with habitat loss driven by deforestation and unsustainable afforestation practices. Climate changes and global warming further accelerate ecological disruptions, impacting species survival and altering animal behavior. Rising environmental pollution exacerbates these issues, affecting air, water, and soil quality. Ethnobotany, rooted in India's rich traditional knowledge, offers insights into conservation and its applications in pharmaceutical science and therapeutics. Harnessing renewable energy, particularly solar energy and photovoltaics, along with recycling, can reduce dependence on fossil fuels and mitigate environmental damage. Green chemistry principles provide sustainable solutions for ecosystem restoration, minimizing toxic waste and promoting cleaner industrial processes. The study of behavioral ecology helps understand species adaptation to changing environments, while wetland ecology highlights the need to preserve India's vital water bodies for climate resilience. Integrating environment and sustainable development ensures that conservation aligns with economic growth. Additionally, mathematical modeling of climate change aids in predicting future environmental trends and devising effective restoration strategies. Addressing these interconnected challenges through innovation and policy reforms can secure a sustainable future for India's ecosystems.

Key Words: Species survival, Climate Resilience, Habitat loss, Ecological balance.

Commercial Rapid Propagation of *Dendrocalamus Asper* (Schultz) Back Ex Heyne Through Tissue Culture Techniques

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Dendrocalamus asper (Schultz) Back. ex. Heyne.is one of the commercially important species of bamboo (NBM). *D.asper* is commonly referred to as sweet bamboo, which has multipurpose,tropical clumping habit with high economic value. However this species has not been balanced between exploitation and innovative cultivation .In the present study we have developed a refined and reproducible protocol for macro and micropropagation of this species through tissue culture techniques.In this experimental studies, explants of high quality germplasm of *D. asper* were collected from PTC lab germplasm nursery, TNB College campus, Bhagalpur.After surface sterilization explants were when cultured in liquid MS media (modified) fortified with phytohormone, BAP (2.5 mg/l) resulted 99 – 100 percent bud proliferation and shoot initiation. The multiplication rate was comparatively higher insemi-solid MS media(modified) supplemented with BAP (1.5mg/l) along with NAA (0.25mg/l) and certain additives. Maximum rooting frequency was observed in half strength of inorganic and organic nitrogenous compounds, however, supplemented with NAA (5mg/l).On the other hand,for macropropagation nodes of the branches treated with IBA (1000ppm) or IAA (800ppm) gave comparatively better results. Further, treated explants were placed in sand bed for enhanced rooting, shoot number, length and also for high survival rate.

Keywords: Dendrocalamus asper, Sweet bamboo, micropropagation, macropropagation, BAP, IBA, IAA.

Study of Environmental Importance in Our Life

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Environmental study is the branch that studies all of us, living things, non-living things, societies, and communities, populations which are present in our environment or surroundings. Thus, it is not only the branch of science but is also associated with humanities as well. Whatever changes occur in our environment, it directly or indirectly affects the living components. Hence any change positive or negative at any place is important to study because it is significant for the welfare of people. The study of environment is helpful in solving many problems and also helps in understanding the fundamental interactions between living and living, non-living and living and living and non-living things. It also studies the societal problems in general. The studies on environment have become surely important for all of us. All of us need basic amenities like food, air, water and shelter. For the amount of food, we need a long list of living and non-living items and the human skills ultimately supply it to the humans. Air occurs naturally and the quality maintenance of it depends upon how we take care of it. Water is naturally available but humans need clean water free from impurities, bacteria etc. For the shelter again we have to modify so many resources around to produce one house. But today pure and good food, water and air are no more available. Today we pay huge amounts to set environment right. Therefore, the study of environment has become more and more importance.

Keyword: Environment, importance, human life, living and non-living.

In Vitro Culture and Rapid Mass Clonal Regeneration of High-Quality Germplasm of *Dalbargia Sissoo* Roxb., A Native Timber Plant of Bihar

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Dalbargia sissoo Roxb. (*Shisham*) is a valuable timber yielding plants. This leguminous plant enriches the soil through nitrogen fixation. This plant also plays an important role in environment conservation and ecosystem balancing. *Shisham* is infect a native plant of Bihar, however, at most of the places the plants are getting dried due to wilting (occlusion of tyloses) and thereby, it is urgently required that Fusarial resistant germplasm of *Shisham* be rapidly propagated. Traditionally this plant is propagated through seeds and planting materials/stem cuttings. However, the vegetative propagation is time consuming, laborious and constrained by low rate of multiplication. Tissue culture approach for clonal propagation of selected genotype can be efficient tool for rapid micropropagation of this valuable plant.

In vitro culture of *Dalbargia sisso*, a native timber yielding leguminous tree plant was developed through auxiliary shoot proliferation. Multiple bud breaking occurred from nodal shoot segments in modified MS medium supplemented with 0.5mgl/l thidiazuron (TDZ). Multiple shoots proliferation (15-20 microshoots /nodes) were observed in MS medium (modified) with combination of 5 mg/l benzylaminopurine (BAP) and 0.1 mg /l NAA in liquid medium. In solid medium, shoot tip necrosis and defoliation were observed, however, this problem was overcome in liquid medium. *Ex vitro* rooting was made utilizing soilrite when the microshoots were treated with 1000 ppm of IAA for 2 - 5 minutes. 90 % rooting were observed

on soilrite within 15-25 days at 25±2°C temp and 16 hrs day and 8 hrs night conditions of greenhouse. Cultured plantlets so developed were hardened, acclimatized and were supplied to DEFCC, Govt. of Bihar for plantation in different climatic zones of Bihar.

Key words: Dalbargia sissoo (Shisham), Clonal propagation, Microshoots, TDZ, Ex vitro

Role of Vermicompost in Sustainable Agriculture Management

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Vermicompost is the biodegraded organic waste produced by the action of earthworm. Certain earthworm species, including *Eudrilus eugeniae*, *Eisenia fetida*, and *Perionyx excavates* are particularly effective in vermicomposting due to their high compost yield in very short period of time. This resulting vermicompost is a complex mixture, containing essential macro- and micronutrients, vitamins, growth-regulating hormones, enzymes, and a diverse population of beneficial microorganisms. Vermicomposting process provides a sustainable solution for managing organic waste generated by households and industries. The amendment of vermicompost into soil helps in plant establishment and reduction in disease possibilities by providing a suitable rooting environment through improving the soil structure, soil porosity, aeration, water retention capacity, nutrient availability, stimulation of microbial activity, augmentation of the activities of various enzymes and production of plant growth-promoting substances by microorganism through interactions with earthworms. Further enhancing its potential, vermicompost can be fortified with biocontrol agents, offering a sustainable strategy for plant disease management. Components like humic acid, nitrogen, and manganese are abundant in vermicompost and these can play a vital role in the synthesis of plant defense compounds, such as phenolics, flavonoids, and lignins etc. which contribute to pathogen resistance.

Keywords: Vermicompost, Earthworm species, Flavonoids, Lignin, Phenolics, Humic acid

Ethnomedicinal Plants Used for the Treatment of Bronchial Diseases in Upper Assam

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Plants and its derived products play a crucial role in preventing various diseases. Utilisation of plants has long been the intricate part of the traditional health care system of rural and tribal communities across the globe. The present study was carried out in 7 districts of Upper Assam to understand ethnomedicinal practices used for the treatments of bronchial disease by the tribal communities of Upper Assam. Data were collected through extensive field survey using semi-structured questionnaire. A total of 30 ethnomedicinal plants represented by 28 genera and 23 families was reported to treat various bronchial ailments. The highest number of medicinal plants was recorded from the family Lamiaceae and Rutaceae each with 4 species followed by Malvaceae with 2 species. Habit wise majority of the species are herbs (12 spp.) followed trees (8 spp.), shrubs (5 spp.), and few species of climber. Among the different plant parts, use of leaves was to be most dominant followed by roots, stem and bark. A total of 13 different formulations using various plants part for the treatment of bronchial ailments was recorded in the present study. The results of the study showed that local communities of upper

Assam possess a vast traditional knowledge on the utilization of plants for the treatment bronchial ailments.

Keywords: Ethnomedicine, Bronchial, Traditional knowledge, Upper Assam

In Vitro Culture of *Bambusa Nutans* Wall. Ex Munro for Commercial Mass Propagation

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Bamboos are the group of perennial, evergreen, deciduous plant taxonomically belong to monocotyledons of family *Poaceae*. Bamboos are one of the world's fastest growing woody plants. Considering bamboo as eco-friendly, biodegradable and renewable natural raw materials, newer industrial applications of bamboo through technological implements have been developed. In present decade there is worldwide demand of alternate renewable source of energy. However, the propagation of bamboo is impeded due to long flowering cycle (60-140 years), non-availability of seeds and also their short viability period (30-50 days). However, this gap of demand and supply can be fulfilled by adopting plant tissue culture techniques of biotechnology. Among the various species of bamboos, *Bambusa nutans* Wall. ex Munro is commercially very important for multipurpose (NBM, Govt. of India). In the present experiment nodal explant was taken for the *in vitro* culture of *B. nutans.* The various sizes of explants were selected to find out the most suitable for culture. Explants were cultured in semi-solid modified MS medium for initiation. Modified MS medium supplemented with BAP (Benzyl amino purine), KIN (Kinetin), NAA (Nephthalene acetic acid), IBA (Indole-3-butyric acid), IAA (Indole-3-acetic acid) individually or at various combinations were used for shoot initiation, multiplication and elongation. The effective biochemical combination of shoot initiation was BAP (2.5 mgl^{-1}) along with NAA (0 .1 mgl^{-1}) with additives. However, for multiplication and rooting it was BAP (2.0 mgl^{-1}) and NAA (5 mgl^{-1}) respectively. The study also enabled to develop an effective propagation protocol for hardening of tissue culture raised seedlings of *B. nutans.*

Keywords: In vitro culture, MS (Modified) media, BAP, NAA, Protocol, Hardening

Role of Microbial Consortia in Climate-Resilient Agriculture

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In the current regime, climate change poses severe threat to global food security, necessitating innovative and sustainable agricultural solutions. As it is well known that plant contains plethora of microbial community in which some of them play a crucial role in enhancing soil fertility, improving plant resilience to environmental stresses, and promoting sustainable farming practices. The microbial consortia, consisting of bacteria, fungi, and other microbes, either singly or mixture of two or more than two similar or different microbial genera strains; contribute to nitrogen fixation, phosphate solubilization, organic matter decomposition, and biocontrol of pathogens. By improving nutrient availability and enhancing stress tolerance against drought, salinity, and extreme temperatures, microbial consortia help crops adapt to changing climatic conditions. Furthermore, they reduce the dependency on chemical fertilizers

and pesticides, and play key role in mitigating environmental pollution and supporting agroecosystem health. This abstract explores the potential of microbial consortia in climate-resilient agriculture, emphasizing their role in enhancing soil health, improving crop productivity, and fostering sustainable agricultural practices in the face of climate change.
Keywords: Climate change; Microbial consortia; Sustainable agriculture, Crop growth

Numerical Response of *Lipolexis Oregmae* Gahan (Hymenoptera: Aphidiidae) Against *Aphis Gossypii* (Hemiptera: Aphididae) Reared On Different Host Plants

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The life-table statistics involves the statistics of birth and death rate which helps in evaluating parasitoids performance. Numerical interaction between parasitoid and host population provides the information for calculating the number of parasitoids needed to regulate the pest population. Increasing parasitoid density help us to understand the performance of aphid parasitoid and indicates a desirable characteristic of a potential bioagent which are effectively used in biological control. *L. oregmae* is a koinobiont parasitoid that develops inside living, mobile hosts and which benefits from the continued life and feeding of the host. The performance of the parasitoids at different density on *Aphis gossypii* infesting three host plants, viz., *Luffa aegyptiaca*, *Lagenaria siceraria* and *Momordica charantia* was investigated. The maximum total fecundity of *L. oregmae* was recorded on *L. siceraria* (70.1 ± 0.7308) and lowest on *L. aegyptiaca* (45±0.40824) at 6 parasitoid densities. Similarly, the maximum net fecundity on six parasitoids was recorded on *L. siceraria* (44.2± 0.54) and lowest on *L. aegyptiaca* (31± 0.81). The minimum generation time was observed on six parasitoid densities in all the three host plants, *L. aegyptiaca* (9.3 days), *L. siceraria* (9.6 days) and *M. charantia* (9.5 days). The maximum doubling time was reported on one parasitoid density and the minimum doubling time was reported on six parasitoid densities in all three plants.
Keywords: *Momordica charantia*; *Lipolexis. Siceraria*, aphid parasitoid

Biocontrol of *Fusarium* wilt of Tomato for Sustainable Agriculture

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Tomato is one of the most important commercial crops. Tomato is commercially grown in various parts of world. But it has high disease infestation rate. This crop has a higher range of disease among which the fungal diseases like *Fusarium* wilt caused by *Fusarium oxysporum* f. sp. l*ycopersici* (FOL) is one of the devastating diseases of tomato crop. FOL reduces the yield of tomato at a very high level. *Fusarium oxysporum* f. sp. *lycopersici* is a soil borne pathogen and can be transmitted through soil in tomato plants. The fungus firstly enters through the soil to the vascular plant tissues of roots and causes wilting of the plant and eventually causes the plant death. Drying of leaves, discoloration of lower leaves of plants and finally wilting of the plant are the major symptoms of *Fusarium* wilt. *Fusarium oxysporum* f.sp. *lycopersici* can produce 3 types of asexual spore, macroconidia, microconidia and chlamydospores. Biocontrol is a promising alternative approach for plant disease management due to its environment

friendly nature. Sustainable management of such a damaging tomato *Fusarium* wilt disease through the application of *Trichoderma* spp. as biocontrol agents is a cost effective, environment friendly and harmless technique.
Keywords: *Tomato; Wilt; Fusarium; Biocontrol*

Development of A Bioformulation to Control *Fusarium* Wilt of Banana: A Sustainable Approach

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Bananas are a staple food for over 400 million people worldwide. *Fusarium* wilt, caused by the fungal pathogen *Fusarium oxysporum* f.sp. *cubense* (Foc), is a devastating disease of banana plants (*Musa spp.*). The Tropical Race 4 (TR4) strain is particularly virulent, posing a significant threat to the globally dominant Cavendish banana variety. According to FAO (), TR4 would result in a 2.8 million tonne or 2 percent reduction in global banana production by 2028 leading to 9.2% rise in global reference price. Our ongoing research emphasizes on the development of a novel bioformulation for the control of *Fusarium* wilt (TR4) in bananas. The bioformulation, composed of selected biocontrol agents (BCAs) and vermicompost was designed to enhance plant resistance and suppress pathogen growth. The BCAs as *Trichoderma* spp. possess a great antagonistic property against *Fusarium* and vermicompost added as the carrier of the biocontrol agent enhances the plant growth and defense system by providing various micro and macro nutrients stimulates microbial activity, enhances crucial enzyme functions, and promotes the production of plant growth-promoting substances through earthworm-microbe interactions.
***Keywords**: Banana; TR4; Biocontrol agents; Bioformulation; vermicompost*

Birds Belonging to Order Passeriformes of Ratlam, Madhya Pradesh

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The avian diversity belonging to order Passeriformes of Ratlam was studied from July, 2015 to June, 2019. Ratlam is located at 23°19′0″N and 75°04′0″E is a city in the northwestern part of the Malwa region in Madhya Pradesh. Results revealed a total of 115 species of birds belonging to order Passeriformes comprising of 67genera and 32 families. These are either residents or winter visitors. Out of these species House crow and common myna are abundant and Red vented bulbul is common; 13 species were occasional and the remaining species were uncommon. The study was designed to evaluate bird's diversity and distribution. Observations were carried out, using distance count method. The list of birds, observations on behavior and conclusion will be presented and discussed along with some photographs of birds.
Keywords: Birds, Passeriformes, Ratlam, Madhya Pradesh, Birds, Malwa, Red vented bulbul

Hypocholesterolemic Effect of *Coccinia Indica* Leaf Extract on Alloxan-Induced Albino Mice (*Mus Musculus*)

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This study explores the potential cholesterol-lowering effect of *Coccinia indica* leaf extract in alloxan-induced diabetic albino mice. The experiment included five groups: Group 1 served as the normal control, while Group 2 was induced with diabetes using alloxan monohydrate (60 mg/kg body weight). Group 3 received 0.5 ml of olive oil per kg body weight as a vehicle control. Groups 4 and 5 were administered *C. indica* leaf extract at doses of 12 mg/0.5 ml olive oil/kg BW and 24 mg/0.5 ml olive oil/kg BW, respectively, for 11, 22, and 33 days. Serum cholesterol levels were assessed using the Zak method (Zak, 1953), and statistical analysis was conducted using SPSS 25.0. The results revealed a notable reduction in cholesterol levels in the *C. indica*-treated groups compared to the diabetic control. The higher dosage (24 mg/kg BW) exhibited a more significant decrease, with cholesterol levels dropping by 12.5% after 11 days, 21.8% after 22 days, and 30.4% after 33 days. Statistical analysis confirmed that these reductions were significant ($p < 0.05$). The findings suggest that *C. indica* leaf extract possesses promising hypocholesterolemic properties and could be beneficial in managing diabetes-related hypercholesterolemia.

Keywords: Hypocholesterolemic properties, Coccinia indica, Cholesterol, Leaf extract, Diabetes

A Spatio-Temporal Comparison of Gridded Precipitation Data in the Ungauged Dihing Patkai Watershed

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This study presents a spatio-temporal comparison of gridded precipitation data (GPPs) in the ungauged Dihing Patkai watershed, located in the northeastern region of India. The primary aim is to evaluate the performance and reliability of various GPPs across different spatial and temporal scales in a region where ground-based weather stations are limited. This study presents a fine scaled comparison of two GPPs, include TRMM and CHIRPS datasets for 10 years (2008-2017). The comparison utilizes statistical metrics such as false alarm ratio (FAR), probability of detection (POD), root mean square error (RMSE), and mean absolute error (MAE) to assess the effectiveness of these datasets in representing precipitation patterns within the watershed. Among satellite GPPs, TRMM showed low FAR (<0.35) and high POD (>0.65), indicating higher detect ability of both events and non-events, whereas CHIRPS showed lowest performance. The research enhances our comprehension of remotely-sensed and spatially-gridded precipitation in the inaccessible region, where ground observations are expected to be insufficient for many years.

Keywords: Spatio-temporal; Gridded precipitation data; Statistical metrics; Ungauged watershed

Echthyological Fauna is Environmental Indicators of Riverine Ecosystem

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In India, freshwater environments are experiencing serious threats to biodiversity, and there is an urgent priority for the search of alternative techniques to promote fish biodiversity conservation and management. The ecological condition of river is represented by the condition of their biotic communities — the living components of aquatic ecosystems that integrate many forms of human disturbances and modification of river stream and the measurements of this subject was the topic of particular interest. Stressors or the pressures that human being exert on aquatic systems through their use of the surrounding environment are commonly the chemical, physical and biological components of the ecosystem. These have the potential to degrade biotic integrity. Some common chemical stressors are toxic compounds, excess nutrients etc. Most of the physical stressors are created when we modify the physical habitat of a river network-excess sedimentation, bank erosion etc. All these can degrade biotic integrity. Water quality plays vital role in riverine ecosystem health regulation. Environmental indicators have been defined as "physical, chemical, biological or socio-economic measures that best represent the key elements of a complex ecosystem or environmental issue. An indicator is embedded in a well-developed interpretative framework and has meaning beyond the measure it represents. Using indicators, it is possible to evaluate the fundamental condition of the environment without having to capture the full complexity of the system. Indicators are based on the best scientific understanding currently available so that changes in these simple measures can be related to more complex environmental trends.
Keywords: Ecosystems, Habitat, Indicators, Socio-economic measures, Environment

Global Environmental Change

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Human activities like Urbanization, industrial development, use of fossil fuel, change of land use etc, transform the biosphere. This increases the concentration of greenhouse gases. Like CO_2, N_2O and CFCs which leads to global change. These are called radioactive gases. Recognizing the problem of potential global climate change, the world Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on climate change (IPCC) in 1988.In 1988 the IPCC published an internationally co-ordinated assessment of the regional impacts of climate change. The IPCC found that the global mean surface temperature has increased by 0.3-0.6'c. since the late nineteenth century. In addition, the 1990s were found to be the warmest decade of the millennium and 1998 the warmest year so far. The Panel included the balance of evidence suggests a discernible human influence on global climate . Computer modelling of the impact of increased greenhouse gases is extremely difficult since may factors need to be considered and little is known about how global climate functions. However, based on the best available knowledge, climate model project that the mean annual global surface temperature will increased by 1- 3.5'c by 2100 that the global mean sea level will rise the spatial temporal patterns of precipitation will occur if the greenhouse effect increases.
Keywords: IPCC, Global mean temperature, Climate change, Greenhouse gasses, UNEP

In Vitro Antioxidant Activity of Ethanolic Extract of *Cymbopogon Citratus* Leaves from Bhagalpur Region

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Cymbopogon citratus (lemongrass) is a widely used medicinal plant known for its bioactive compounds with significant pharmacological properties, particularly antioxidant potential. The present study evaluates the in vitro antioxidant activity of the ethanolic extract of *Cymbopogon citratus* leaves collected from the Bhagalpur region. The extract was obtained through maceration, followed by phytochemical screening to identify key secondary metabolites. Antioxidant activity was assessed using multiple assays, including DPPH (2,2-diphenyl-1-picrylhydrazyl) radical scavenging assay, Hydrogen peroxide assay, ferric reducing antioxidant power, and Phosphomolybdate assays. The results indicated that the ethanolic extract exhibited significant free radical scavenging activity in a dose-dependent manner, with IC_{50} values demonstrating strong antioxidant potential comparable to standard reference antioxidants such as Butylated Hydroxy Toluene. Phytochemical analysis revealed the presence of flavonoids, phenolics, tannins, and other bioactive compounds, which are primarily responsible for the antioxidant activity. The strong reducing potential and radical scavenging capacity of the extract suggest its potential use in pharmaceutical, nutraceutical, and cosmetic industries. These findings highlight the therapeutic significance of *Cymbopogon citratus* as a natural antioxidant source. Further studies on the isolation, purification, and structural elucidation of active compounds, along with in vivo evaluations, are necessary to explore its full pharmacological potential.

Keywords: Cymbopogon citratus, Antioxidant activity, Ethanolic extract, Phytochemicals, Free radical scavenging.

Mathematical Modeling of Climate Change Impact on Agriculture of Green House Gas

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Mathematical modeling of climate change impact on Agriculture and greenhouse gas emission is a critical area of research. Global agriculture is being seriously impacted by climate change, which mainly arises by greenhouse gas (GHG) emission. The most efficient approach for examining how climate change impacts crop production, soil health, water accessibility, and agricultural productivity is mathematical modeling. In order to assess the effects of temperature rise, CO_2 concentration, and precipitation variability on agricultural systems, this study evaluates a number of mathematical models, including statistical, process-based, and machine learning models. Predictive insights that guide sustainable farming methods and policy actions can be produced by combining climate data with agricultural models. To lessen the side effects of GHG emissions on agriculture, the findings emphasis the significance of mitigation techniques which includes carbon sequestration, precise farming, and climate-resilient crops. The significance of this mathematical modeling in developing flexible methods to guarantee food security in a changing environment is highlighted by this study.

Keyword- Climate change, Carbon sequestration, Crop yield, Agricultural sector, Greenhouse gas, Mathematical modeling, Adaptation techniques and Sustainable farming.

Density and Percentage Composition of Phytoplankton of Udhuwa Lake, Sahibganj District, Jharkhand, India

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Phytoplankton are assemblages of heterogenous microscopic algal forms whose movement is more or less depends upon water current. The study makes a record on the density of phytoplankton in a perennial lake ecosystem of Udhuwa lake during a period from Dec.2020 to Aug.2022. The percentage composition of different families under which different phytoplankton species belongs was noted as well as percentage composition of each phytoplankton species was also noted. In year 2020-2021 among the density of phytoplankton groups, the density of Chlorophyceae was highest in summer (839 U/L) along with 42.5 % composition and lowest in monsoon (162 U/L) with 36.65 % composition. Density of Cyanophyceae found highest in summer (419 U/L) with 21.23 % composition lowest in monsoon (103 U/L) with 16.69 % composition while the density of Bacillariophyceae was highest in winter (527 U/L) with 27% composition lowest in monsoon (139 U/L) with 31.45% composition. Euglenophyceae showed its highest density in the winter (290 U/L) with 15.32% composition and lowest in monsoon (21 U/L) with 4.75% composition. In second year of December 2021 to August2022, the density of Chlorophyceae was highest in winter (669 U/L) with 25.99% composition and lowest in monsoon (169 U/L) along with 41.93% composition. The density of Cyanophyceae highest in summer (517 U/L) with 27.11% composition and lowest in monsoon (82 U/L) with 20.35 composition. Density of Bacillariophyceae, highest in summer (605 U/L) with 32.63% composition and lowest in monsoon (110 U/L) with 26.25% composition and in Euglenophyceae the highest density showed in summer (280 U/L) with 17.87% composition. The abundance of phytoplankton was highest during the summer season which could be attributed to more stable hydrological conditions prevailing during summer season and the abundance of phytoplankton was lowered during the monsoon season because of heavy rain fall, high turbidity caused by run-off and decease temperature and pH in both years.

Key words- Phytoplankton, Density, Percentage composition and Udhuwa lake.

Biodiversity Conservation and Environmental Sustainability approach through Community-Based Participatory Research (CBPR) Incorporating Community Priority Index (Cpi) in Koshi Region, Bihar, India

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Today unanimously we acknowledged that human and natural systems are interdependent and co-evolving. The multidisciplinary lens combining indigenous and traditional knowledge with scientific methods, enables the diverse knowledge systems to solve environmental conservation & challenges. Contrarily, major conservation programme is based on Western scientific

knowledge, enforced in area-specific approaches. In the present study, the Community-Based Participatory Research (CBPR) approach with Community Priority Index (CPI) has been implemented to evaluate how complementing scientific and local knowledge can better utilize the conservation of biodiversity and environmental issues in Koshi region. CBPR when combining with CPI provided the better understanding of stakeholders same-time the relative contribution of both scientific & social views synchronized in the study area, influenced by the time-scale data of scientific studies, socio-ecological context helps in developing sustainable conservation practices. Despite these implications while data sharing, commonly observed that socio-psychological boundaries are the main drivers that generated asymmetric information including their knowledge, wisdom and socio-economic status. These results revealed that working through CBPR technique can improve biological and ecological understanding for spatial conservation planning. On the factual generated from field study, it is suggested to bridge the scientific information and societal perspectives should be considered by sharing information, knowledge, and wisdom through appropriate visualizations and dialogue. The importance of this inclusiveness of knowledge action planning was noted effective in the present study attempts. Additionally, openness of science must move beyond community-driven conservation and scientific data collection, to inform sustainable design of global conservation programmes.

Keywords: Community-Based Participatory Research (CBPR), Community Priority Index (CPI), Biodiversity conservation, River Koshi

Histopathology of Lambda-Cyhalothrin on Tissues (Liver and Intestine) of *Anabas testudineus*

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The present study investigates the histopathological effects of lambda-cyhalothrin, a synthetic pyrethroid insecticide, on the liver and intestine of *Anabas testudineus* (climbing perch). Fish were exposed to sub-lethal concentrations of lambda-cyhalothrin over a specified period, and tissue samples were analyzed for morphological alterations. Histopathological examination of the liver revealed hepatocellular degeneration, vacuolization, congestion of blood vessels, necrosis, and sinusoidal dilation. The intestine exhibited epithelial cell degeneration, mucosal layer disruption, villous atrophy, and inflammatory infiltration. These findings suggest that lambda-cyhalothrin induces severe tissue damage, impairing vital physiological functions and potentially affecting the survival and health of *A. testudineus*. The study highlights the toxic impact of this pesticide on aquatic organisms, emphasizing the need for monitoring and regulating its environmental exposure.

Keywords: Lambda-cyhalothrin, A. testudineus, Degeneration, Pesticide

Unveiling Rhizosphere Bacterial Diversity of *Rauvolfia tetraphylla* L. for Advancing Sustainable Agriculture

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Climate change, habitat destruction and shift in soil composition have severely disrupted and degraded diversity and complex networks of rhizosphere bacterial communities. Moreover, various anthropogenic assaults, such as land-use changes, excessive use of chemical amendments, and urban expansion, have gradually led to the loss of these bacteria even before they can be isolated and their true potential realised. In recent years, rhizosphere bacterial communities associated with non-leguminous plants have been an active area of research. The present research focuses on unveiling the bacterial diversity in the rhizosphere of *Rauvolfia tetraphylla* L., with the objective of identifying isolates for sustainable agricultural applications. Upon isolation and characterization of such isolates for attributes such as nitrogen fixation, siderophore production etc., they will be studied for their antagonistic activity against phytopathogens. To determine their taxonomic affiliation, biochemical characterization will be performed, followed by 16S rRNA gene sequencing for precise molecular identification.

Keywords: Rhizosphere, diversity, bacteria, Rauvolfia tetraphylla L., sustainable agriculture

Treatment of Gastric Disorders with Herbal Remedies instead of Omeprazole

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Omeprazole (OME) is a drug of worldwide use in the treatment of intestinal disorders like peptic ulcer and Gastroesophageal reflex. OME is a Proton pump inhibitor. The aim of this this study is to know the digestive issues (GI disorders like cramps, diarrhea, constipation, bloating, heart burnt, acid reflux, indigestion) effect of OME. The Swiss albino mice of 25 to 30 grams is treated with The Sublethal dose of OME. However concurrent treatment with Aloe vera gel, and Ajwain resulted, decrease in digestive issues like acid reflux, and irritable bowel syndrome. Thus, the recent study showed that Aloe vera gel and Ajwain ameliorate OME-induced gastrointestinal disease in *Mus musculus*

Keywords: - Omeprazole, Gastrointestinal disorders, Aloe vera gel, Ajwain

Mathematical Modelling of Climate Change

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Climate change is one of the most pressing global challenges, requiring accurate prediction and analysis for effective mitigation and adaptation strategies. Mathematical modeling serves as a crucial tool in understanding and forecasting climate change by incorporating various physical,

chemical, and biological processes into computational frameworks. These models utilize differential equations, statistical techniques, and numerical simulations to analyze climate dynamics, including temperature variations, greenhouse gas emissions, ocean currents, and atmospheric interactions. There are several types of climate models, ranging from simple conceptual models to complex General Circulation Models (GCMs) that simulate interactions between the atmosphere, oceans, and land surfaces. These models help predict future climate scenarios based on different socio-economic pathways and emission trends. Data assimilation techniques, including machine learning and statistical inference, enhance model accuracy by integrating real-world observations with theoretical predictions. Furthermore, sensitivity analysis and uncertainty quantification play a significant role in improving the reliability of climate projections. Despite advancements, challenges persist in refining models to capture localized climate impacts, extreme weather events, and long-term feedback mechanisms. Continuous improvements in computational power, data collection, and interdisciplinary collaboration contribute to enhancing the precision of climate models. By providing scientific insights, mathematical models play a pivotal role in policymaking, enabling governments and organizations to design effective climate policies and mitigation strategies. This paper explores the fundamental principles of mathematical modeling in climate science, discusses various modeling approaches, and highlights the significance of integrating advanced computational techniques to improve predictive capabilities. The development of more accurate and comprehensive climate models is essential for addressing climate change challenges and ensuring sustainable environmental management.

Keywords: Mathematical Modeling, Climate Change Prediction, General Circulation Models (GCMs), Data Assimilation, Climate Policy and Mitigation

Exploring the Potential of Cold Tolerant Microorganisms for Paddy Straw Degradation at Low Temperature

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The aim of this study was to investigate the enzyme production of cold-tolerant lignocellulolytic, silicolytic, and xylanolytic fungi at low temperatures. A series of enrichment, isolation, and screening steps were performed, leading to the isolation of twenty-nine fungal strains from cold-adapted regions, specifically Balim and Kohali villages in Amritsar, Punjab. During qualitative screening at 15ºC, thirteen fungal isolates exhibited promising enzymatic activity and were further subjected to quantitative estimation of enzyme production at three low temperatures (10, 15, and 20ºC). Among these, isolates S14, S15, S17, and S20 demonstrated the highest production of CMCase, FPase, xylanase, and laccase. Additionally, low-temperature tolerance was assessed by measuring radial growth at 15ºC, where these four isolates achieved 100% growth within seven days of incubation. Their survivability was further evaluated through a freeze-thaw adaptation experiment over 20 days, confirming their resilience in cold environments. The findings highlight the potential of these cold-tolerant fungi for paddy straw degradation and provide valuable insights into microbial degradation mechanisms for waste management in cold regions.

Keywords: Paddy straw, cold tolerant microorganisms, Low temperature, Lignocellulolytic degradation, Reese mineral medium

Functional Characterization of Micrornas and Gene Modulation for *Fusarium* Wilt Resistance in Chickpea Using Crispr/Cas Genome Editing

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The chickpea (Cicer arietinum), a vital legume crop, is a major protein source globally, especially in arid and semi-arid regions (Mohsenzadeh et al., 2024). It is a diploid (2n=16) crop that self-pollinates and is a member of the Fabaceae family. Chickpea is highly susceptible to various biotic stresses, which significantly impact its productivity. The major disease in chickpea is *Fusarium* wilt, caused by *Fusarium oxysporum* f. sp. ciceris (isolate 7682) leading to significant yield losses. This study aims to identify and functionally characterize microRNAs (miRNAs) and genes regulating *Fusarium* wilt stress tolerance in contrasting chickpea genotypes. Selected genotypes were subjected to *F. oxysporum* infection under controlled conditions, and stress-induced RNA samples were extracted for gene expression analysis. Candidate miRNAs and genes involved in wilt resistance were validated using qRT-PCR at multiple time points. Further, genome editing using CRISPR/Cas9 was employed to target key regulatory miRNAs associated with *Fusarium* resistance. Constructs were designed and transformed into chickpea via *Agrobacterium*-mediated gene transfer, followed by screening for transgenic lines. Edited lines were evaluated for stress tolerance using physiological assays and miRNA expression analysis. Preliminary phenotypic evaluation revealed enhanced wilt resistance in selected edited lines, demonstrating the potential of targeted genome modifications in chickpea improvement. This study provides novel insights into the molecular regulation of *Fusarium* wilt tolerance, paving the way for developing resistant chickpea cultivars through gene-editing approaches. Future research will focus on field evaluation and multi-environment validation of edited lines to enhance chickpea resilience against *Fusarium* wilt.

Keywords: Chickpea, Fusarium oxysporum, CRISPR/Cas9, microRNA, Wilt Resistance, Gene Editing

Tribals in the Conservation of Forest in India

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Indigenous tribes and forests have long coexisted peacefully in India, a country with a sizable tribal population. Tribals, who make up around 8.6% of the nation's population, have long been important to forest conservation since they manage resources sustainably and depend on them for their livelihood. Their deeply ingrained spiritual and cultural beliefs have greatly aided in the conservation of biodiversity. Tribal people are still in charge of protecting India's forests in spite of the growing challenges of industrialization, urbanization, and deforestation.

The historical and current roles of indigenous people in forest conservation are examined in this article, along with the effects of laws like the Forest Rights Act of 2006, their sustainable practices, and the difficulties they face. It also looks at case studies of conservation initiatives conducted by tribes and how to combine traditional knowledge with contemporary conservation techniques in the future. In India, acknowledging and enabling these people is essential to ecological preservation and sustainable forest management.

Keywords: Indigenous, Forest conservation, Biodiversity, Industrialization, Sustainable Environment

Study of Diversity of Butterflies in Munger District of Bihar

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Butterflies (Lepidoptera: Rhopalocera) are beautiful coloured insects and are essential component of ecosystem. Butterflies are good indicators of climatic, seasonal and ecological changes and help to formulate conservation strategies. They serve as food sources and good pollinators. In order to examine the diversity of butterflies, a survey was conducted in several location around the Munger district of Bihar. 29 species of butterflies were recorded from the target area. Butterfly diversity was rich in the rural areas. Among these, maximum 17 species belonging to 5 families were recorded in the rural areas. *Danaus chrysippus, Euploea core, Junonia almana, Junonia iphita, Leptosia ninanina, Lerodea eufala, Melanitis leda ismene, Papilio demoleus* and *Ypthima huebneri* were the most prevalent species in the target area. *Neptis hylas, Acraea terpsicore, Eurema hecabe* and *Pareronia hippia* were recorded only in few localities. The maximum diversity was observed in winter season.
Keywords: Biodiversity; Lepidoptera, Rhopalocera, Ecosystem, Munger

Impact of Water Pollution on Icthyofaunal Diversity in Channels of River Ganga in Bhagalpur, Bihar

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Water quality plays a crucial role in maintaining aquatic biodiversity particularly Icthyofaunal diversity. The study investigate the impact of physico-chemical parameters on the diversity of Champanala and Barari Pool Ghat , the Channels of river Ganga Bhagalpur. The river channels influenced by anthropogenic threats habitat destruction, sewage discharge, silk industry discharge, progressive eutrophication and climate change. The study conducted between January 2024 to December 2024. The fish diversity in freshwater is in declining mode due to heavy water pollution level. The physico-chemical Parameters such as pH, Dissolved Oxygen, Temperature, free CO_2, Chloride, Nitrate, phosphate ,TDS, total hardness and transparency recorded in the present studies that shows severe effects on Fishfauna, which result shows 51 fresh water fish species belonging to 17 families was found to be dominated and most of the fish species where under least concerned. The Conservation data have been collected from local fisherman during different seasons which shows diversity of fishes because of variation in physico-chemical Parameters of water. Icthyofaunal diversity is a good indicator of the health of aquatic ecosystems, and reflects a balanced ecosystem. It is highly recommended to prevent the loss of biodiversity.
Keywords: Icthyofaunal diversity, water pollution, River channel Ganga, Physico-chemical Parameters

Climate Change and Sustainable Development of Rotifers and their Role in Water Quality of River Ganga at Patna, Bihar

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Rotifers are microscopic, aquatic organisms known for their resilience and adaptability. Significance of rotifers in freshwater ecosystems. It highlights their use as bioindicators in assessing water health, emphasizing their sensitivity to environmental changes and pollutants. By understanding the role of rotifers in aquatic ecosystems. We can better monitor and manage water quality, ensuring the sustainability of these vital resources. Rotifers belonging to the phylum Rotifera are microscopic metazoans found in various aquatic environments. They are an essential component of the freshwater plankton community. Playing crucial roles in nutrient cycling. Energy flow and as prey for higher trophic levels. Their sensitivity to environmental changes makes them valuable indicator of water quality and ecosystem health. Climate change results in food insecurity due to direct impact on food production yields resulting scarcity of food. The study advocates converging together public health efforts, sustainable development efforts, environmental planning efforts and to Converse and co-ordinate with each other for a better future of whole humanity.

Keywords: Rotifers, Bioindicator, Water health, Climate change, Sustainable development

Sustainable Management of Wilt of Pigeon Pea Through Biocontrol Approach

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Pigeon pea is an important crop of Indian subcontinent and African countries, cultivated in the tropics and subtropics. Fusarium wilt is one of the major yield and growth-limiting factors of pigeon pea along with Nematodes such as *Meloidogyne incognita* and *Fusarium udum* result is highly destructive wilt disease complex, which is the major constraint for the successful cultivation of pigeon pea. *F. udum* from the same or different geographical origin have shown that the fungus is highly variable in cultural characteristics and pathogenicity. Although development and use of resistant cultivars is effective, economical, and environmentally sound strategy for disease control ,still variable responses with cultivation conditions had been a matter of concern. For an eco-friendly and sustainable management of Fusarium wilt, biological control with the application of PGPR offers a potential nonchemical means for disease management. *Trichoderma* is popularly known as multi-talented and effective biocontrol agents for pigeon pea wilt through combination of several organisms have been proved more effective in field conditions. *Trichoderma* strains result in massive changes in the plant genome and metabolism.

Keywords: Fusarium wilt, Biological control, Trichoderma, Sustainable management, PGPR

Isolation And Characterization of Fungal Pathogens From Insect Pests Of Wheat (*Triticum aestivum* L.*)*

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Wheat (*Triticum aestivum* L.) is a crucial global staple crop vulnerable to numerous insect pests, leading to considerable yield reductions. Using entomopathogenic fungi (EPF) as biological control agents provides a sustainable alternative to traditional chemical insecticides. This study was designed to isolate, identify, and characterize fungal pathogens from insect pests obtained from wheat fields. Insect cadavers that exhibited signs of fungal infection were gathered and subjected to standard mycological procedures to isolate and purify fungi. A morphological approach was utilized for the identification of fungi. The pathogenicity of the isolated fungi was then evaluated. The findings revealed the existence of different fungal species demonstrating significant potential for the biological control of primary insect pests affecting wheat. Beauveria bassiana and Metarhizium anisopliae were potential EPF identified. M. anisopliae induced 81.45 pathogenicity in mites, 85.6% in weevils, 73% in borers, and 71% in aphids. These results offer important insights for formulating biopesticides to promote sustainable wheat farming.

Keywords: Wheat, Entomopathogenic fungi, biopesticides, Fungal infection, Biological control

Biodiversity in Mushrooms: Cultivation and Ecological Perspectives

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Fungi's fruiting bodies, mushrooms, are an important part of the world's biodiversity. They are essential to ecosystems because they aid in the decomposition of organic matter, the cycling of nutrients, and the development of symbiotic partnerships with plants. Mushrooms are incredibly diverse, with many species serving a variety of ecological purposes. A varied collection of macrofungi, mushrooms are essential to the breakdown of organic materials, the cycling of nutrients, and plant symbiosis. With thousands of species found globally, many of which are yet unknown, mushrooms have a huge biodiversity. The ecological relevance of mushrooms, their great diversity, and the differences between their natural functions and cultivation are all examined in this paper. The nutritional, therapeutic, and financial advantages of mushroom growing have led to its expansion as a business. Controlled farming, however, causes issues with biodiversity loss, environmental degradation, and ecological imbalance even while it aids in conservation and resource efficiency. Although using agricultural waste as a growing medium for mushrooms encourages sustainability, incorrect waste disposal might result in contamination problems. Furthermore, local ecosystems may be disturbed when non-native species are introduced into unfamiliar settings. Eco-friendly growing methods, the preservation of wild mushroom species, and the promotion of native types must all be prioritized in order to guarantee sustainable mushroom production. Food security and biodiversity preservation can be achieved through mushroom production, which combines scientific discoveries with traditional ecological knowledge.

Keywords: Pollution, Sustainability, Symbiosis, Ecosystems, Environmentally friendly

Amic Acid- Based Transitional Metal Complexes: An Excellent Adsorbent for Removing Heavy Metal Ions.

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Waste water and water pollution with heavy metals from different resources have become a great threat and major concern in recent years due to their toxic nature and show a tendency for bioaccumulation and persistence in the environment. Various heavy metal removal strategies have been developed including adsorption, precipitation, reduction, filtration and electrolysis. Adsorption is employed as one of the most prominent methods over traditional techniques. Biodegradable adsorbents show better absorbent performance due to their strong binding ability to heavy metal ions by physical and chemical bonds. In this regard Coordination compounds have several expensive applications in metallurgical processes, analytical chemistry, industrial catalysts, textile dyeing, electroplating, medicinal chemistry, and environmental concerns. These properties are due to the presence of multi chelating sites in coordination compounds. Recently poly amic acids and their transition metal complexes have exhibited remarkable adsorbent efficiency for the heavy metal ions removal from wastewater due to their versatile chelating properties. Amic acid derivatives with specific functional groups show selectivity for various heavy metal ions such as selectivity for such as Pb^{2+}, Hg^{2+}, As^{3+} etc. The complexes facilitate the separation of heavy metal ions from waste water or drinking water in acetic medium through solvent extraction processes. Amic Acid based transition metal complexes are cost effective and eco-friendly remedy for pollution control and enhance the performance of remedies. Further research may optimize the complex for the sustainability of the selective documentation of wastewater.

Keywords: Amic acid-based transition metal complexes, Heavy metal, Biodegradable adsorbent, Chelating property, Bioaccumulation

Morphological Diversity of Olfactory Rosette of Two Teleost Fishes: *Wallago attu* (Bloch & Schn.) and *Channa punctatus* (Bloch.)

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The morphological diversity of the olfactory rosette in teleost fishes, such as *Wallago attu* (Giant river cat fish) and *Channa punctatus* (Spotted snake head), plays a crucial role in their sensory adaptation to different ecological niches. The olfactory rosette, a key organ for chemoreception, varies in structure depending on the species, habitat and feeding behaviour. Fishes have a well developed sense of smell and can detect odour with the help of a pair of olfactory organs. In both the fishes, these paired olfactory organs are enclosed within olfactory chambers, where olfactory rosettes are located. During the present study, variations have been observed in the location of anterior and posterior nosrils. In *Wallago attu*, the anterior and posterior nostrils are situated a little apart from each other, whereas in *Channa punctatus* the anterior nostrils and posterior nostrils are situated more apart from each other. The relationship between the olfactory organs and the forebrain vary in both fish species. The olfactory bulbs are present just below the olfactory rosette in *Wallago attu* although the olfactory lobes are absent. Well differentiated olfactory lobes are present in *Channa punctatus* but distinct

olfactory bulbs are totally lacking in this fish. The olfactory rosettes are cup shaped and claw like lamella present in *Wallago attu* whereas in quadrangular shape of the olfactory rosette and triangular shape of lamella are present in *Channa punctatus.*

Keywords: Biodiversity, Olfactory Rosettes, Morphology, *Wallago attu* and *Channa punctatus*

Mathematical Modeling Review of Climate Change

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Climate change is one of the most pressing global challenges of our time. Understanding and predicting its impacts require sophisticated tools, among which mathematical modeling plays a crucial role. Mathematical models help simulate the Earth's climate system and predict future climate scenarios based on different greenhouse gas emission trajectories. This paper reviews various mathematical models used to study climate change, including Energy Balance Models (EBMs), Earth Models of Intermediate Complexity (EMICs), and General Circulation Models (GCMs). The review highlights the strengths and limitations of each model, emphasizing the importance of model validation and uncertainty analysis. EBMs provide a simplified representation of the climate system, focusing on the balance between incoming solar radiation and outgoing terrestrial radiation. These models are useful for understanding the fundamental principles of climate dynamics and for making preliminary estimates of climate sensitivity. However, their simplicity means they cannot capture the complex interactions between different components of the climate system. EMICs offer a more detailed representation of the climate system compared to EBMs. They incorporate interactions between the atmosphere, oceans, and biosphere, allowing for a more comprehensive understanding of climate processes. EMICs are particularly useful for studying long-term climate changes and for exploring the potential impacts of different emission scenarios. However, they still rely on simplifications and parameterizations that can introduce uncertainties. GCMs are the most comprehensive and sophisticated climate models available.

Keyword- Mathematical modeling, Models of Intermediate Complexity (EMICs), Model validation, Earth Models

Restoration and maintenance of long-term ecological balance and biodiversity

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Ecological balance and biodiversity are critical for the health and sustainability of our planet. The loss of biodiversity and the disruption of ecological balance due to human activities, such as deforestation, pollution, and climate change, have far-reaching consequences. This paper explores the principles and practices involved in restoring and maintaining long-term ecological balance and biodiversity. It highlights the importance of ecosystem restoration, the role of biodiversity in ecosystem functioning, and the strategies for achieving sustainable ecological restoration. Ecological balance refers to the equilibrium between living organisms and their environment, ensuring the stability and sustainability of ecosystems. Biodiversity, the variety of life forms within an ecosystem, plays a crucial role in maintaining this balance. High biodiversity enhances ecosystem resilience, productivity, and stability, enabling ecosystems to withstand and recover from disturbances. The loss of biodiversity can lead to the collapse of

ecosystems, affecting the services they provide, such as clean air and water, soil fertility, and climate regulation. Restoring and maintaining long-term ecological balance and biodiversity are critical for the health and sustainability of our planet. By adopting holistic, adaptive, and community-based approaches, we can enhance the effectiveness of restoration efforts. Sustainable practices, habitat restoration, and the conservation of keystone species are essential strategies for achieving ecological balance. Addressing the challenges posed by climate change, funding constraints, and governance issues will require innovative solutions and collaborative efforts. By prioritizing ecosystem restoration, we can ensure a resilient and biodiverse future for generations to come. Restoring and maintaining long-term ecological balance and biodiversity is crucial for the health and sustainability of our planet. This paper explores the principles and practices involved in ecosystem restoration, emphasizing the importance of biodiversity in ecosystem functioning and resilience.

Keyword- Ecosystems, Biodiverse, Ecological balance, Emphasizing, Environment

Animal Behaviour and Migration Patterns In Climate Change

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Climate change is profoundly impacting animal behaviour and migration patterns, leading to significant ecological consequences. This paper explores the various ways in which climate change influences animal behaviour, focusing on changes in migration patterns, breeding cycles, feeding habits, and social interactions. The review highlights the adaptive responses of different species to changing environmental conditions and the resulting ecological implications. By examining case studies and recent research, this paper aims to provide a comprehensive understanding of the complex relationship between climate change and animal behaviour, emphasizing the need for effective conservation strategies to mitigate the adverse effects of climate change on biodiversity. Climate change is one of the most significant environmental challenges of our time, affecting ecosystems and species worldwide. Among the many impacts of climate change, alterations in animal behaviour and migration patterns are particularly noteworthy. Migration is a critical ecological process that allows animals to exploit seasonal resources, avoid harsh environmental conditions, and maintain population dynamics. However, climate change is disrupting these patterns, leading to shifts in migration timing, routes, and destinations. This paper reviews the current understanding of how climate change affects animal behaviour and migration patterns, highlighting key findings and implications for conservation. Climate change is causing shifts in the timing of migration for many species. For example, many bird species are migrating earlier in the spring and later in the fall due to changing temperatures and food availability. These shifts can lead to mismatches between the timing of migration and the availability of resources, affecting the survival and reproductive success of these species Climate change is having far-reaching effects on animal behaviour and migration patterns, with significant implications for the survival and reproductive success of many species. By studying these behavioural changes, scientists can gain valuable insights into the resilience and adaptability of wildlife in the face of environmental change. This knowledge is essential for informing conservation efforts and developing strategies to mitigate the impacts of climate change on biodiversity. Despite the challenges posed by climate change, many species are showing remarkable adaptability and resilience. Behavioural plasticity, or the ability to change behaviour in response to environmental changes, is a key factor in the survival of many species. For example, some animals are altering their foraging strategies, nesting sites, and migration routes to cope with changing conditions. Understanding these

adaptive behaviours is crucial for predicting the impacts of climate change on biodiversity and developing effective conservation strategies.

Keywords- Climate change, Behavioural plasticity, Migration patterns, Mitigation, Migration

Green Corrosion Inhibitor for Mild Steel in HCl

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Withania somnifera and *Aloe vera* extract can act as an eco-friendly and low-cost green inhibitor of mild steel. The Methyl alcohol extract of *W. somnifera* and *Aloe vera* were added as corrosion inhibitor in 15% HCl. Different concentrations of green inhibitors were used up to a fixed interval of time and fixed concentration of inhibitors were used up to 6 hrs, 12hrs,24hrs. The percentage of weight loss was calculated and thus inhibition efficiency known from the experimental results. The surface morphology has studied with SEM and FTIR. FTIR spectrum of surface product on the metal in presence of inhibitor indicate the adsorption of inhibitor on metal surface. The experimental results confirmed that *W. somnifera* extract has 97% inhibition efficiency. The mechanism of inhibition may be explained on the basis of adsorption behaviour. Langmuir adsorption the best fit for experimental results. The inhibition property may be attributed to the formation of surface film over the metal surface and presence of amino group in green inhibitor. Thus, the present paper dealt with the method of exploring sustainable approach of inhibition.

Key words: Green inhibitor, corrosion, Langmuir, FTIR, SEM.

Ecosystem Restoration in India: Challenges and Opportunities

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Ecosystem restoration is an urgent priority in India, where rapid environmental degradation is threatening biodiversity, water resources, and the livelihoods of millions. The country's diverse ecosystems, including forests, wetlands, and river systems, are under immense pressure from deforestation, land-use changes, pollution, and the growing impacts of climate change. These challenges not only degrade the environment but also hinder sustainable development, making ecosystem restoration essential for both ecological health and socio-economic stability. The primary challenges to restoration in India include the loss of forest cover, soil erosion, water scarcity, and the degradation of wetlands. Deforestation and land-use changes, driven by agriculture, urbanization, and industrial expansion, have significantly impacted India's natural landscapes. The effects of climate change, such as altered weather patterns and extreme weather events, further complicate restoration efforts. Additionally, the lack of comprehensive data and inconsistent monitoring practices hinder effective planning and intervention. Despite these challenges, India has significant opportunities for ecosystem restoration. One promising approach is integrating traditional knowledge with modern scientific methods. Indigenous communities possess valuable insights into sustainable land-use practices and ecosystem management, which can be combined with contemporary restoration techniques to enhance the effectiveness of projects. Technological innovations, such as satellite imaging and drones, allow for better monitoring and management of ecosystems, facilitating large-scale restoration. Government initiatives, including the Green India Mission and the National Afforestation

Programme, offer important policy frameworks and financial support for restoration efforts. International funding and partnerships further provide resources for large-scale projects. In conclusion, ecosystem restoration in India requires a multi-faceted approach involving government, local communities, NGOs, and technology. By combining traditional knowledge, modern science, and policy support, India can restore its ecosystems, improve biodiversity, and ensure the long-term ecological and economic well-being of its people.

Keywords: Ecosystem restoration , Climate change , Technology and innovation , Government initiatives

Obesity, Metabolic Health, and Ecological Stability: Insights from Wetland Ecosystems

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Obesity is a major global health challenge that significantly impacts metabolic health, leading to hormonal imbalances, oxidative stress, and reproductive dysfunctions. In mammals, including Albino mice, excessive fat accumulation alters biochemical parameters, affecting fertility and overall physiological stability. This study explores the effects of obesity on metabolic and reproductive health while highlighting the protective role of lemon juice, a natural antioxidant. Rich in bioactive compounds, lemon juice has demonstrated potential in reducing oxidative stress, improving metabolic efficiency, and restoring biochemical balance.

Beyond biological systems, this research draws parallels with wetland ecosystems, which function as nature's regulators by filtering toxins, recycling nutrients, and maintaining ecological stability. Just as wetlands mitigate environmental stressors and sustain biodiversity, the human body relies on adaptive mechanisms to counteract metabolic disruptions. Understanding these natural detoxification and resilience processes in ecosystems provides valuable insights into managing obesity-induced disorders.

By integrating concepts from wetland ecology with biomedical research, this study presents an innovative approach to metabolic health. Recognizing the principles of ecological stability may inspire sustainable, nature-based interventions for restoring homeostasis in obese individuals. This interdisciplinary perspective emphasizes the importance of environmental and biological resilience, advocating for holistic health strategies aligned with natural regulatory systems.

Keywords: Obesity, Metabolic health, Reproductive dysfunction, Lemon juice, Ecological stability

Climate Change and Global Warming in Bihar

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Climate change refers to long-term shifts in temperature, precipitation patterns, and other atmospheric conditions on Earth. While the Earth's climate has always gone through natural cycles of warming and cooling, the term "climate change" today is most often used to describe the rapid and unnatural changes occurring due to human activities, primarily the burning of fossil fuels like coal, oil, and gas, which release large amounts of greenhouse gases into the atmosphere. This has led to alterations in global weather patterns, affecting everything from sea levels to biodiversity. Global warming is a specific aspect of climate change. It refers to the increase in Earth's average surface temperature due to the buildup of greenhouse gases, particularly carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), in the atmosphere.

These gases trap heat from the Sun, preventing it from escaping back into space, a phenomenon known as the **greenhouse effect**. While global warming is a key driver of climate change, it is just one part of the larger picture, which also includes changes in rainfall, ocean currents, and other climatic factors. Climate change and global warming have increasingly noticeable effects on many regions of the world, including Bihar, a state in eastern India. The impacts in Bihar are diverse and severe, influencing agriculture, water resources, health, and the overall economy. In conclusion, climate change and global warming are reshaping Bihar's environment and its socio-economic fabric. The effects of rising temperatures, erratic rainfall, and extreme weather events are making life increasingly difficult for Bihar's population, especially for farmers who depend heavily on the climate. Effective adaptation and mitigation strategies are essential to help the state cope with these challenges.

Keywords: Influencing agriculture, Water resources, Health and Economy etc.

Effect of *Aloe vera* gel and *Mentha piperita* in Estradiol valerate induced PCOS Swiss albino mice

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Infertility due to polycystic ovarian syndrome (PCOS) is a worldwide problem that is increasing at alarming rates. PCOS is a neuroendocrine metabolic disorder characterized by polycystic ovaries, chronic anovulation and hyper-androgenism leading to symptoms of irregular menstrual cycles, hirsutism, acne and infertility. Insulin resistance and elevated levels of male hormones (androgens) are associated with PCOS. The sedentary lifestyle, dietary variations, lack of exercise and stress etc. are also the contributory factors. The present study was conducted to investigate the effect of *Aloe vera* gel and *Mentha piperita* on polycystic ovary syndrome in Swiss albino mice. Adult female albino mice (25-30gm) treated by one intramuscular injection of 2mg/kg body wt. with Estradiol valerate solvated in olive oil at the estrous stage for PCOS development, and were further treated with *A. vera* gel and peppermint (0.5ml /mice) for 30 days. This preliminary study explores the effectiveness of *A. vera* gel and peppermint in prevention and treatment of PCOS condition. In this studies showed that plants such as *A. vera* and peppermint improve fertility by increasing the number of ovarian follicles, and also reduce testosterone and androgen levels. It was also shown that *A. vera* gel and peppermint improve the adverse effects of diabetes caused by PCOS by lowering lipid and blood glucose levels. It was also effective in changing endometrial tissue parameters in PCOS by reducing estrogen and hyperplasia. In conclusion, AVG and peppermint has chemical components with anti hyperlipidemic, anti-cholesterol effects and hypoinsulinemia effect. The present Research article will be an excellent resource on understanding the role of herbal medicine in PCOS.

Keywords: PCOS, Estradiol Valerate, Intramuscular, Infertility, Insulin, Anovulation, Testosterone, Estrogen, Hyperlipidemic, Endometrial tissue

Mahakumbh: Air and the River Water Quality

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Even as more than 62 crores devotees have taken a holy dip in the Triveni Sangam in the Mahakumbh 2025, Central Pollution Board's Environment Consultant Engineer Shahik Shiraz

has given this information and said that during Maha Kumbh, the Maha Kumbh area remained in the green zone in terms of air quality. According to him, the Air Quality Index of Maha Kumbh was 67 on 13 January Paush Purnima. Similarly, it was 67 on 14 January Makar Sankranti, 106 on 29 January Mauni Amavasya, 65 on 03 February Basant Panchami and 52 on 12 February Maghi Purnima. The successful mahakumbh with healthy air due to 9600 workers of Municipal Corporation, Prayagraj. Apart from this, more than 800 sanitation workers were also active throughout the time. But river water quality was not good due to high levels of faecal coliform (microbes from human and animal excreta) were found in river water in which people took holy dip during the Maha Kumbh, according to a report submitted to the National Green Tribunal (NGT) by the CPCB. Therefore, the river water was unfit for bathing according CPCB.

Keywords: Mahakumbh, Triweni sangam, Air quality, River water quality, CPCB.

Desulphurization of Dibenzothiophene by Native Bacterial Strains: An Eco-Friendly Method to Obtain Clean Fuel from Coal

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Coal is a vital energy resource and many deposits contain a significant quantity of organic sulfur compounds. Combustion of coal releases SO_2, CO_2, and other gases into the atmosphere and causes a negative impact on the environment. Biodesulphurization of dibenzothiophene could be a prominent method for removing sulfur from coal. Here we successfully employed bacterial strains to degrade dibenzothiophene, and characterized through chromatography, high performance liquid chromatography (HPLC) and gas chromatography-mass spectrometry (GC-MS). Strains of *Ralstonia* sp., *Pseudoxanthomons* sp. and *Rhodococcus* sp. were used in the present investigation. Only *Rhodococcus* sp. converted dibenzothiophene (DBT) into 2-hydroxy biphenyl (2-HBP) and could break the C-S bond without disturbing the heterocyclic structure of DBT ring. This is also complemented by the blue color of Gibb's assay, which indicates DBT conversion into 2-HBP while brown color indicates complete consumption of DBT by bacteria. After two days of bacterial treatment, there was no further removal of DBT. DBT conversion into 2-HBP was monitored through HPLC during six days of experiment. Thus, *Rhodococcus* sp. could be a proficient candidate for biodesulphurization of dibenzothiophene and, eventually, biodesulphurizing organic sulfur-rich coal with an eco-friendly and energy-efficient process. Though it an encouraging technique for desulphurization, more studies on coal are still required to support the industrial scale biodesulfurization.

Keywords: Desulfurization, Dibenzothiophene, 2-hydroxyl biphenyl; Gibb's assay; Rhodococcus sp.

Phytoplankton Diversity And Water Quality Index Of The Budhi Gandak River At Khagaria, Bihar, India

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The phytoplankton diversity of river Budhi Gandak of Khagaria (Bihar) in relation to certain physico-chemical factors was studied. A total of 81 genera of phytoplankton, belonging to four groups – chlorophyceae, cyanophyceae, bacillariophycae and euglenophyceae were found in

the river water. The phytoplankton density in different seasons was in order of winter > summer > monsoon. The species belonging to bacillariophyceae were dominant. A significant positive correlation was established in between total density of phytoplankton and various physico- chemical factors such as TDS and conductivity. The species diversity of phytoplankton (H^{-}) varied from 0.3 to 2.8, the relative abundance of algal species indicate *Navicula subtilissima, Melosira granulata* and *Synedra ulna* as indicator of the pollution of the river. On the basis Shannon Weiner index river water was moderate to heavily polluted condition. WQI were in the range of poor category in monsoon season almost at all the three sites.

Keywords: Phytoplankton, Species Diversity, Relative Abundance, Shannon Weiner Index, Water Quality Index

Heavy Metals in the Surface Water of the Ganga River: Current Insights and Future Perspectives

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A vital natural resource that is essential to life and supports human civilization on all continents is freshwater. Recently, heavy metal pollution has become a global problem due to its enormous effects on the aquatic environment at both spatial and temporal scales, as well as the detrimental consequences it has on the creatures of freshwater. Numerous diseases and health risks for living things can be spread by polluted water. It has been determined that heavy metals are carcinogenic, hazardous to aquatic life, and harm the environment of rivers. India is endowed with the world's holiest and most revered rivers. Not just the local population but also those living far away from these rivers place a great deal of value on them. However, water pollution is a major problem for many Indian rivers, including the Ganga river, as a result of the country's fast industrialization and urbanization. The Ganges has been essential to the nation's economy, way of life, and civilization by providing freshwater. The present manuscript attempts to give in-depth insights into the presence of heavy metals from surface water along the Ganga river in India in order to evaluate the risk to aquatic and human health. The report emphasizes the role that heavy metals play in deteriorating the river's water quality and calls for prompt action to deal with its pollution. It is possible to address the issue of heavy metal pollution of the Ganges river water by using the data produced on changes in metal concentrations in addition to long-term monitoring programs. Since human civilization depends on river banks, heavy metal pollution of river waters is a global social issue that necessitates source identification and potential toxicity assessment in order to develop solutions for pollution reduction and sustainable water resource management.

Keywords: Environmental monitoring; Ganga river; Heavy metals; Toxic elements; Water pollution

The Industrial Revolution and the Birth of Global Warming"

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The Industrial Revolution, which began in the late 18th century, was a pivotal period in human history that fundamentally reshaped economies, societies, and technologies. However, it also marked the beginning of significant environmental change, particularly in the form of global warming. The widespread adoption of coal, the invention of steam engines, and the rapid expansion of factories led to an unprecedented increase in the burning of fossil fuels, releasing vast amounts of carbon dioxide and other greenhouse gases into the atmosphere. This seminar will explore how the Industrial Revolution contributed to the birth of global warming by examining the relationship between industrialization and environmental degradation. Key topics will include the rise of carbon emissions, the role of technological innovation in energy consumption, and the impact of urbanization and deforestation. By connecting the historical roots of industrial development to the modern climate crisis, the seminar will highlight the long-term environmental consequences of human progress and the historical foundations of today's global warming challenges.

Keywords: Industrial Revolution, global warming, carbon emissions, fossil fuels, climate change, industrialization, urbanization, environmental degradation, technological innovation, greenhouse gases

Climate change and Global warming

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Global warming and climate change have grown to be serious problems impacting ecosystems, human communities, and the environment everywhere. There have been serious and pervasive effects from the ongoing increase in global temperatures, which is mostly caused by human-caused greenhouse gas emissions. These include rising sea levels brought on by melting glaciers and polar ice caps, as well as extreme weather phenomena like hurricanes, droughts, and heat waves. Global food security and economic stability are also under risk due to changes in agricultural systems, ocean acidification, and biodiversity loss. The main contributors to climate change are examined in this overview, including deforestation, industrial activity, greenhouse gas emissions from burning fossil fuels, and unsustainable farming methods. The extensive effects of global warming on ecosystems, human health, and socioeconomic systems are also examined. The article also covers possible mitigation techniques include switching to renewable energy, reforestation initiatives, improving energy efficiency, and creating carbon capture devices. Global collaboration to combat climate change is greatly aided by policy measures, particularly international accords such as the Paris Agreement. Because of the severity of the climate catastrophe, governments, businesses, and individuals must work together. To lower carbon footprints and lessen environmental harm, sustainable habits, technical advancements, and legislative actions must be adopted. Immediate and sustained efforts are necessary to curb global temperature rise and build a resilient and sustainable future for all. In order to effectively tackle climate change, this study emphasizes the significance of combining scientific knowledge, policy-making, and personal accountability.

Keywords: Global warming, Ecosystems, Greenhouse gas, Deforestation, Unsustainable

Human impact on Ecosystem: Issues and Solution.

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An ecosystem is a community of living organisms and their non- living environment that interact with each other in a specific area. Flow of food energy and ego balance is the root of the mutual interaction. There is different kinds of food energies & internal habituate specialities in each ecosystem so ,obviously humans didn't only use these substances but exploit it in a drastic way. As the result an opposite impact on both plant & animal kingdom with issue of ecological imbalance stemed in the every part of the world. Increased temperature, acid rain,ozone hole and of course green house effects are just some instance which gave a horrible view of future. According to the report of UNEP, in the world avrage 50 types of biotic components have vanished everyday which is actually a genetical loss. As the same time we got the news that Venezuela became the first country in the world who almost lost all the glacier . IPCC's fifth report depicted that global warming getting increase in Celsius each year compare to pre industrialization level. Tuvalu & Carterte Island of Pacific ocean almost drown . India also facing a difficult situation of climate change. It's coastal region are on high alert. India's biggest cities always top in world most polluted city. It is just some examples who show that our next generation will be destroyed if we wouldn't take a right step in the fulness of time. From Stockholm International summit 1972 to Bohn Climate summit 2024 ,our global leaders, thinker & activitist launched many program and set the goal to achieve climatic balance like as , New Zealand and Australia provided carbon tax in their system for control global warming. As well as India stabilizing solar power plant as the substitute electricity. Bio - fuel also invented for reducing our dependence on carbonic material . India's Tiger project 1973 got a huge success. These all incident are effective and sound delicious but not sufficient. We'll have to make aware about environment conservation program at ground level. Afforestation, avoid plastic and maximum use of sustainable energy with mental peace exactly are some major techniques which may be proved as game changer factor ; essentially, it sets a maximum allowable level of resource consumption to safeguard ecosystem.

Keywords: Environment conservation, Sustainable energy, Climate change, Genetic loss, Acid rain

Green Chemistry Principle in Ecosystem Restoration

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Green chemistry principles play a crucial role in ecosystem restoration by promoting sustainable, non-toxic, and efficient methods for repairing environmental damage. These principles focus on reducing hazardous substances, using renewable resources, and minimizing waste to restore ecosystems without further harm. Bioremediation is a green chemistry approach where microorganisms or plants are used to remove pollutants from soil and water. In the restoration of oil-contaminated wetlands, scientists have used hydrocarbon-degrading bacteria to break down toxic compounds, preventing further environmental damage. This method is safer and more sustainable than chemical dispersants. Phytoremediation, where plants absorb heavy metals from polluted soil. In India's Kanpur region, known for leather industry pollution, vetiver grass has been planted to absorb chromium from contaminated

lands, improving soil health naturally. Eco-friendly materials are replacing hazardous chemicals in ecosystem restoration. In coral reef restoration, researchers use biodegradable materials instead of concrete to create artificial reefs, reducing long-term pollution. By applying green chemistry principles, ecosystem restoration becomes more effective, minimizing environmental harm while promoting long-term sustainability. These approaches help heal ecosystems naturally, ensuring a healthier planet for future generations.

Keywords: Sustainability, Biodegradability, Non-toxic, Eco-friendly, Bioremediation

Assessment of avian diversity of Kabar Lake Begusarai,Bihar

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Kabar wetland has ecological significance as it has been a home for several associated biodiversities. It lies about 22km north west ofBegusarai. Here an attempt has been made to study the avian diversity Altogether 73 species ofbirds have sen identified ni hte survey (2018-19) out of 37 species so far identified, 3species are resident and 6 species migrant. Migrating species included Black tailed godwit, Common teal, Great cormorant, Pied harier and Red crusted pochard. These birds utilize the wetland as foraging ground. Due to differential ecological condition and abundance of aquatic vegetation huge number and variety of birds visiting this wetland in previous years but in recent past both number and diversity has sharply declined probably due to loss and degradation of habitats, shrinkage of wetland in dry season, eutropication and increased anthropogenic activities.

Keywords: Kabar lake, Avian Diversity, Eutroplication, Anthropogenic activites; Aquatic Vegetation

The Effect of Fat Rich Diet on Enzymatic Activity(LDH) in *Mus musculus*

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A Diet is the combination of foods eaten by a specific group of organisms. Diet has great emphasis on the health , weight management and metabolic activity of the organisms. Fat Rich diet (FRD) contains Edible Coconut oil (CO) and Vanaspati ghee (VG) . CO is an edible oil and it contains lauric acid which is primary fatty acid. It is derived from kernels , meat and milk of the coconut palm fruit. VG is a cheaper substitute for ghee and butter. Nickle is used as catalyst in the hydrogenation process to convert edible vegetable oils into VG. Traces of nickel might be found in Vanaspati as an impurity, which is hazardous for the health. VG and CO is partially hydrogenated oil which contain trans fatty acids (TFAs) has adverse impact on enzymatic activity (LDH) . It is manufactured by industrial process by partial dehydrogenation of vegetable oils, heating at a very high temperature. TFAs is new artificial isomers which is formed after destroying natural essential fatty acid. TFAs increases the Low density lipoprotein (LDL) and decreases the high density lipoprotein (HDL). Changes in the fatty acid composition of the diet affect the physiological process because it lacks the essential metabolic activity of the parent compound. TFAs has negative effect on physiological, metabolic and molecular pathway . TFAs increases the plasma alanine aminotransferase activity, acute phase protein hepatoglobin , hepatic and plasma cholesterol concentration, steatosis in comparison to cis-unsaturated fatty acid and saturated fatty acid. FRD was prepared by using Edible coconut oil and vanaspati ghee mixture in the ratio of 2:3 respectively and it was administrated at a dose of 10ml/kg body weight with normal chow diet for 30 days. Albino laboratory mice (*Mus musculus*),40-50 days old, average initial weights 20-40gm, was be used in this study. The

animals was divided into 2 groups and each group contains 5 albino mice. From the above experiment we observed that there was a decreases of enzymatic activity (LDH) in treated group with FRD as compare to control group at 30 days in albino mice. In control group there was a 5 differents type of LDH isoenzymes are present but in treated group only 4 types of LDH isoenzymes are present and one LDH isoenzyme is lost due to FRD.

Keywords – Fat Rich Diet , Vanaspati ghee , Coconut Oil , LDH isoenzymes

Status and Problem of Wetlands of North Bihar with Particularre Reference to Goga Beel

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Wetlands are the shallow water, periodically flooded and high ground water environment with special functions and values. Wetlands are among the most productive and threatened ecosystems. Wetlands have been damaged and destroyed in search of short term profit and many have already been lost their existence and character as well. Wetlands are mostly concentrated in the North-Bihar. The local population has an intimate concern with wetlands due to their social, economic and ecological values. Presently, wetlands of North-Bihar are facing multiple serious problems like hydrologic alterations, increased sedimentations, encroachments, denudations of catchment area leading to siltation, profuse growth of weeds, conversation of wetland area for agriculture and human settlement, changes in characteristic flora and fauna, decrease in biodiversity, over exploitation of wetland products and administrative apathy. Although, government of Bihar started Jal Jeevan Hariyali mission for conservation and renovation of water resources and rain water harvesting structures and to promote massive scale plantation to increase Green belt in Bihar, which finally ensure less incident of flood and drought by maintaining a proper balance with nature. The paper chiefly takes into account some important facts related to values, problems and conservation of wetlands of North-Bihar with particular reference to Goga beel, Katihar.

Key words: Wetlands, Threatened Ecosystems, Hydrologic alterations, Sedimentations, encroachments, Catchment area, Siltation, flora, Fauna, biodiversity, North Bihar

Effect of Urbanization on Animal Behaviour and Ecological Interactions

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Urbanization is a major driver of environmental change, significantly altering animal behaviour and ecological interactions. As natural habitats are increasingly replaced by man-made landscapes, wildlife must adapt to novel conditions, leading to shifts in foraging strategies, movement patterns, and social dynamics. Many species exhibit behavioral plasticity, such as altered feeding habits due to anthropogenic food sources, changes in communication to overcome noise pollution, and modified nesting or breeding behaviours to exploit urban structures. Additionally, predator-prey dynamics are disrupted, with some predators thriving due to increased food availability, while others see the decline due to habitat fragmentation. Competition among species is also affected, as urban-adapted generalists often outcompete specialists, leading to shifts in biodiversity. Furthermore, human-wildlife interactions introduce new challenges, including increased road mortality, disease transmission, and human-wildlife

conflicts. Despite these challenges, some species exhibit remarkable resilience, adapting to urban environments through behavioral alterations and innovations. Understanding how urbanization influences animal behaviour is crucial for developing conservation strategies that promote coexistence between wildlife and continuously expanding human population. This study highlights the need for sustainable urban planning that considers ecological integrity and fosters biodiversity conservation in rapidly growing cities.

Keywords: Urbanization, Wildlife, Conservation, Sustainable, Behaviour

Panch Mahabhutas (Five Elements) and Their Balance: A Vedic Perspective on Environmental Restoration

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The Panch Mahabhutas—Earth (Prithvi), Water (Jal), Fire (Agni), Air (Vayu), and Space (Akash)—form the foundation of nature and the ecosystem, as per Vedic philosophy. These elements are deeply interconnected, influencing biodiversity, climate patterns, and environmental sustainability. The balance of these elements is crucial for ecosystem restoration, ensuring soil fertility, clean water, pure air, and a stable climate. However, modern environmental challenges such as deforestation, water pollution, air contamination, and climate change disrupt this balance, leading to ecological degradation. This study explores the significance of the Panch Mahabhutas in ecosystem restoration and highlights both challenges and opportunities in integrating Vedic knowledge with contemporary ecological practices. Key challenges include rapid industrialization, unsustainable resource consumption, and lack of awareness about traditional environmental wisdom. Conversely, opportunities lie in adopting sustainable agricultural practices, restoring forests through Vrikshayurveda, promoting renewable energy sources inspired by Agni, and reviving water conservation techniques like Jal Shuddhi (water purification). By harmonizing ancient wisdom with modern environmental science, we can develop holistic and sustainable strategies for ecosystem restoration, ensuring a balanced coexistence between humans and nature.

Keywords: Panch Mahabhutas, Ecosystem Restoration, Vedic Ecology, Sustainability, Environmental Challenges, Traditional Knowledge, Climate Resilience

Eco-Spirituality in Hinduism, Buddhism, and Jainism: Pathways to Sustainable Living

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Eco-spirituality, deeply embedded in Hinduism, Buddhism, and Jainism, offers a holistic approach to ecosystem restoration by integrating spiritual values with environmental ethics. These religious traditions emphasize non-violence (ahimsa), interconnectedness, and reverence for nature, promoting sustainable living practices that align with ecological balance. Hinduism views nature as sacred, with rivers, forests, and mountains personified as deities, fostering a cultural responsibility for environmental conservation. Buddhism advocates for mindful

consumption, simplicity, and the Middle Path to reduce ecological footprints. Jainism's strict principles of non-violence and minimalism encourage biodiversity conservation and sustainable resource use.

Despite the rich ecological wisdom in these traditions, challenges such as rapid urbanization, deforestation, industrial pollution, and climate change threaten ecosystem restoration efforts in India. The dilution of traditional values, loss of indigenous knowledge, and conflicts between economic development and environmental conservation pose significant hurdles. However, opportunities exist in reviving ancient ecological practices, promoting community-led conservation efforts, and integrating spiritual teachings with modern environmental policies. Initiatives such as sacred groves conservation, yajnas for atmospheric purification, Buddhist eco-monasteries, and Jain vegetarianism provide pathways to sustainable living. By blending spiritual ethics with contemporary ecological strategies, India can foster a culturally rooted, ethical, and effective approach to environmental restoration.

Keywords: Eco-Spirituality, Hinduism, Buddhism, Jainism, Sustainable Living, Environmental Ethics, Ahimsa, Ecosystem Restoration, Sacred Groves, Climate Resilience, Traditional Knowledge

Bridging Mind and Nature: An Eco-Psychological Approach to Ecosystem Restoration

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This Study explores the profound interrelationship between human psychology and environmental stewardship through the lens of ancient Indian spiritual traditions. This study examines how eco-psychological frameworks—incorporating mindfulness, meditation, and nature connectedness—can foster pro-environmental behaviors and catalyze community-based ecosystem restoration initiatives. Drawing on the rich philosophical heritage of Hinduism, Buddhism, and Jainism, the research highlights the transformative power of reverence for nature, which not only enhances psychological well-being but also nurtures sustainable living practices. Amidst challenges such as urbanization, environmental degradation, and the erosion of traditional values, this interdisciplinary approach reveals opportunities to integrate cognitive resilience with ecological restoration. By bridging the gap between mind and nature, the study offers a culturally rooted, holistic pathway to address contemporary environmental challenges while reinforcing the symbiotic relationship between mental health and ecosystem vitality.

Keywords: Eco-Psychology, Nature Connectedness, Ecosystem Restoration, Mindfulness, Indian Spiritual Traditions, Sustainable Living, Environmental Psychology, Eco-Spirituality

Study of Protective Effect of Wheat Grass Juice on histological alteration in Ovary of Estradiol Vallarate Induced PCOS in Female Mus musculus

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Polycystic ovary syndrome (PCOS) is a prevalent endocrine disorder affecting female reproductive health, often induced experimentally using estradiol valerate (EV) in animal models. The present study investigates the protective effect of wheatgrass juice (Triticum aestivum) on histological alterations in the ovary of *Mus musculus* (female mice) induced with EV to develop PCOS. A total of [number] female mice were divided into control, EV-induced PCOS, and treatment groups receiving wheatgrass juice. Histological examination of ovarian tissues was conducted to assess morphological changes, including follicular cyst formation, granulosa cell degeneration, and stromal fibrosis. The results indicated that wheatgrass juice administration mitigated ovarian damage by restoring follicular integrity, reducing cystic structures, and promoting normal ovarian histoarchitecture. The study suggests that wheatgrass juice exhibits potential therapeutic properties in alleviating PCOS-associated ovarian histopathology, possibly due to its antioxidant and anti-inflammatory effects. Further investigations are required to elucidate the underlying molecular mechanisms of this protective effect.

Keywords: PCOS, wheatgrass juice, Mus musculus, estradiol valerate, ovarian histology, follicular integrity

Study of Protective Effect of *Aloe vera* on Alteration of Different Biochemical Parameters in Type-2 Diabetic *Mus musculus*

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Department of Zoology, B.N.M.V. College, Madhepura

Diabetes mellitus, particularly Type-2 diabetes (T2D), is a major metabolic disorder characterized by hyperglycemia and associated biochemical alterations. Aloe vera, a medicinal plant with known antidiabetic and antioxidant properties, has been widely studied for its potential therapeutic benefits. This study investigates the protective effect of Aloe vera on the alteration of various biochemical parameters in Type-2 diabetic *Mus musculus* (mice). Experimental diabetes was induced in mice using a high-fat diet and Alloxan administration. The treatment group received Aloe vera extract, and key biochemical markers, including blood glucose, lipid profile, liver enzymes, and oxidative stress parameters, were assessed. The results indicate that Aloe vera supplementation significantly reduced hyperglycemia, improved lipid metabolism, and restored liver and kidney function markers toward normal levels. Additionally, Aloe vera exhibited antioxidant activity by mitigating oxidative stress in diabetic mice. These findings suggest that Aloe vera has a protective role in managing biochemical alterations associated with Type-2 diabetes, making it a promising natural therapeutic agent.

Keywords: Aloe vera, Type-2 diabetes, Mus musculus, biochemical parameters, oxidative stress, lipid profile.

Study of conservation of *Monopterus cuchia* in freshwater habitat

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The study focuses on the conservation of *Monopterus cuchia*, an important freshwater eel species, in its natural habitat. *Monopterus cuchia*, commonly known as the swamp eel, plays a vital role in aquatic ecosystems and has significant economic value due to its high demand in local and international markets. However, habitat degradation, overexploitation, and pollution have led to a decline in its population. This research aims to assess the current status of *M. cuchia* in freshwater habitats, identify key threats to its survival, and propose effective conservation strategies. Field surveys, habitat analysis, and population assessments were conducted to evaluate environmental conditions affecting the species. Conservation approaches such as habitat restoration, sustainable fishing practices, and community participation were explored to ensure the long-term sustainability of *M. cuchia* populations. The study highlights the need for immediate conservation measures and policy interventions to protect this species and maintain ecological balance in freshwater ecosystems.

Keywords: Monopterus cuchia, freshwater conservation, habitat restoration, sustainable management, ecological balance

Ameliorative Effect of Watermelon (Citrullus lanatus) Seed Aqueous Extract on Hematological Parameters

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The current study investigates the potential benefits of watermelon (Citrullus lanatus) seed aqueous extract on the haematological parameters of albino male mice (*Mus musculus*) exposed to toxicity caused by copper sulphate ($CuSO_4$). The harmful effects of $CuSO_4$ on blood physiology, which include oxidative stress and haematological abnormalities, are well established. An extract-treated group that received only *C. lanatus* seed extract, a control group that received no treatment, a $CuSO_4$-treated group, and a co-treated group that received both the extract and $CuSO_4$ were the four groups of male albino mice. The white blood cell (WBC) count increased significantly after exposure to $CuSO_4$, indicating hematotoxicity and immune response activation, whereas the red blood cell (RBC), haemoglobin (Hb), and haematocrit (HCT) counts significantly decreased. Co-administration of C. lanatus seed extract, however, considerably improved these haematological indices by lowering excessive WBC elevation and returning RBC count, Hb levels, and HCT to normal ranges. The extract supported haematopoietic function and reduced oxidative damage by exhibiting antioxidant, hematoprotective, and detoxifying qualities. These results point to *C. lanatus* seed extract as a possible natural therapeutic agent against $CuSO_4$-induced hematotoxicity, which calls for more investigation to clarify its exact molecular mechanisms and wider pharmacological uses.

Keywords: Watermelon seed extract, Citrullus lanatus, hematological parameters, $CuSO_4$ toxicity, oxidative stress, hematoprotection, detoxification, albino mice, Mus musculus.

Eco-Tourism Development: The Vikramshila Dolphin Sanctuary Model in Bhagalpur (Bihar)

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Eco-tourism is a cool way to support environmental protection while boosting local economies and communities. The Vikramshila Dolphin Sanctuary (VDS) in Bhagalpur, Bihar, is India's only dolphin sanctuary and a critical home for the endangered Gangetic River Dolphin (*Platanista gangetica*). This study dives into how eco-tourism can help with both conservation of biodiversity and community development around the sanctuary. We're looking at whether organized eco-tourism practices can really make a difference in protecting local wildlife, improving local jobs, and helping with sustainable growth. To get to the bottom of this, we used a mix of methods, interviews with key people, and digging into some past data—to see how eco-tourism is doing, its impact on conservation efforts, and how involved the community. Our findings show that even though the sanctuary has amazing eco-tourism potential, the current tourism facilities and community involvement aren't quite up to scratch. The paper points out that if we promote community-run tourism projects, set up eco-friendly infrastructure, and raise awareness about these efforts, we could really boost eco-tourism. Building collaborative partnerships among government, NGOs, and local folks is super important for developing a sustainable eco-tourism model. This study adds to the conversation about how eco-tourism can balance the needs of conservation with local economic growth in protected areas.

Keywords: Eco-tourism, Vikramshila Dolphin Sanctuary, Gangetic River Dolphin, Sustainable Development

Excessive Dependence of Farmers on Inorganic Fertilizers: Effects on Environment and Sustainable Development of Agriculture

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Sustainable agriculture is highly motivated through intensive agricultural strategy. Again, intensive agriculture is also directed by chemical fertilizers to increase the productivity of various crops. The present study focuses on the motive of farmers about application of inorganic fertilizers for cultivating the Mustard Seeds in the Kashimnagar Gram Panchayat (GP) of Suti-II Block, Murshidabad District of West Bengal, India. The study is based on the primary data and the supporting data have been collected directly from the farmers by the field survey through the stratified random sampling procedure during 2023-24. From the collected data, it has been observed that 98% belong to the category of small and marginal groups. An interesting finding is that seventy percent of farmers are dependent only on inorganic fertilizers. They have applied excessive chemical fertilizers greater than the government's prescribed norm (N:P: K=4:2:1). An excessive application of chemical fertilizers will damage soil health in the future. That ultimately will create a negative impact on the environment that

is, pollute the water and destroy the various biomass of agricultural fields. For estimated results, it is also noticed that an excessive application of inorganic application of fertilizers does not influence both the production and productivity of Mustard Seeds. This implies that the unbalanced utilization of chemical fertilizers will hamper the sustainability of agriculture.

Keywords: Inorganic fertilizers, sustainable agriculture, productivity, Environment

Green Chemistry, Hazardous Waste and Ecological Imbalance - A Constitutional and Legal Approach

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The present study deals with an applicability of Green chemistry principles in order to minimize hazarding waste, protect, preserve ecological imbalance and ecosystem for sustainable development with the advancement of science and technology have given birth to many problem including the problem of eco-imbalances and environmental degradation. Green chemistry is sustainable chemistry and it is sustainable to waste. It emphasizes 100 percent atom economy and reduction of risk as hazard and exposure to the environment. The basic rule of this chemistry that waste prevention is much better than waste clean up because hazardous waste product causing problems to imbalance ecology and ecosystem. Designing of chemical process and product by green chemistry to ensure effectiveness and reduce toxicity. Emphasizing the use of renewable raw materials instead of depletable feed stocks and fossil fuels. Real time control in-process monitoring techniques for efficient safe operation and minimize production of wastes. Green chemistry substance innocuous in nature and biodegradable. Application and impact of green chemistry on various industries, environment, economic and social benefits for waste minimization improve resource efficiency, cost improve resource efficiency, cost saving and enhanced product quality. For adoption of green chemistry, there is need of scalability, regulation framework and public awareness. Constitution safeguards under Articles 14, 19, 21, 48-A, 51A(g) and 253 etc. to ensure protection and balance of natural environment balancing ecology and safe of humankind. Judicial response also taking endeavour to protect and restore nature and ecosystem. Two salutary principles Precaution and Polluter pay along with "Sustainable development" adopted by the Indian judiciary to reduce environmental risk. National Green Tribunal (NGT) ACT, 2010 another step aim to check industrial pollution and allows to claim civil damages for non implementation of environmental laws. Several Acts & rules like Environmental protection Act 1986, Waste (Management and Trans boundary Movement) Rules 2016, Hazardous Chemicals (1989) etc. to combat environmental degradation and restoration of ecosystem.

Keywords:- Green chemistry, Hazardous waste, Ecological imbalance, Polluter pay principle, Precautionary principle, Sustainable development.

Impact of Physico - chemical parameters of water on Avifauna of Jagatpur Wetland, Bhagalpur, Bihar

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Wetland ecosystems play a crucial role in sustaining biological diversity, with birds acting as bio-indicators of environmental health. This study aims to investigate the impact of physico-chemical parameters on the avifauna of Jagatpur Wetland, located in the Bhagalpur district. The research was conducted from January 2024 to February 2025. Significant adverse changes were observed in various water quality parameters, including pH, dissolved oxygen (DO2), free CO2, chloride, nitrate, and phosphate, which directly affected the wetland's avifauna. A total of 52 bird species were recorded in the survey conducted in February 2025. However, a noticeable decline in species diversity was observed, which may be attributed to climate change and its impact on water quality parameters. These changes in the physico-chemical composition of the wetland water have negatively affected aquatic habitats, leading to a decline in wetland avifauna. This highlights the urgent need for monitoring and mitigating the impacts of climate change on wetland ecosystems.

Keywords: Wetland Ecosystem, Avifauna, Physico-chemical Parameters, Water Quality, Climate Change

The Impact of Ethanol on the Environment

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Ethanol, a biofuel derived from sugarcane, grains, and other organic sources, is a promising alternative to fossil fuels. The Ethanol Blended Petrol (EBP) program, initiated in India in 2001, aims to reduce carbon emissions and dependency on crude oil imports. The government has set an ambitious target of 20% ethanol blending by 2025 to promote a greener future. A Niti Aayog report states that when petrol was blended with 20% of the biofuel, carbon monoxide reduced by 30% in four-wheelers and 50% in two-wheelers. While ethanol offers environmental benefits, its large-scale production raises concerns. Water-intensive ethanol factories are depleting groundwater resources, particularly in states like Andhra Pradesh, Maharashtra, Haryana, and Punjab. Pollution from these factories contaminates air and soil, releasing harmful chemicals such as acetaldehyde and formaldehyde. Additionally, ethanol production competes with food supply by diverting crops like sugarcane and maize.

Balancing biofuel expansion with environmental sustainability is crucial. Policymakers must implement stricter regulations to minimize ecological damage while promoting cleaner energy alternatives.

Keywords: Ethanol, Biofuel, Environmental Impact, Ethanol Blended Petrol (EBP), Carbon Emissions

शंकर साह विक्रमशिला महाविद्यालय कहलगांव

स्थापित : 03 दिसम्बर 1967

(तिलकामांझी भागलपुर विश्वविद्यालय, भागलपुर की अंगीभूत इकाई)

प्रो. (डॉ.) जवाहर लाल
माननीय कुलपति, टीएमबीयू
भागलपुर

हमारी विशेषताएं :-

1) 03 दिसम्बर 1967 उत्तरवाहिनी मां गंगा के तट पहाड़ी के ऊपर अवस्थित शांतिपूर्ण एवं सुरम्य वातावरण में पढ़ाई की सुविधा।
2) कहलगाँव अनुमंडल का एकमात्र अंगीभूत महाविद्यालय।
3) कला संकाय में 12 तथा विज्ञान संकाय में 05 विषयों की पढ़ाई।
4) सात हजार से ज्यादा विद्यार्थियों के लिए गुणवत्ता पूर्ण सह-शिक्षा की व्यवस्था।
5) राष्ट्रीय शिक्षा नीति- 2020 के अंतर्गत चार वर्षीय सेमेस्टर सिस्टम पर आधारित पढ़ाई की व्यवस्था।
6) योग्य एवं विद्वान शिक्षकों एवं कर्मठ शिक्षकेत्तर कर्मचारियों की टीम।
7) प्रायोगिक विषयों के लिए आधुनिक संसाधनों से सुसज्जित प्रयोगशाला।
8) एनटीपीसी०, कहलगाँव के सहयोग से तीव्र स्मार्ट क्लास की सुविधा।
9) बिहार सरकार के डिजिटल लर्निंग योजना के तहत मुफ्त वाई-फाई परिसर।
10) पुस्तकों से समृद्ध पुस्तकालय की व्यवस्था।
11) 160 कैडेटों की क्षमता वाली एक NCC इकाई, 100 स्वयंसेवकों की क्षमता वाली दो NSS इकाई।
12) समृद्ध क्रीड़ा परिषद् एवं सांस्कृतिक परिषद् की गौरवशाली इतिहास।
13) वार्षिक पत्रिका 'विक्रमशिला' का प्रकाशन।

विद्यार्थियों के लिए प्रधानाचार्य का संदेश

1) महाविद्यालय में सभी विषयों का कार्यदिवस वर्गशिक्षण के अनुसार आरम्भ है।
2) महाविद्यालय परिसर में अनुशासन एवं ड्रेस कोड का अनुपालन अनिवार्य है।
3) कक्षा में छात्र-छात्राओं की 75% उपस्थिति अनिवार्य है अन्यथा उनका नामांकन रद्द किया जा सकता है या उन्हें परीक्षा फार्म भरने से वंचित किया जा सकता है।
3) महाविद्यालय में नामांकित सभी विद्यार्थियों को https://infimath.com लिंक के माध्यम से सभी विषयों की सही-सही भरना अनिवार्य है, जिससे महाविद्यालय द्वारा पेपरलेस कार्य किया जा सकेगा।
5) महाविद्यालय परिवार आपके उज्ज्वल भविष्य की कामना करता है।

महाविद्यालय की आगामी योजना :-

यशस्वी कुलपति एवं प्रधानाचार्य के कुशल नेतृत्व में महाविद्यालय वेबसाइट के माध्यम से ऑनलाइन नामांकन, महत्वपूर्ण विषयों में स्नातकोत्तर की पढ़ाई, स्नातक स्तर पर वाणिज्य संकाय, संथाली भाषा, अंगिका भाषा, भूगोल इत्यादि विषयों की पढ़ाई, बी०सी० ए०, बी० बी० ए०, 'एंटरप्रेन्योरशिप, जैसे व्यावसायिक पाठ्यक्रमों की पढ़ाई, एडिसिप के साथ-साथ IGNOU का सेंटर प्रारंभ करने तथा NAAC मूल्यांकन कराने की दिशा में अग्रसर है।

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Prof. (Dr.) Sachchida Nand Pandey
Principal of T.N.B. College, Bhagalpur

It is with great pleasure that I welcome you to **T.N.B. COLLEGE, BHAGALPUR,** a place where knowledge meets opportunity, and dreams find wings to soar. As the Principal of this esteemed institution, I am honoured to be part of a community that is dedicated to the pursuit of academic excellence and holistic development.

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I want to emphasize that our college is not just a place of learning; it is a community of support and encouragement. We are here to guide and mentor our students on their educational journey, and we value the

Prof (Dr.) Jawahar Lal
Hon'ble Vice- Chancellor

P.N.A. Science College, Bhagalpur

(A Permanent affiliated College of Tilka Manjhi Bhagalpur University)

प्राचार्य संदेश,

यह कॉलेज 1985 में शुरू किया गया था। हमारे कॉलेज से कई मेधावी छात्रों ने अपनी पढ़ाई पूरी की है, और आज अच्छे पदों पर काम कर रहे हैं। इस कॉलेज की प्राकृतिक सुंदरता देखने लायक है। कॉलेज विश्वविद्यालय प्रशासनिक ब्लॉक के पीछे स्थित है। एक छात्र के रूप में याद रखने वाली सबसे महत्वपूर्ण बात यह है कि आलस्य आपका सबसे बड़ा दुश्मन है और कड़ी मेहनत आपका सबसे अच्छा दोस्त है। छात्र जीवन का एक सुंदर, फिर भी व्यस्त हिस्सा है, इस दौरान लोग हर तरह के संघर्षों से गुजरते हैं। समय आपका सबसे अच्छा दोस्त और आपका सबसे बड़ा दुश्मन हो सकता है, इस पर निर्भर करता है कि आप इसका वस्था के इस्तेमाल करते हैं या इसे बर्बाद करते हैं।

Prof. (Dr.) Jawahar Lal,
Vice Chancellor

Dr. Paras Kumar Pandit,
Principal

Vision

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 To educate students from all over India including those from rural backward area of our country so that they become enlightened individual, improving the standards of their families & society. We are trying our best to provide quality education with character building.

About

Welcome to Teachers Training College, Bhagalpur, located along the picturesque banks of the River Ganga in the bustling Barari Industrial Area. Affiliated with Tilka Manjhi Bhagalpur University (TMBU) and recognized by the National Council for Teacher Education (NCTE) in Bhubaneswar, our college is committed to producing skilled and compassionate educators. With modern facilities and experienced faculty, we provide a nurturing environment for academic and practical learning. Our curriculum emphasizes hands-on teaching experiences and holistic development. Join us at Teachers Training College, Bhagalpur, to embark on a journey of academic excellence and personal growth in the field of education.

About SKMSP Mahavidyalaya

Sri Krishna Manorama Shikshak Prashikshan Mahavidyalaya is an initiative by Gautam Social and Educational Trust and has been established as a result of a thought that Teachers are the shapers of nation and a good teacher is not born but are made. It is and will be a constant Endeavour of Sri Krishna Manorama Shikshak Prashikshan Mahavidyalaya to obtain and maintain a real high standards in terms of Teacher Education. Sri Krishna Manorama Shikshak Prashikshan Mahavidyalaya is non profit, unaided self financing Institution.

Our Address: Dadhi Pakaria, Shambhu Ganj,
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Prof. (Dr.) Jawahar Lal
Hon'ble VC

Prof(Dr.) Shiv Shankar Mandal
Principal

Mission

G.B. College Naugachia inspires, prepares, and empowers students to succeed in a changing world. This means:
We inspire students to learn and to develop as whole people: intellectually, physically, and emotionally
We inspire students to continue learning throughout life.
We prepare and empower students to be successful by helping them develop the knowledge, skills and abilities needed to enter or progress within the work force or to transfer to a four-year institution, and to adapt and thrive in our increasingly diverse and ever-changing world.

About Us

Welcome to the Puranmal Bajoria Teacher Training College a world of learning possibilities and opportunities. At PBTT College we encourage a positive attitude towards learning and the development of a lifelong love for knowledge. Within the domain of each teacher Training unique strengths and competencies we aim to provide meaningful educational experiences develop skills and nurture constructive attitudes thereby allowing for the full expression of academic physical and creative talents. We look upon the PBTT as an extension of the home in terms of the nurturing it provides to the young and a portal to the outside world in as much as it prepares our teachers to actively apply their learning to real life situations. Puranmal Bajoria Teachers Training College promises to deliver world class holistic education to its students. Education that imparts knowledge by instilling confidence. Students are encouraged to ask questions instead the other way round because we believe that a curious mind is the receptacle of learning. We allow young children to explore the outside because learning cannot be confined within the four walls of the classroom and that there is no better teacher than nature. We have embraced technology and innovation with an open mind because children of this millennium have to master technology and not become its slave. Our efforts are backed by the ergonomic and scientifically designed campuses which are a learning space as a whole. Emphasis is been laid on utilizing natural resources to the fullest. Students are taught the importance of environmental conservation through conscious minimizing and recycling of waste and making the college a zero - tolerant zone for plastics and polybags.

Murarka College, Sultanganj

Murarka College, Sultanganj was established in 1955 by the visionary enterprise of the local business tycoon Late Ranglal Jee Murarka. The College lies in 17.5 acre serving the rural area which encompassed a diameter of about 30 KM. The College becomes a Constituent Unit of Tilkamanjhi Bhagalpur University on 23 February 1976. The College is a multi facility unit that is, the college houses the science faculty as well as Humanities and Social Science. The institution has on roll approximately One Thousand and Nine Hundred in Bachelor stage . The College provides Sport and Recreational facilities. In the past two years the college has been runner up in football tournament and has sent many athletics to represent the university as well as the state. Thus the college endeavors to provide all round development. The College is a Constituent Unit of T. M. Bhagalpur University, Bhagalpur.

From the desk of Principal...

Welcome to Murarka College, Sultanganj Bhagalpur , a milestone of academic excellence and co-curricular and extracurricular performances which has enlarged and enriched in Bihar. Murarka College, Sultanganj was established on 23rd February 1955 under Bhagalpur university. We belive that the purpose of 0educations is to turn mirrors into windows, and as such are focused not only on pure studies but also on providing opportunity to each student to explore his or her own capabilities and their area of interest . we aim to develop soft skills that will equip them to manage and lead the valid opportunities and challenges of the society with and added edge We care for mind, we care for person- the accent is on allround development of personality . i wish you the best in process of seeking to became a part of murarka college family. Murarka College family was dedicated, is dedicated and will be dedicated to establish **All for Knowledge , Knowledge for All.** - Prof.(Dr.)Amar Kant Singh Email - info@murarkacollegesult.org Mobile - (+91) 94381001208

Sundarwati Mahila Mahavidyalaya

S.M.College, Bhagalpur, is a foremost institution of fame and repute. It holds a prominent position in the field of higher education for women in Bihar. The sapling which was planted in the premises of Mokshada Girls School, Bhagalpur by Dr. Sharda Vedalankar on 15th of August, 1949, has now blossomed into a premier Women's College of T. M. Bhagalpur University, Bhagalpur and has celebrated its golden jubilee in 1999. In 2004 the College has been Accredited by NAAC team and graded as B+. It has already made a niche in women's education and is forging ahead from multiple successes. (NAAC certificate attached).

The college can boast of high standard of teaching, the credit of which goes to its devoted teachers. Ninety per cent of its teachers have got Doctorate degree. They are constantly engaged in research activities and project works. This college has been contributing both to academics as well as extra-curricular activities. It has a long glorious history of producing brilliant debaters, who represented the college at national level and brought laurels to the college. Its students have also been participating in Youth Festivals and winning distinctions. The college has very good arrangement both for N.C.C. and N.S.S. and Sports activity.

Principal
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B. L. Sarraf Commerce College, Naugachia

(An Affiliated Unit of Tilka Manjhi Bhagalpur University)

Affiliated By: Tilka Manjhi Bhagalpur University

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Navgachhia, Bhagalpur : 853204
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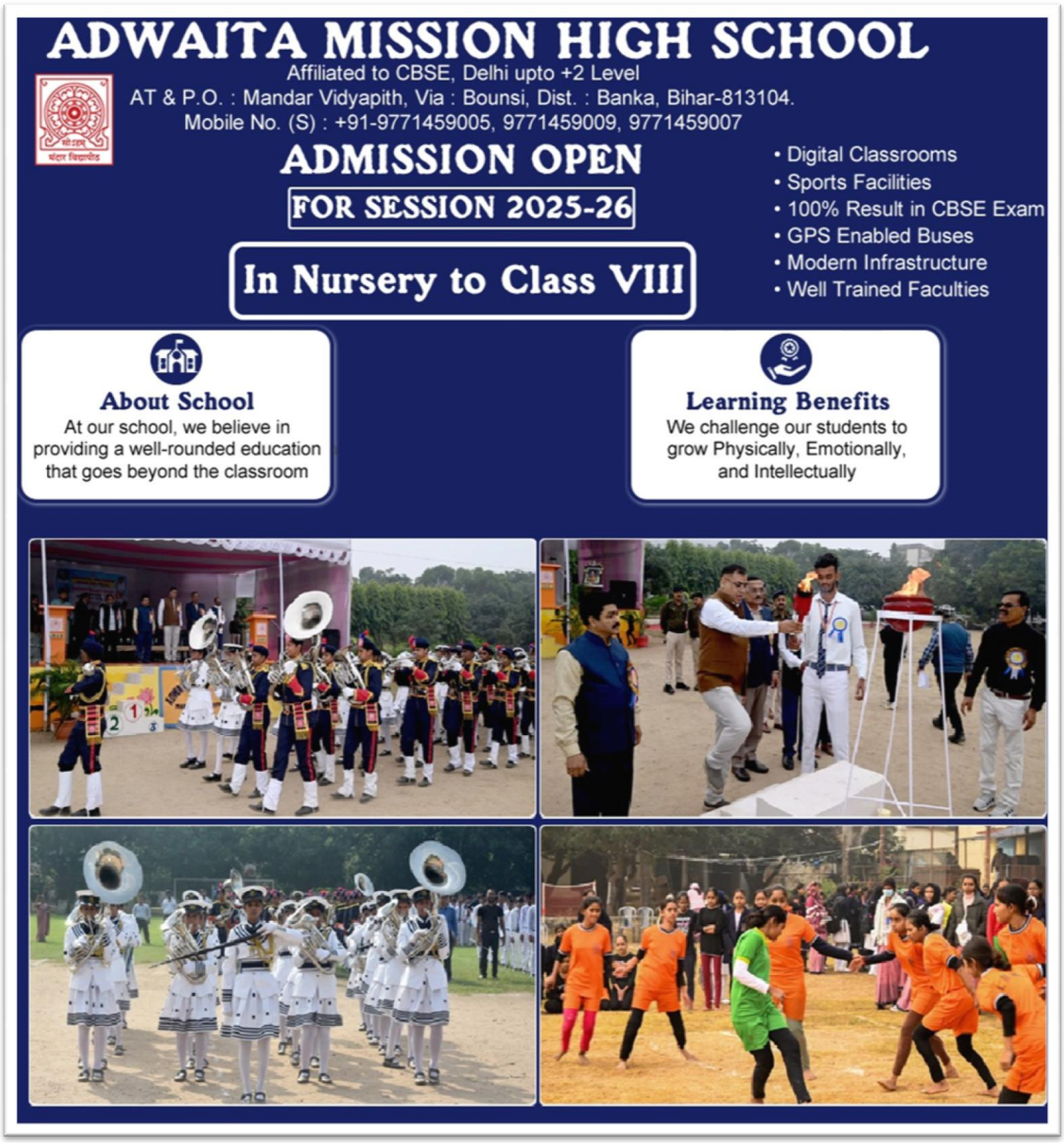

Bhagalpur National College, Bhagalpur

NAAC Accredited

(A Constituent Unit of T.M.B.U. Bhagalpur)

www.bncollegebgp.ac.in

M- 0641-3500248, 249 Email - bncollegebhagalpur@gmail.com

Bhagalpur National College is located within the municipal limit of Bhagalpur City, one of the oldest Divisional Headquarters of Bihar. It is situated beside the National Highway (NH-80) linking Patna-Kolkata. The college is one of the premier constituent units of T.M. Bhagalpur University. The college has a homogeneous sprawling campus stretching an area of about 4 acres. The river Ganga flows only one km away the North of the college. Bhagalpur, popularly known as a silk city, has a great historical antiquity. Bhagalpur has been a famous commercial and industrial centre with specialization in silk industry and trade since time immemorial. There is a good amalgamation of Marwari, Bengali, Angika and Urdu languages and cultures. Eminent distinguished personalities like Rabindra Nath Tagore, Sharat Chandra Chattopadhyay and Ashok Kumar etc; lived here. Established in 1960, the college passed through phases of growth, expansion and produced a number eminent personalities in sphere of politics, administration, social services and academic.

The college is managed and maintained by T.M. Bhagalpur University. There are 23 permanent teachers and 17 guest/visiting teachers imparting teaching in fifteen subjects of the faculties of Arts Science and Commerce. Teachers of the college are in good number participating in seminars/workshops/conferences/symposium at national/international level.

Thanking You,

Prof. (Dr.) Ashok Kumar Thakur
Principal
Bhagalpur National College, Bhagalpur