



Department of Science & Technology
Ministry of Science & Technology
Government of India



Department of Biotechnology
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Government of India

INTERNATIONAL CONFERENCE ON **ADVANCES IN SYSTEMS BIOLOGY**

6th - 8th March, 2025

ABSTRACT BOOK

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School of Biological Sciences

Dr. Harisingh Gour Vishwavidyalaya, Sagar (M.P.) India
(A Central University)

In Association with IQAC & DORD





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**International Conference on
“ADVANCES IN SYSTEMS BIOLOGY”
MARCH 6-8, 2025**

Time	Activity	Title	Venue
6th March, 2025			
09:00-10:30 am	Registration (Kit, Certificate, Coupons, Payment, Abstract book, Signature, Receipts)		Abhimanch Sabhagar
10:30-12:30 pm	Inaugural Session & Plenary lecture (Lifetime Achievement Award) by Prof. A.P. Dash , Member CSIR Society <i>End NTDs to achieve SDGs</i>		Abhimanch Sabhagar
12:30-13:00 pm	Tea		Abhimanch Sabhagar
13:00-14:20 pm	Technical Session I		Abhimanch Sabhagar
Session Chair: Prof. A.P. Dash Dr. Ashok Kumar	Key note address 1 13:00-13:40 pm	Dr. Gopal Krishna ICAR-CIFE, Mumbai <i>Fisheries Development vis-a-vis Technology Intervention</i>	
Rapporteur: Dr. Shashwat Singh	Special lecture 1 13:40-14:20 pm	Dr. Vineet Kumar Singh Unicorn Natural Products Pvt. Ltd., Hyderabad <i>Beyond Label: Relative retention strategies to divulge steroidal lactones for thwarting state-of-the-art adulteration in Ashwagandha root extract</i>	
14:20 -15:15 pm	Lunch		Acharya Shankar Bhavan
15:15 -16:15 pm	Technical Session II		Abhimanch Sabhagar
Session Chair: Dr. Gopal Krishna Prof. Subodh Jain	Key note address 2 15:15-15:30 pm	Prof. BD Joshi Gurukul Kangri, Haridwar <i>About cyto-morphological variations in blood corpuscles of fishes under different physio-pathological conditions</i>	
Rapporteur: Dr. Sweta Sharma	Special lecture 2 15:30-15:45 pm	Dr. Ashok Kumar Deen Dayal Upadhyay Gorakhpur University, Gorakhpur <i>Cancer: A preventable epidemic? The role of lifestyle, diet and environment.</i>	
	Special lecture 3 15:45-16:00 pm	Prof. Mohd. Arif Mohammad Ali Jauhar University, Rampur <i>How to keep Earth liveable</i>	
	Special lecture 4 16:00-16:15 pm	Dr. DK Sharma Dr. B.R. Ambedkar University of Social Sciences, Dr. B.R. Ambedkar Nagar <i>Hantavirus: a systematic review on pathophysiology, clinical diagnosis, and public health prevention</i>	

16:20-17:00 pm	Poster Session-I with Tea <i>Acharya Shankar Bhawan</i>	
17:00-18.00 pm	Technical Session III: Senior Scientist Award <i>Abhimanch Sabhagar</i>	
Session Chair: Prof. S.C. Joshi Prof. Devashish Bose Rapporteur: Dr. Yogesh Bhargava	Key note address 3 17:00-17:15 pm	Prof. Pratyush Shukla Banaras Hindu University, Varanasi <i>Innovations in cyanobacterial biotechnology: multifaceted applications and future perspectives</i>
	Special lecture 5 17:15-17:30 pm	Dr. GC Pandey Dr. Ram Manohar Lohia Avadh University, Faizabad <i>Toxicants of health hazards</i>
	SS Talk 1 17:30-17:45 pm	Dr. Shireesh Shrivastava International Centre for Genetic Engineering and Biotechnology, New Delhi <i>Multi-omics investigations reveals insight into the mechanisms behind improved performance of yeast for high gravity fermentation</i>
	SS Talk 2 17:45-18:00 pm	Dr. Ram Kumar Nema ICMR-NIREH, Bhopal <i>Droplet digital PCR for enteric virus detection: a high sensitivity approach for waste water surveillance</i>
20:00 hrs	Dinner	

7 th March 2025		
10:00–12:00 pm	Technical Session –IV	Abhimanch Sabhagar
Session Chair: Prof. Mohd. Arif Dr. D.K. Sharma Rapporteur: Dr. Satyam Verma	Key note address 4 10:00-10:15 am	Dr. Giribabu Nelli University of Malaya, Kuala Lumpur, Malaysia <i>Integrative insight into metabolic disorder in male infertility: impact of diabetes, Vitamin D deficiency, obesity and hypothyroidism</i>
	Special lecture 6 10:15-10:30 am	Prof. S.C. Joshi
	Special lecture 7 10:30-10:45 am	Prof. Keshav Singh Deen Dayal Upadhyay Gorakhpur University, Gorakhpur <i>Vermicomposting: a tool for waste management and self-employment</i>
	Special lecture 8 10:45-11:00 am	Dr. Kapil Soni Barkatullah University, Bhopal <i>α-Terpineol-D3, a bio-active compound derived from <i>Ocimum basilicum</i> (L.) extract's fraction OB-2 reduces LTC-4, COX-2, IL-6 and Lung inflammation in Wistar albino rats <i>Rattus norvegicus</i>.</i>
	Special lecture 9 11:00-11:15 am	Dr. Tuncera Bhadouriya Feroze Gandhi Degree College, Lucknow University, Lucknow <i>Role of earthworms in chromium remediation and soil quality enhancement in tannery effluent-affected soils</i>
	Special lecture 10 11:15-11:30 am	Dr. Amrita Yadav RRU Lucknow, Lucknow <i>Nature-inspired algorithms: an effective routing solution for drones</i>
	Special lecture 11 11:30-11:45 am	Dr. Ashwani Kumar Allahabad University, Prayagraj <i>Omics Insight of Microbe-Driven Contaminant Degradation of Emerging Concern</i>
	Special lecture 12 11:45-12:00 pm	Dr. Shivendra Chaurasiya NIT Bhopal, Bhopal <i>Glutamate Decarboxylase and Metabolic Adaptation in Mycobacteria: Implications for Intracellular Survival and Drug Resistance</i>
12:00-12:30 pm	Poster Session-II with Tea	Acharya Shankar Bhavan

12:30-14:00 pm	Technical Session V: Young Scientist Award <i>Abhimanch Sabhagar</i>	
Session Chair: Prof. Naveen Kango Prof. Vandana Soni Rapporteur: Dr. Payal Mahobia	Key note address 5 12:30-12:45 pm	Dr. Ishan Patro Jiwaji University, Gwalior <i>Early life challenges and brain aging</i>
	Special lecture 13 12:45-13:00 pm	Dr. Praveen Kumar Korla North Carolina State University, North Carolina, USA <i>Bioinformatics data analysis without using coding</i>
	Special lecture 14 13:00-13:15 pm	Prof. Dinesh Yadav Deen Dayal Upadhyay Gorakhpur University, Gorakhpur <i>Genomics and bioinformatics insights into nuclear factor-Y (NF-Y) transcription factor in finger millet</i>
	YS Talk 1 13:15-13:30 pm	Dr. Mukesh Kumar Meena National Institute for Plant Genomic Research, New Delhi <i>Role of early signalling modules in plant adaptation to insect infestation</i>
	YS Talk 2 13:30-13:45 pm	Dr. Kaushik Kumar Day Research Hospital Memphis, USA <i>Integrated proteomics and systems biology analysis reveals mitochondrial associated proteins in Alzheimer's disease progression</i>
14:00-15:00 pm	Lunch <i>Acharya Shankar Bhawan</i>	
15:00-16:45 pm	Technical Session VI: Young Scientist Award Cont.	
Session Chair: Prof. Pratyush Shukla Dr. Malabika Sikdar Rapporteur: Dr. Somenath Ghosh	Key note address 6 15:00-15:15 pm	Prof. Vishal Trivedi Indian Institute of Technology, Guwahati <i>Characterization of molecular determinants of FIKK Kinase(s) to detect Plasmodium falciparum</i>
	Special lecture 15 15:15-15:30 pm	Dr. Ramwant Gupta Deen Dayal Upadhyay Gorakhpur University, Gorakhpur <i>Enhancing photosynthetic efficiency in crops to ensure food security under varied climatic conditions</i>
	Special lecture 16 15:30-15:45 pm	Dr. Rajshri Gaur Deen Dayal Upadhyay Gorakhpur University, Gorakhpur <i>In silico identification of chilli genome encode MicroRNAs targeting the Candidatus phytoplasma trifolii</i>

	YS Talk 3 15:45-16:00 pm	Dr. Shahid Sami Siddique Governemt PG College, Rudrapur, US Nagar <i>Hepialus cordyceps complex: a wonder drug in Himalayas</i>
	YS Talk 4 16:00-16:15 pm	Ms. Sneha Bibyan Dr. Harisingh Gour Vishwavidyalaya (A Central University), Sagar <i>Diethyl phthalate-mediated neurotoxicity: insight into mitochondrial dysfunction and behavioural disturbance in zebrafish</i>
	YS Talk 5 16:15-16:30 pm	Ms. Priyanka Gupta Dr. Harisingh Gour Vishwavidyalaya (A Central University), Sagar <i>Mint as a natural insecticide: its effectiveness against cockroaches for sustainable pest management</i>
16.30-17:30 pm	Poster Session-III with Tea <i>Acharya Shankar Bhawan</i>	
17:30-18:30 pm	Technical Session VII: Young Scientist Award Cont. <i>Abhimanch Sabhagar</i>	
Session Chair: Prof. B.D. Joshi Prof. Ishan Patro Rapporteur: Dr. Deepali Jat	Key note address 7 17:30-17:45 pm	Dr. Pratyush P. Mohapatra Zoological Survey of India, Kolkata <i>Taxonomy and conservation challenges in Indian reptiles</i>
	YS Talk 6 17:45-18:00 pm	Dr. Siddharth Mishra University of Lucknow, Lucknow <i>System biology approach in targeted therapy in</i>
	YS Talk 7 18:00-18:15 pm	Dr. Robin Kumar Pundir MIET College, Meerut <i>Impact of various LED light spectra on acrylamide reduction in post-harvest storage of potatoes (Solanum tuberosum L.)</i>
	YS Talk 8 18:15-18:30 pm	Mr. Ashivani Kumar Srivastav Banaras Hindu University, Varanasi <i>Toxicological effect of 4-octylphenol exposure on hematological parameters in the stinging fresh water catfish Heteropneustes fossilis: a comparative study across three reproductive cycle</i>
Cultural Programme: 19:00-20:00 pm <i>Abhimanch Sabhagar</i>		
Dinner 20:00 pm		

8 th March 2025		
International Women's Day Celebration		
10:00-11:00 am	Inauguration of International Women's Day <i>Abhimanch Sabhagar</i>	
11:00-11:30 am	Poster Session-IV with Tea <i>Acharya Shankar Bhawan</i>	
11:30-13:30 pm	Technical Session –VIII: Women Scientist Award <i>Abhimach Sabhagar</i>	
Session Chair: Dr. Tuncera Bhadouriya Dr. Amrita Yadav Rapporteur: Dr. Arti Gupta	Key note address 8 11:30-11:45 am	Dr. Vinita Gowda Indian Institute for Science Education Research, Bhopal <i>Understanding Indian biodiversity using molecular and classical taxonomy tools - stories from the Indian mountains</i>
	Special lecture 17 11:45-12:00 pm	Dr. Nish Patro Jiwaji University, Gwalior <i>Early life challenges and brain aging</i>
	Special lecture 18 12:00-12:15 pm	Dr. Rashmi Srivastava University of Allahabad, Prayagraj <i>Impact of Withaferin-A on diabetes mellitus induced female reproductive dysfunction mediated by GnRH-1 in Brain and ERs in ovaries of Swiss Albino Mice</i>
	Special lecture 19 12:15-12:30 pm	Dr. Kirsten Paff (Online) Los Alamos National Laboratory, Los Alamos, USA <i>Impact of drought on global food security by 2050</i>
	WS Talk 1 12:30-12:45 pm	Dr. Babita Sharma Patna Science College, Patna <i>Plasmodium P25 proteins and their interactions: understanding malaria transmission blocking</i>
	WS Talk 2 12:45-13:00 pm	Dr. Cuckoo Mahapatra Maharajha Sriram Chandra Bhanja Deo University, Takatpur <i>RNA seq analyses reveal species specific expression of regeneration inducing genes during handling regeneration in the Indian frog Polypedates maculatus</i>
	WS Talk 3 13:00-13:15 pm	Dr. Simpal Patil RS Government PG Girls College, Chhindwara <i>Role of enzymes and influence of ecological factors on toxicity in plants</i>
	WS Talk 4 13:15-13:30 pm	Dr. Pooja Kumari Raja Mahendra Pratap Singh University, Aligarh <i>Evaluation of optimal anaesthetic concentration for complete anaesthetization of Channa punctatus and Channa gachua</i>

13:45-14:30 pm	Lunch	<i>Acharya Shankar Bhawan</i>
14:30-15:30 pm	Technical Session IX: Women Scientist Award Cont.	<i>Abhimanch Sabhagar</i>
Session Chair: Dr. Vandana Vinayak Dr. Vinita Gowda Rapporteur: Dr. Archita Singh	Keynote address 9 14:30-14:45 pm	Dr. Swati Tripathi Amity University, Noida <i>Revitalizing soils and improving crop yield with nano-microbial solutions</i>
	WS Talk 5 14:45-15:00 pm	Dr. Sakshi Singh Banasthali Vidyapeeth, Banasthali <i>Larvae of Lepidopteran and Coleopteran insects as an alternative to plastic biodegradation</i>
	WS Talk 6 15:00-15:15 pm	Dr. Nalini Tiwari Dr. Harisingh Gour Vishwavidyalaya (A Central University), Sagar <i>Breaking the complexity: identifying two different species of earthworm in the Metaphire houlleti complex through integrative taxonomy</i>
	WS Talk 7 15:15-15:30 pm	Dr. Kiran Singh Dr. Harisingh Gour Vishwavidyalaya (A Central University), Sagar <i>Salvia hispanica seed extract mediated synthesis of ZnO Nanoparticles for Enhanced Antioxidant, Antidiabetic, Antimicrobial, and Dye Degradation Activities.</i>
15:30-16:00 pm	Tea	<i>Abhimanch Sabhagar</i>
16:00-17:00 pm	Valedictory function	<i>Abhimanch Sabhagar</i>

Summary

Invited lectures:

1. Lifetime Achievement: 1
2. Keynote: 9
3. Special: 19

Talks for award category

1. Senior scientist: 2
2. Young scientist: 8
3. Women scientist: 7

Oral presentations: 35

Poster presentations: 67



Oral Presentations (8+2 minutes only) (Acharya Shankar Bhawan): 7th March (Day 2)
Oral Presentations Session I (10:00 -12:00 noon); Venue: Acharya Shankar Bhawan
Session Chair:

Prof. Dinesh Yadav

Rapporteur:

Dr. Deepanshi Jaiswal

S. No.	Presenter	Title
Biotechnology		
1	Dr. Neha Joshi Vyom Biotech Pvt Ltd, Indore	Eco-friendly Fe ₃ O ₄ and MnO ₂ nanoparticles synthesized via beetroot (<i>Beta vulgaris</i> L.) extract: as an antioxidant, antidiabetic, antimicrobial and nano-catalyst agent
Botany		
2	Dr. Arun Kumar Maurya Multanilal Modi College, Modinagar	Rising e-waste-based environmental contamination: assessment of bioaccumulation and toxicity of Indium (In) on moth bean [<i>Vigna aconitifolia</i> (Jacq.) Marechal]
3	Dr. Deepak Mishra AKS University, Satna	Genetic diversity of <i>Boswellia serrata</i> in Madhya Pradesh
Microbiology		
4	Mr. Ashwini Waghmare DHSGV, Sagar	Tuneable effect of Divalent cations on tendrill patterning during swarming motility of <i>Pseudomonas aeruginosa</i> through chemical engineering approach
5	Ms. Laxmi Kurmi DHSGV, Sagar	Photodynamic control of <i>Pseudomonas aeruginosa</i> by nanocomposites between iron nanoparticles and triphenyl methane-based dyes
Zoology		
6	Mr. Aamir Khan DHSGV, Sagar	Impact of synbiotics on Estrogen receptors effecting reproductive physiology male <i>Coturnix coturnix japonica</i>
7	Ms. Anshika Yadav DHSGV, Sagar	Parasitic helminth diversity in fish of Ganges and Betwa rivers: a comparative morphological study
8	Mr. Anupam Kumar DHSGV, Sagar	Targeted isolation and characterization of phosphate-solubilising rhizobacteria; development of bio-inoculants for optimized phosphorus acquisition and sustainable crop production
9	Ms. Archana Lalit Narayan Mithila University, Darbhanga	The efficacy of daidzein on enzymic antioxidants and cytotoxicity induction in cultured ovarian cancer cell line

10	Dr. Manju Bhaskar Chattrapati Shahu Ji Maharaj University, Kanpur	Ornithological survey of the Gangetic region in Kanpur district: diversity and distribution patterns
Oral Presentations Session II (12:00 -14:00 pm); Venue: Acharya Shankar Bhawan Session Chair: Prof. Keshav Singh Rapporteur: Dr. Lebin Thomas		
S. No.	Presenter	Title
11	Ms. Kainat Usmani DHSGV, Sagar	Chitosan nanoparticle-mediated delivery of earthworm extract: investigating the therapeutic potential in allergic asthma through in vivo regulation of NF κ B and histone deacetylase activity
12	Mr. Pritam Chakrabarti Indian Institute of Technology, Guwahati	Repurposing of Shukramatrika Bati to develop novel anticancer therapy
13	Mr. Sanjay Kumar Vishwakarma Chhatrasal Govt. PG College, Panna	Assessment of plankton diversity and hydrological parameter of Lokpal sagar lake
14	Mr. Suraj Kumar Lalit Narayan Mithila University, Darbhanga	Assessment of pulmonary function and respiratory health of women and children exposed to indoor air pollution in village of Darbhanga, Bihar
15	Mr. Yashab Kumar Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj	Incidences of urinary tract infection in pregnancy
16	Mr. Debabrata Dash DHSGV, Sagar	The UPR pathway in liver cirrhosis and hepatic encephalopathy: a critical connection
17	Ms. Ankita Dwivedi DHSGV, Sagar	A Dose-Dependent Evaluation of Neurotoxic Impact of TBBPA in Neurobehavioral Impairment and Developmental Alterations in Zebrafish
18	Ms. Shahla Nigar M.J.P. Rohilkhand University, Bareilly	Lead induced toxicity and haematological alterations with erythrocyte morphological anomalies in stinging catfish, <i>Heteropneustes fossilis</i>

19	Dr. Aditi Mehrotra DHSGV, Sagar	N-Methyl-D-Aspartate (NMDA) Receptors: Therapeutic Target against Cancer
20	Dr. Smita Shukla DHSGV, Sagar	A definitive Compendium of the <i>Araneae</i> of Sagar: An Ecological Survey
21	Dr. Neisseril Anirudhan Kashmeera DHSGV, Sagar	A Systematic Review of Centipede (Chilopoda) Diversity in Madhya Pradesh, India: Annotated Checklist and Biogeographical Insights into Knowledge Gap
22	Dr. Raj Kumar Koiri DHSGV, Sagar	Repurposing PDE5 inhibitor tadalafil and sildenafil as anticancer agent against hepatocellular carcinoma
Lunch 14:00-15:00 hrs		
Acharya Shankar Bhawan		
Oral Presentations Session III (15:00 -17:00 pm); Venue: Acharya Shankar Bhawan Session Chair: Dr. Giribabu Nelli Rapporteur: Dr. Amit Kumar		
S. No.	Presenter	Title
23	Ms. Smita Maurya C. M. P. Degree College, Prayagraj	Ameliorative effect of curcumin on polystyrene-induced ovarian toxicity in a teleost fish, <i>Channa punctatus</i> (Bloch)]
24	Dr. Sweta Arora Kalinga Institute of Social Sciences Deemed to be University, Bhubaneswar	Protective Effects of <i>Boerhaavia diffusa</i> on Hyperglycemia and Diabetic Kidney Damage in a Hamster Model
25	Dr. Priyoneel Basu Kalinga Institute of Social Sciences Deemed to be University, Bhubaneswar	Metoclopramide modulates photic signals in descending contralateral motion detector neurons in the grasshopper
26	Ms. Tripti Verma DHSGV, Sagar	Association of coiled-coil-helix-coiled-coil-helix domain-containing protein2(CHCHD2) gene variants with Parkinson's Disease in the northern India
27	Ms. Shruti Jain DHSGV, Sagar	Mechanistic Insights into Antioxidant Pathway Alteration by Microcystin-LR and the Protective Role of Coenzyme Q10
28	Mr. Mohd. Sanawar Khan	Lactational exposure effect of brexpiprazole on the body weight of albino mice
29	Ms. Archana Rajak DHSGV, Sagar	Hibiscus as a natural insecticide against rice weevil: A green alternative to synthetic pesticides

30	Ms. Ameya. R DHSGV, Sagar	From Temperature to Humidity: How Climatic Factors Influence Insect Communities
31	Ms. Pooja Tiwari DHSGV, Sagar	Endemic Earthworm Diversity in Madhya Pradesh: A Study of Distribution in Nauradehi Wildlife Sanctuary
32	Mr. Vineet Kumar DHSGC, Sagar	Molecular Mechanism of Phytochemical-Mediated Gut-Brain Axis Regulation, Depression Treatment, and Neuroprotection: A Comprehensive Review
33	Dr. Seema Singh Rama Devi Bajla Mahila College, Deoghar	Artificial inoculation of <i>Cordyceps militaris</i> (medicinal caterpillar mushrooms) to observe its pathogenicity from low altitude area lepidopteran insect <i>Bombyx mori</i> (silkworm)
34	Ms. Roshni Rajpoot DHSGV, Sagar	Protective role of Coenzyme Q10 against microcystin-LR-induced oxidative stress in mice
35	Mr. Siddharth Rajput DHSGV, Sagar	MC-LR-Induced Modulation of Unfolded Protein Response-Related Gene Expression in Mice and the Ameliorative Role of Coenzyme Q10

Poster presentations (Acharya Shankar Bhawan): 6th March to 8th March (Day 1 to 3)

Poster Session-I: 6th March (16:20-17:00 pm); Venue: Acharya Shankar Bhawan		
S. No.	Presenter	Title
Biotechnology		
1	Mr. Ashutosh Kumar Singh VIT Bhopal University, Bhopal	Assessing Human Astrovirus Contamination in Wastewater: A droplet digital PCR Based Epidemiological Study
2	Mr. Johnson Gill CSIR – National Botanical Research Institute Lucknow	Green Synthesis of Copper Oxide Nanoparticles Using Beta vulgaris Extract: Characterization and Application in <i>Alternaria solani</i> -Induced Early Blight Management
3	Ms. Khushali Agarwal NIIT University, Neemrana	Microarray data analysis of oral squamous cell carcinoma (OSCC) patients
4	Ms. Suhani Nagar DHSGV, Sagar	Gene Therapy and approach in the treatment of Amyotrophic Lateral Sclerosis
5	Mr. Abhishek Pathak DHSGV, Sagar	Fabrication, Characterization and Application of Terpinacol-Loaded Zein Nanoparticles for Controlling Fungal Diseases in Potato
6	Mr. Adarsh Tamrakar DHSGV, Sagar	Exploring the Antioxidant and Antibacterial potential of Shatavari (<i>Asparagus racemosus</i>) root extract
7	Ms. Gayatri Batham Barkatullah University, Bhopal	DNA BARCODING: A useful tool in species identification to resolving taxonomic conflicts in lotic ecosystem of Madhya Pradesh
8	Ms. Khushi Meena DHSGV, Sagar	Therapeutic Potential of Naringin: Pharmacological Properties and Clinical Prospects
9	Mr. Kuldeep Gauliya DHSGV, Sagar	Pyridoxine Powerhouse: Metabolic Engineering of potato (<i>Solanum tuberosum</i> L.) for Enhanced Vitamin B6 Biosynthesis and Stress Resilience via <i>PDX1.3</i> and <i>PDX2</i> Co-Expression
10	Mr. Manish Kumar Manjhi DHSGV, Sagar	Allyl Sulphide Loaded Lipid Nanoparticles as Targeted Therapeutics Against Breast Cancer Cell Lines
11	Ms. Sanno Ratuparna Ravenshaw University, Cuttack	Detection of microplastics in water samples
12	Mr. Vipin Kumar Gound DHSGV, Sagar	Formulation and characterization of Eugenol loaded solid lipid nanoparticles and evaluate their antimicrobial activity against pathogenic fungi and bacteria

13	Ms. Supriya Dwivedi DHSGV, Sagar	Applications of Next Generation Sequencing in Metagenomic Research
14	Ms. Shivangi Ahirwar DHSGV, Sagar	Bioprospection of fungal secondary metabolites from fungi with a focus on therapeutic application
15	Ms. Raksha Devi Lodhi DHSGV, Sagar	Assessment of antimicrobial and anti-cancerous activity of bioactive secondary metabolites of fungi <i>Paramyrothecium</i> spp.
16	Mr. Neetesh Mandal DHSGV, Sagar	Exploring the Antioxidant potential and Pancreatic Lipase-Targeted Therapeutic role of Diosgenin from <i>Dioscorea bulbifera</i>
17	Mr. Pravanjan Dash DHSGV, Sagar	Preparation, expression and construct of a Mycobacterium tuberculosis gene [RV2563] and studying its over expression profile.
Poster Session-II: 7th March (12:00-12:30 pm); Venue: Acharya Shankar Bhawan		
Botany		
18	Ms. Bharti Kaushik Multanimal Modi College, Modinagar	Nitro-oxidate stress: bioaccumulation-based toxicity of Indium (In) on moth bean [<i>Vigna aconitifolia</i> (Jacq.) Marechal]
19	Mr. Abhinav SR DHSGV, Sagar	Feasible Bioremediation Approaches to Mitigate Polluting Substances in Sagar District of Madhya Pradesh (MP) for Sustainable Environment
20	Ms. Jyoti Kumari DHSGV, Sagar	Effect of air pollution on pollination ecology
21	Ms. Monalisa Mahato DHSGV, Sagar	Intraspecific floral variations in plant-pollinator interactions
22	Ms. Sheetal Multanimal Modi College, Modinagar	Cadmium toxicity and management by gasotransmitters, Nitric oxide (NO) and Hydrogen sulfide (H ₂ S) imparting cadmium stress tolerance in Moth bean [<i>Vigna aconitifolia</i> (Jacq) Marechal]
23	Mr. Kartikey Mishra Vikram University, Ujjain	Artificial Leaf Technology: A Biomimetic Approach for Sustainable Energy Conversion
24	Ms. Binny Kumari Jaggiwan College, Ara,	Different methods used in weed management

25	Mr. Rakesh Pandey DDU Gorakhpur University, Gorakhpur	Fermented Food Nutraceuticals for Health Promotion and Food Security
26	Mr. Vivek Pandey DDU Gorakhpur University, Gorakhpur	Antibacterial activity of some medicinal plants of North-Eastern Terai Region of Uttar Pradesh
27	Mr. Kishan Kumar Prajapati DDU Gorakhpur University, Gorakhpur	Exploring the Phytopharmaceutical Potential of Underutilized Plant <i>Dioscorea alata</i> L. from the Forests of North-Eastern Terai Region of Uttar Pradesh
Microbiology		
28	Ms. Shweta Tiwari DHSGV, Sagar	Mechanistic insight into Glycerol induced Fluorescence enhancement of <i>Catharanthus roseus</i> Carbon dot and their specific interaction with Dead Yeast Cells
29	Mr. Brajesh Kachhi DHSGV, Sagar	Advancements in Microbial Enzyme Technology for Soil Pollutant Removal: A Critical Review
30	Ms. Hemlata Kachhi DHSGV, Sagar	Formulation and characterization of Eugenol loaded solid lipid nanoparticles and evaluate their antimicrobial activity against pathogenic fungi and bacteria
31	Ms. Hemlata Kachhi DHSGV, Sagar	Extraction and Evaluation of Mycological Dyes for Textile Industry and their Antifungal Activities.
32	Ms. Bipasha Priyadarshini Ravenshaw University, Cuttack	Bioremediation of heavy metal contaminated waste water through integrated microbial- chemical treatment
Zoology		
33	Mr. Anand Prakash Bhagat Lalit Narayan Mithila University, Darbhanga	Genistein induced Alteration of Enzymic Antioxidants and Cytotoxicity Induction in cultured breast cancer cell line
34	Ms. Anjali Tiwari DHSGV, Sagar	To make people aware about "Cancer"
Poster Session-III: 7th March (16:30-17:30 pm); Venue: Acharya Shankar Bhawan		
35	Ms. Divya Pandey DHSGV, Sagar	Unraveling the T Cell Enigma: Pathophysiological Changes in Cervical Cancer and Emerging Therapeutic Strategies
36	Ms. Garima Stephen DHSGV, Sagar	Bioremediation of Microplastics in Soil: A Metagenomic and Culturomics Approach

37	Ms. Janhiphula Kanhar Kalinga institute of Social Sciences, Bhubaneswar	Impact of Circadian Rhythm on Silk Fiber Production in Bagworms: A Study of Pendent Cocoon Spinning Behavior and FESEM Characterization
38	Ms. Kainat Usmani DHSGV, Sagar	Metabolomic Profiling of Eugenol-Loaded Chitosan Nanoparticles in Allergic Airway Inflammation: Targeting NF-Kb, MAPK and HDAC Pathways Through In Vivo and In Silico Investigations
39	Kriti Rastogi DHSGV, Sagar	Addressing Socio-Economic Disparities in HPV-Driven Cervical Cancer: Insights from GLOBOCAN Data and Strategies for Global Prevention
40	Mr. Mantu Meher Kalinga institute of Social Sciences, Bhubaneswar	Examining Daily Fluctuations in Cognitive Abilities: A Study of Rural vs. Urban Populations
41	Mr. Pawan Kumar Chaudhari PG College, Ghazipur	Acute toxicity of an organophosphorus pesticide, chlorpyrifos and its effect on the behavior of a freshwater fish <i>Channa punctatus</i>
42	Mr. Praddum Kumar Namdey DHSGV, Sagar	Earthworm Metabolomics and Soil Health: A Meta-analytical Review of Environmental Stress Impacts
43	Ms. Prakasini Naik Kalinga institute of Social Sciences, Bhubaneswar	Addressing Menstrual Hygiene and Cultural Taboos Among University-Going Tribal Girls in Koraput District: A Call for Comprehensive Education and Research
44	Mr. Rakesh Kumar Singh SMM Town PG College, Ballia	Effects of arsenic on the behaviour of freshwater stinging catfish <i>Heteropneustes fossilis</i> (Bloch, 1794)
45	Mr. Sambid Sunamajhi DHSGV, Sagar	Chronotype among Scheduled Tribes: Differences between urban and rural populations
46	Ms. Ankita Das Banaras Hindu University, Varanasi	Impact of <i>Mucuna pruriens</i> seed extract on lifespan, locomotion, mating behavior, and metabolic profiles across different age cohorts of the wild-type and Parkinsonian model of <i>Drosophila melanogaster</i>
47	Ms. Awani Thakur DHSGV, Sagar	Ecological Niche Modeling of Bird Species in Tropical Deciduous Forests: Implications for Conservation and Management
48	Ms. Divya Kumari DHSGV, Sagar	Foraging Behavior of Birds in a Tropical Deciduous Ecosystem: A Study of Resource Utilization and Predator Avoidance

49	Ms. Mrinal Nagwanshi DHSGV, Sagar	The Impact of Lifestyle Factors on Menstrual Cycle Dysregulation in Adolescent Girls and Young Women
50	Ms. Muskan Rajak DHSGV, Sagar	Anatoxin-a: A Neurotoxic Cyanotoxin Disrupting Antioxidant Defense and Inducing Oxidative Stress
51	Ms. Priyanka Manothiya DHSGV, Sagar	Microbiome dysbiosis as a driver of liver disease and hepatic encephalopathy
Poster Session-IV: 8th March (11:00-11:30 pm); Venue: Acharya Shankar Bhawan		
52	Ms. Shataroopa Shaktimayee DHSGV, Sagar	Assessment of Polycyclic Aromatic Hydrocarbons (PAHs): A step towards river monitoring and conservation
53	Mr. Praddum Kumar Namdev DHSGV, Sagar	Earthworm Metabolomics and Soil Health: A Meta-analytical Review of Environmental Stress Impacts
54	Mr. Abhilash Chaudhary DHSGV, Sagar	Endocrine Disruptors and Fish Reproductive Health: A Review of Hormonal Disruptions, Ecological Consequences, and Regulatory Challenges
55	Ms. Aditi Saraf DHSGV, Sagar	Glycyrrhizin as a Natural Shield Against UVB-Induced damage
56	Mr. Avnish Kumar DHSGV, Sagar	Analyzing the Symbiotic Interaction between Insects and Microorganisms in the Degradation of Pesticides and their Prospective Application in the Detoxification of Agricultural Ecosystems: A Systematic Review
57	Mr. Satish Satyam Barik DHSGV, Sagar	MC-LR-induced alterations in the unfolded protein response pathway in mice and the ameliorative effects of coenzyme Q10
58	Ms. Anjali Singh DDU Gorakhpur University, Gorakhpur	Effect of Different Combinations of Feed Materials on the Population Dynamics of Earthworms
59	Ms. Nishat Fatima DDU Gorakhpur University, Gorakhpur	Soil Detoxification Through Earthworms: Heavy Metal Accumulation Potential
60	Mr. Vilas Patil IGNOU, New Delhi	Toxicants and Their Effects on Human Body
61	Ms. Khushboo Gupta DHSGV, Sagar	Neurotoxic Effects of Pentylene-tetrazole in Zebra Fish: Mechanisms, Implications, and Potential Therapeutic Interventions

62	Mr. Pravin Kumar Bind Banaras Hindu University, Varanasi	Population Genetics of <i>Drosophila ananassae</i> : Latitudinal trends in morphometry, triglyceride content and microsatellite variants
63	Ms. Shweta Upadhyay Banaras Hindu University, Varanasi	The effect of multigenerational exposure of sodium arsenite on behavioral traits and biochemical parameters in isofemale lines of <i>Drosophila ananassae</i>
64	Ms. Madhuri Singh DHSGV, Sagar	Unveiling Vertebrate Development: Zebrafish as a Key Model Organism
65	Mr. Syed Hashim DHSGV, Sagar	The Science of pheromones in Insect Pest control: Mechanism and Innovations
66	Mr. Syed Hashim DHSGV, Sagar	Ant Pheromones as biocontrol Agents: Exploring their Mechanisms and cross- species interactions
67	Ms. Keerti Central Zone Regional Centre Zoological Survey of India, Jabalpur	Collection, Preservation and Identification of Family Reduviidae of Hemiptera in Madhya Pradesh



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धर्मेन्द्र प्रधान
धर्मेश्वर प्रधान
Dharmendra Pradhan



सत्यमेव जयते



शिक्षा मंत्री
भारत सरकार
Minister of Education
Government of India



MESSAGE

I am happy to know that **Dr. Harisingh Gour Vishwavidyalaya, Sagar, Madhya Pradesh** is going to organise an International Conference on "Advances in System Biology" during 6-8 March, 2025 and to mark this occasion, a Souvenir is being brought out.

I am sure, the Conference will present an excellent platform to well-known researchers, scientists, experts and students from different parts of the country and abroad, to exchange their ideas and experience on this important theme.

I wish the International Conference all success.

(Dharmendra Pradhan)

सत्यमेव जयते, सत्यमेव जयते

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Prof. Neelima Gupta

Hon'ble Vice Chancellor

Dr. Harisingh Gour Vishwavidyalaya, Sagar (M.P.)



MESSAGE

It is with immense delight that I welcome you to the prestigious three-day **International Conference on Advances in Systems Biology (ICASB-2025)**, organized by the Department of Zoology at Dr. Harisingh Gour Vishwavidyalaya (A Central University) from March 6th to 8th, 2025.

Dr. Harisingh Gour Vishwavidyalaya has always remained committed to its vision of becoming a centre of excellence in Education, Research, and Development. I would like to extend my sincere appreciation to the Convener, Organizing Secretary, Co-Organizing Secretary and Co-ordinators for their tremendous efforts in organizing this grand event. Your efforts in curating this platform of knowledge exchange are truly appreciated.

This Conference will provide a unique opportunity for students to gain valuable insights into the current challenges in pharmacy education. It will also serve as a platform for academic and industry experts to discuss the latest advancements in basic and applied biology, as well as explore technical concerns and challenges.

As a Zoologist, I am confident that the discourse and deliberations shared here will inspire and galvanize nascent biologists, effectively propelling their future professional journeys. I extend my sincere gratitude to all participants for their valuable attendance. It is my hope that this conference will catalyze engagement with the latest paradigms in biological sciences, foster the exchange of groundbreaking ideas, and forge enduring professional relationships. These connections will undoubtedly contribute to both individual career advancement and the advancement of our field. I would also like to extend my heartfelt congratulations to Convener **Professor Shweta Yadav**, Organizing Secretary **Dr. CP Uppadhya** and **Dr. Raj Kumar Koiri** for their exceptional work in organizing this conference. Their dedication and efforts have undoubtedly contributed to the success of this event. I wish this event resounding success.

Progress boldly, embrace goals and achieve dreams!!!

Prof Neelima Gupta
Chief Patron



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CHAUDHARY CHARAN SINGH UNIVERSITY, MEERUT-250 004 (U.P.)

(NAAC A++ Accredited)

Professor Sangeeta Shukla

Vice Chancellor

D.Sc.



Dated : 23.02.2025

MESSAGE

It is with immense pleasure and profound enthusiasm that I extend my heartfelt commendation to Dr. Harisingh Gaur Vishwavidyalaya (A Central University), Sagor, for their visionary initiative in hosting the forthcoming three-day International Conference on "ADVANCES IN SYSTEMS BIOLOGY," scheduled from the 6th to 8th of March, 2025.

As a zoologist, I am particularly excited about the transformative potential of systems biology to revolutionize our understanding of the animal kingdom. This discipline, with its holistic approach to unraveling complex biological networks, offers invaluable tools for addressing critical questions in zoology. From deciphering the intricate interplay of genes and environment in animal behavior and adaptation, to understanding the dynamics of ecosystems and the impact of climate change on animal populations, systems biology provides a powerful framework for exploration.

This esteemed international conference will serve as a crucial nexus for leading researchers, erudite students, and industry luminaries, fostering a dynamic exchange of knowledge on the latest advancements in systems biology. I anticipate that the event will be an invaluable platform for the dissemination of cutting-edge research, the cultivation of synergistic collaborations, and the strategic shaping of the discipline's future trajectory, particularly in its application to zoological sciences.

The spirit of collaborative endeavor, wherein collective effort culminates in shared triumph, resonates deeply. I extend my sincere wishes for the resounding success of this conference, and anticipate its role in weaving novel vistas for impactful progress in systems biology and its vital contributions to our understanding and preservation of the animal world.

Furthermore, I extend my heartfelt congratulations to Vice-Chancellor Prof. Neelima Gupta and Convener Prof. Shweta Yadav for their leadership and dedication in organizing this significant event.

I am particularly looking forward to seeing how the conference will address the integration of ecological data with molecular data, which is a crucial step in understanding the complex interactions that shape animal life.

Sangeeta

(Sangeeta Shukla)

Prof. Neelima Gupta
Vice-Chancellor,
Dr. Harisingh Gaur Sagor University
(A Central University)
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Prof. Shweta Yadav

Head, Dept. of Zoology
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Date 6 March, 2025

Dear Esteemed Colleagues and Researchers,

The Department of Zoology at Dr. Harisingh Gour Vishwavidyalaya in Sagar proudly welcomes you to the International Conference on Advances in Systems Biology (ICASB-2025), a prestigious event dedicated to exploring the forefront of systems biology and driving innovation in biological research through collaboration. Supported by the Department of Research and Development (DoRD), Internal Quality Assurance Cell (IQAC), Anusandhan National Research Foundation (ANRF), and a DBT-Builder grant, ICASB-2025 promises to be a platform for significant advancements in the field.

ICASB-2025 will serve as a dynamic platform for leading experts, researchers, and students to converge and share their cutting-edge findings and insights in the rapidly evolving field of Systems Biology. Our aim is to foster collaboration, spark innovative ideas, and drive significant advancements in biological research through a systems-level approach.

We are honoured to have the visionary leadership of Hon'ble Vice-Chancellor Prof. Neelima Gupta, whose expertise and dedication have been instrumental in shaping the conference program and ensuring its high scientific quality.

A special thank you to our Organizing Secretary, Dr. C.P. Upadhyay, and Co-organizing Secretary, Dr. Raj Kumar Koiri, for their tireless efforts in bringing ICASB-2025 to life. We also extend our gratitude to our dedicated faculty, research scholars, and postgraduate students, including our newly recruited faculty members, Dr. Arjun Aditya, Dr. Priyoneel Basu, and Dr. Sandeep Kumar, for their invaluable contributions.

ICASB-2025 will feature:

- **Inspiring Keynote Lectures:** Hear from renowned international experts who are at the forefront of systems biology research.
- **Engaging Oral and Poster Presentations:** Showcase your latest research and discover groundbreaking findings from your peers.
- **Interactive Workshops and Symposia (supported by DBT-Builder grant):** Gain hands-on training and delve deeper into specialized topics through interactive sessions.
- **Networking Opportunities:** Connect with fellow researchers, potential collaborators, and industry leaders in a stimulating and collaborative environment.

The Department of Zoology at Dr. Harisingh Gour Vishwavidyalaya, with its rich academic tradition and commitment to excellence, is honored to host this significant event. We are dedicated to providing a stimulating and enriching environment for all participants.

We look forward to welcoming you to ICASB-2025!

Sincerely,

Shweta Yadav

Convener, ICASB-2025



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Dr. Chandrama Prakash Upadhyaya

Organizing Secretary

International Conference on Advances in Systems Biology



25th February, 2025

MESSAGE

Dear Esteemed Colleagues and Participants,

It is with great pleasure that I welcome you to the International Conference on Advances in Systems Biology (ICASB-2025), hosted by Dr. Harisingh Gour Vishwavidyalaya (A Central University), Sagar. The conference will focus on the latest developments in systems biology, with an emphasis on biosystematics, integrating experimental data, computational modelling, and theoretical analysis to gain a holistic understanding of biological systems.

Our conference aims to disseminate the latest research findings and methodological advances in systems biology. We also aspire to foster collaboration and knowledge exchange among researchers from diverse backgrounds by providing a platform for academia to present their work and interact with leading scientists. We are hopeful that our efforts will promote the translation of systems biology research into practical applications in life sciences.

This international conference has the potential to significantly impact the field by fostering collaboration, disseminating knowledge, and promoting the development of new technologies and therapies. We believe that with your support, this conference will be a resounding success, contributing to the advancement of systems biology and its applications for the benefit of society.

I would like to extend my earnest gratitude to our sponsors, partners, and organizing committee members for their untiring support and dedication in making this conference a success. Thank you for your participation, and I look forward to seeing you all in the conference.

Warm regards,

C.P. Upadhyaya
25/2/2025

Dr. Chandrama Prakash Upadhyaya

Assistant Professor

Department of Biotechnology,

Dr. Harisingh Gour Vishwavidyalaya

(A Central University)

Sagar, Madhya Pradesh, India



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Raj Kumar Koiri

Assistant Professor
Department of Zoology,
Dr. Harisingh Gour Vishwavidyalaya
(A Central University)
Sagar, Madhya Pradesh, India



25th February, 2025

MESSAGE

Dear Esteemed Colleagues and Participants,

It is with great pleasure that I welcome you to the International Conference on Advances in Systems Biology (ICASB-2025), hosted by Dr. Harisingh Gour Vishwavidyalaya, Sagar. This conference brings together leading scientists, academicians, industry professionals, and experts from around the world to discuss and explore the latest advancements in the field of Systems Biology.

Our conference aims to provide a platform for the exchange of ideas, knowledge, and research findings that will drive the future of Systems Biology. We have an exciting program lined up, featuring keynote lectures, parallel oral presentations, poster sessions, specialized workshops, and networking events. These sessions will cover a wide range of topics, including Biosystematics, Integrative Biology, Cell Biology, Genetics, Genomics, Proteomics, Structural and Developmental Biology, Infectious and Metabolic diseases, Cancer Biology, Environmental Toxicology, Application of nanotechnology in agriculture and medicine, Synthetic Biology and Big Data Handling. In addition to this two day workshop will cover essential tools and techniques of molecular biology.

I encourage all participants to actively engage in the discussions, share their insights, and collaborate with fellow researchers to foster interdisciplinary collaborations. Your contributions will be invaluable in advancing our understanding of complex biological systems and addressing global challenges.

I would like to extend my heartfelt gratitude to Hon'ble Vice-Chancellor Prof. Neelima Gupta, convener Prof. Shweta Yadav, Organizing Secretary Dr. CP Upadhyaya, Department of Research and Development (DoRD), Internal Quality Assurance Cell (IQAC), Anusandhan National Research Foundation (ANRF), and a DBT-Builder grant, our sponsors, partners, and organizing committee members for their unwavering support and dedication in making this conference a success. I am confident that ICASB-2025 will be a memorable and enriching experience for all attendees.

Thank you for your participation, and I look forward to your valuable contributions.

Warm regards,

Raj Kumar Koiri

Co-Organizing Secretary, ICASB-2025
Dr. Harisingh Gour Vishwavidyalaya, Sagar



End NTDs to Achieve SDGs

A.P. Dash

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Abstract

According to the World Health Organisation (WHO); “Neglected tropical diseases (NTDs) are a diverse group of conditions caused by a variety of pathogens and associated with devastating health, social and economic consequences”. WHO has prioritized 21 NTDs for control, elimination and These diseases disproportionately affect marginalised communities in tropical and sub-tropical regions. Fifteen out of 21 NTDs are prevalent in South East Asia Region (SEAR) which bears 54% of the global NTD burden. NTDs are more prevalent among people living in poverty, particularly those lacking access to clean water, adequate sanitation, and health care. These conditions create a vicious cycle of poverty and disease, making it difficult for affected populations to break free from their socio-economic challenges. NTDs affect nearly 2 billion people worldwide. Most of the NTDs are infectious diseases.

The Sustainable Development Goals (SDGs) were launched in 2015 by the United Nations (UN) as a global initiative to address pressing social, economic and environmental challenges. The SDGs aim to eradicate poverty, protect the environment, and promote peace and prosperity for all by 2030. The SDGs have 17 goals and 169 targets; all revolving around gender, equity, human rights and environment. In addition to Goal 3, successful interventions against NTDs contribute to meeting other SDGs, such as alleviating poverty (Goal 1) and hunger (Goal 2), quality education (Goal 4), productive working lives (Goal 8) and promoting equality, for example with regard to gender (Goals 5 and 10). On the other side wider provision of clean water, sanitation and hygiene (WASH) (Goal 6) will help to eliminate / control NTDs. The availability of resilient infrastructure (Goal 9) should facilitate delivery of medicines and outreach to remote communities. The goals of sustainable cities (Goal 11) and climate action (Goal 13) can support the environmental management necessary for control of disease vectors. Attaining all SDGs and NTD goals is founded on strong global partnerships (Goal 17)

India is gradually progressing well in achieving the SDGs, but challenges remain in several areas. We have entered an era of polycrisis, where multiple interconnected global



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challenges - conflict, climate change, economic instability and the lingering effects of the COVID-19 pandemic – are threatening to derail hard earned progress made. We have crossed two third of the deadline for the 2030 agenda. Elimination and control of NTDs are important for achieving the SDGs. While, India was declared free from Dracunculosis (2006), Yaws (2016) and Trachoma (2024); it is still endemic for nearly half a dozen of NTDs. Diseases like lymphatic filariasis (LF), Kala-azar (KA), leprosy and rabies are targeted for elimination while dengue, soil transmitted helminthiasis etc are targeted for control and prevention. India has reached the point of elimination of Kala-azar and is awaiting WHO certification. In 2021, WHO published its second road map for NTDs, setting targets for the prevention, control, elimination, and eradication aligning with the SDGs goals by 2030. The progress so far shows that over one billion people benefited from at least one NTD intervention. Fifty-two countries have eliminated at least one NTD. Progress of NTDs elimination and control in India are discussed.



Fisheries Development *vis-a-vis* Technology Intervention

Gopal Krishna

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Abstract

Aquaculture and fisheries are the world's fastest-growing sector of agricultural business. During the past 10 years, In India the average growth rate of fish production has been recorded to be more than 7%. The present fish production (2023-2024) has been reported to be 184 LT and targeted to be 240 LT in 2024-2025. With the use of technology, aquaculture could help to meet increasing demand and can make a great contribution.

The technology that helps in the development of any sector has two steps – the invention of relevant technology and the human resource (HR) to handle its implementation. The technologies developed include controlled breeding of fish, developing breeding plans, gene banking and conservation strategies, nutrition and nutrigenomics, environmental management, fish health management, molecular biology, gene mapping, chromosome and gene manipulation, genome mapping and genomics, bioremediation, transgenesis, diagnostics, vaccine development etc. The availability of trained and qualified human resources is a major cause of concern as compared to the requirement in the sector. Professionally qualified HR and technically trained technocrats are the back bone of transfer of the techniques to the end users. In the country, there are more than 35 fisheries colleges offering graduate and post graduate programs; other than that there are a few central and state agricultural universities offering exclusively post graduate programs and advance training in specific areas of fisheries science. All the educational institutions are supported by ICAR, being the highest standard setting body under DARE, government of India. The advanced technology and HR together will be able to turn the tables in favour of the governmental policies and targets to achieve food and protein sufficiency for all.

Various institutes under ICAR / State and Central Government, private organizations and entrepreneurs are investing in developing the technology and human resources. Keeping the growing population in mind and changes in the food intake pattern, it is imperative that the growth of the fisheries and aquaculture need to be increased to multiple times to cater the domestic and export market.

The paper discusses the pros and cons of the advanced technologies and their implementation in the field condition for the sectoral development.



Cancer: A Preventable Epidemic? The Role of Lifestyle, Diet, and Environment

Ashok Kumar

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Abstract

Cancer, a word that evokes fear and dread, remains a leading cause of death worldwide. While genetic predispositions play a role, a growing body of research highlights the significant impact of lifestyle, diet, and environment on cancer development, raising the crucial question: Is cancer, to a large extent, a preventable epidemic?

The modern world, with its rapid industrialization and shifting societal habits, has inadvertently created fertile ground for cancer proliferation. Our sedentary lifestyles, characterized by a lack of physical activity, contribute significantly to increased cancer risk. Exercise, on the other hand, has been proven to bolster the immune system, regulate hormones, and reduce inflammation, all of which play a crucial role in cancer prevention.

Diet is another cornerstone of cancer prevention. The Western diet, typically high in processed meats, saturated fats, and sugar, has been linked to various cancers, including colorectal, breast, and prostate cancer. Conversely, a plant-based diet rich in fruits, vegetables, and whole grains provides a wealth of antioxidants, vitamins, and minerals that protect cells from damage and inhibit tumor growth. Cruciferous vegetables, such as broccoli and cauliflower, contain compounds that have been shown to have potent anti-cancer properties.

Furthermore, environmental factors play a critical role in cancer development. Exposure to carcinogens, such as asbestos, radon, and air pollutants, can significantly increase cancer risk. Similarly, ultraviolet radiation from the sun can lead to skin cancer, while exposure to secondhand smoke increases the risk of lung cancer.

However, the notion of cancer as a "preventable epidemic" is not without its complexities. While lifestyle, diet, and environmental modifications can significantly reduce cancer risk, they cannot eliminate it entirely. Genetic factors, random mutations, and other unknown variables also contribute to cancer development.

Moreover, access to healthy food choices, safe environments, and healthcare resources is not uniform across populations. Socioeconomic disparities often create barriers to adopting



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healthy lifestyles, making certain communities more vulnerable to cancer. Addressing these inequalities is crucial in the fight against cancer.

In conclusion, while cancer is a complex disease with multiple contributing factors, the evidence strongly suggests that lifestyle, diet, and environmental modifications play a significant role in its development. By embracing healthy habits, such as regular exercise, a balanced diet rich in fruits and vegetables, and avoiding exposure to carcinogens, individuals can significantly reduce their risk of developing cancer. While it may not be entirely preventable, the power to mitigate its impact lies largely in our hands. Recognizing this and taking proactive steps is crucial in turning the tide against this devastating disease and moving towards a healthier future for all.



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About cyto-morphological variations in Blood Corpuscles of fishes under different physio-pathological conditions

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Abstract

The variations found among all sorts of blood corpuscles of all vertebrates are profoundly used to assess the state of health or pathogenecity, following clinical haematological observations, on account of variety of diseases or any other eco-physiological conditions, including ambient environmental factors, etc. Fishes being the first vertebrates among all groups of vertebrates are the first group of animals in the ladder of evolution where all types of blood corpuscles were evolved. These show highly significant diagnostic variations through their blood corpuscles, at all stages and species levels too. Erythrocytes contribute the highest number and volume among cellular components of blood also show, the cheapest, easiest and quickest way of monitoring fish health, as in higher vertebrates, but are still not routinely used in pisci-culture. This paper describes about the cyto-morphological distortions, variations, etc. among the erythrocytes of fishes, due to certain pathological conditions, with special reference to our work on an Indian catfish *Heteropneustes fossilis* Bloch.



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Effect of Various Stressors and Pollutants on the Selected Haematological Parameters of Freshwater Fishes

B.D. Joshi*, Induja Mishra and Pashupati Nath

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Abstract

Fish blood is now being routinely trusted to assess both the aspects of fish health as well as its ambient environment. The fish being the fast vertebrate, where a closed blood vascular system evolved along with the different types of blood corpuscles, is one of the most important contribution of the fishes. This paper briefly describes alterations in blood values on account of sudden thermal stress, desiccation, altitudinal changes, exposure to mercuric chloride, exposure to molasses and hypoxic conditions. The TEC, TLC, Absolute blood values, haematocrit and haemoglobin values exhibit an immediate and discernible change, as compared to normal values for the same sized, aged, sex specimens at intra species level. The corpuscular elements also show conspicuous changes in their arithmetic as well as cytomorphological conditions. There are specific changes on account of a specific physical or chemical stressor, which can be differentiated from each other, to have an accurate diagnosis.



Status of Eco-Biology of River Ganga

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Abstract

The Ganga is regarded as the most sacred river in the world by the believers and followers of Hinduism. A number of mythological tales are woven around it and related to its origin. Whatever the myth maybe it is true that human civilization is regarded to have evolved on the riparian zones along the course of this sacred river, which still today is the life line for about a quarter billion of population of this great country. The holy Ganga has its origin in the form of a small stream at the cave of the Gaumukh glacier in deeper Himalayas at an altitude of about 7010 meters in Gangotri, Uttarakashi district of Uttarakhand state of India on the southern slopes of the Himalayan range which forms a natural northern boundary of the Ganga Basin. It is in between Rishikesh -Haridwar that it comes out of its motherly lap of Himalaya and enters in plains. The Yamuna, RamGanga, Gomti, Gandak, Ghaghara, Kosi and Bhagmati are the major tributaries which also originate from the Himalayas. The Hindon, the Chambal, the Sind, the Betwa and the Ken rivers feed the Yamuna from the North and South. The Yamuna joins the Ganga from the South at Sangam near Allahabad. Other tributaries joining the Ganga from the South are the Son, Damodar and Rupnarayan originating from the mountain range of Vindhya. With some high plateaus, the Vindhya mark the southern boundary of the Ganga Basin. Eleven miles below Farakka in India the river enters Bangladesh and joins the Brahmaputra at Goalundo. The Meghna joins further south and the combination of the three rivers empty into the Bay of Bengal. From source to outfall, the length covered by the Ganga is about 2,500 km.



Beyond label: Relative Retention Strategies to Divulge Steroidal Lactones for Thwarting State-of-the-Art Adulteration in Ashwagandha Root

Extracts

**Singh Vineet Kumar*, Ramprasad P, Danaboina GB, Ghosh S,
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Abstract

Ashwagandha (Indian Ginseng, *Withaniasomnifera*(L.) Dunal, Fam. Solanaceae) has been quite popular in the past six years, particularly since COVID-19, because of its adaptogenic properties, which are backed up by numerous *scientific studies. According to recent sales data from mainstream or natural channels in the United States, ashwagandha is among the top five herbal supplements. Its efficacy revolves around the withanolides, as an active ingredient which comes under the class of steroidal lactones and their respective glycosides, which ultimately helps manufacturer to standardize their extracts. Only roots are covered in several pharmacopoeia monographs; none of them discuss aerial components in-depth. Because of their comparable chemistry, it provides an additional edge for manufacturer to adulterate the root extract with aerial extract for their own economic benefits.

Our current findings, manifests mere way to detect aerial part's presence in root extract even after post treatments which typically eliminates aerial markers. This identification is possible because of a unique marker that is predominantly found in aerials parts but trace amounts only, in roots. However, according to the USP-NF/PF Ashwagandha root dry extract method, this new molecule, unidentified and co-elutes with 12-deoxywithastramonolide(12-DW)(RRT: 0.96), it leads to inflated assays, when we analyse these tainted extracts on the RRT concept.

We intend to discuss our findings and thoughts on the stated observations in more detail during the presentation. We anticipate that our research will spark additional discussion on the subject to improve our knowledge of ashwagandha's root quality.



How to Keep Earth Livable

Mohammad Arif

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Abstract

Since the origin of earth, ocean and life billion and million years ago accordingly, highly evolved human being (*Homo sapiens*) appeared on the scene of earth about 2 to 2.5 lacs ago with colonial and nomadic nature depending on their lively hood and habitation in nature and on natural resources water, air, food etc. Before 10000 BCE the same human being had no knowledge of language, agriculture and artificial habitation even no knowledge of relations between parents and off springs.

It was only stone age when the same human learnt a little bit about fire, roasting of hunted animals and naturally grown food grains and started growing of millets by developing agricultural equipments of stones and woods. Passing through bronze and iron age with the development of modern equipments gradually started plantation, animals domestication and altering of land scape and since 10000 BCE to 20 Century transformed natural ecosystem i.e. Agro ecosystem (AES) to Human ecosystem (HES) in the process of urbanization, industrialization, privatization exploiting the natural resources and nature at the cost of human health and environment and natural ecosystem.

Consequently, with the budging population and exploitation of abiotic and biotic natural resources i.e. air, water, soil, forest, plants, animals and fossil fuels etc the question has arisen "How to keep the Earth Livable" and thus the present paper deals with it.



Hantavirus: A Systematic Review on Pathophysiology, Clinical Diagnosis, and Public Health Prevention

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Abstract

Hantavirus is very old virus but considered as an emerging virus because of its recent infection case in China during the Covid pandemic. Hantavirus causes two distinct human diseases viz: hemorrhagic fever with renal syndrome (HFRS) caused by old world Hantavirus (Asia and Europe) and Hantavirus cardiopulmonary syndrome (HPS) caused by new world Hantavirus (America). Hanta virus belongs to genus *Hantavirus* and family *Bunyaviridae*. Different types of Hantavirus strains are present and the symptoms depend on the type of strain causing diseases. Hantavirus cardiopulmonary syndrome (HPS) having very high mortality rate almost 35 to 50 percent. Despite the high mortality rate of Hantavirus infection, there is no vaccine or drug approved by FDA. In this review there is a detail about Hantavirus genome, structure, proteome, clinical symptoms and prevention from HFRS and HPS.



Innovations in cyanobacterial biotechnology: Multifaceted applications and future perspectives

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Abstract

The cyanobacteria are useful for the production of crucial metabolites which includes biopolymers and bio-pigments. With the developments in computational biology, systems biology and other AI-ML based tools, there is immense scope of utilizing these techniques for various biotechnological applications. As the cyano-metabolites are ecofriendly, these are gaining research focus towards its commercialization. There are such diversified opportunities towards algal metabolites bioprocess optimization and understanding the mechanistic insights of the overall production yield and control mechanisms. In this work, we have reported innovative Artificial Intelligence-Machine Learning based (AI-ML tools) for algal metabolite production enhancement. Our studies reported a substantially robust AI-ML platform for process optimization with better yield and productivity. However, the challenges towards industrial pilot scale yield of these metabolites is crucial task and it has certain limitation, including the microalgal harvesting improvement. Here, we have also tried to improve algal harvesting methods and a novel innovative amylopectin-based polymer was successfully used for microalgal harvesting. Our studies explained the microalgal biopolymers production for harvesting of microalgal biomass. Our studies on microalgal-cyanobacterial harvesting holds a great promise towards substantial improvement in the production of metabolites (bio-pigments and bio-polymers) by the integrative use of AI-ML based tools.



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Toxicants of Health hazards

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Abstract

The rapid industrialization and modernization of agricultural techniques have indeed led to the large-scale production and use of chemicals, many of which find their way into the environment. These chemicals include pesticides, herbicides, plasticizers, dyes, drugs, and various industrial chemicals. As their concentration in ecosystems increases, they pose significant risks to human and animal health. Many of these toxicants exhibit harmful properties such as toxicity, mutagenicity, carcinogenicity, and teratogenicity, with dose- and time-dependent effects on biological systems, particularly enzymes. In this specific discussion we highlight the toxicants which create health hazards.



Multi-omics investigation reveals insights into the mechanisms behind improved performance of yeast for high gravity fermentation

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Abstract

S. cerevisiae is an industrial workhorse for bioethanol production. The fermentation economics can be improved significantly through developing yeast strains capable of fermenting more concentrated sugar solutions (high gravity fermentation). We had previously shown that long-term salt-stress adaptation of *S. cerevisiae* significantly improves fermentation of a 30% glucose or sucrose solution; the growth, glucose intake and ethanol production rates were significantly improved, lag time was significantly reduced, and importantly, the ethanol titers improved by about 30%. In this work, we conducted flux balance analysis (FBA) using the latest genome-scale metabolic model (GSMM) and conducted data-independent acquisition (DIA) proteomics of the adapted and control cells to identify the mechanisms of improved fermentation performance. The FBA using the Yeast9 model revealed significantly upregulated glycolytic flux but reduced TCA cycle flux. Out of the 3546 detected proteins, 88 proteins were upregulated, and 112 proteins were downregulated (Benjamini Hochberg-corrected p-value of 0.01 and log₂ fold change of at least 2). The increased glycolytic flux was driven by an overall upregulation of the glycolysis pathway while the reduced glycerol production was due to increased glycerol metabolism. Some transcription factors associated with improved performance were also identified to have altered expression. Thus, the multi-omics analysis identified novel insights into the alterations at the level of intracellular fluxes and protein levels that are associated with the improved performance of the adapted *S. cerevisiae* strain.



Droplet Digital PCR for Enteric Virus Detection: A High-Sensitivity Approach for Wastewater Surveillance

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Abstract

Enteric viruses are a group of pathogens capable of replicating in the gastrointestinal tract of humans and animals. These viruses, primarily shed through feces and sometimes urine, can contaminate water sources and cause various illnesses, including gastroenteritis, meningitis, and poliomyelitis. Among them, Rotavirus, Norovirus, and Human Astrovirus are the leading causes of gastroenteritis in children under five globally. Due to the high viral load shed by infected individuals, wastewater systems serve as reservoirs for these pathogens, necessitating effective detection methods for environmental surveillance. Detecting viral RNA in environmental samples presents challenges due to amplification inefficiencies, often exacerbated by the presence of inhibitors. Droplet Digital PCR (ddPCR), an advanced molecular detection technique, overcomes these challenges by partitioning samples into thousands of nanoliter-scale droplets, enabling absolute quantification without the need for standard curves. In this study, we developed and validated a ddPCR-based method for detecting enteric viruses in effluent samples from 9 wastewater treatment plants (WWTPs) of Bhopal districts. Virus concentration was done using Polyethylene Glycol (PEG 8000) precipitation method and the viral RNA was isolated using the Allprep Power Viral DNA/RNA extraction Kit. Our findings revealed the presence of Rotavirus in 25.92%, Norovirus in 33.33%, and Astrovirus in 32% of WWTPs samples. This study establishes ddPCR as a robust tool for environmental virome surveillance, providing critical insights for public health preparedness and contamination management, with broader implications for monitoring emerging pathogens in wastewater.



Integrative Insights into Metabolic Disorders and Male Infertility: Impacts of Diabetes, Vitamin D Deficiency, Obesity, and Hypothyroidism

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Abstract

Male infertility, impacting approximately 15% of couples worldwide, is intricately linked to metabolic disturbances such as diabetes mellitus (DM), obesity, hypothyroidism, and vitamin D deficiency. This study investigates the multifaceted effects of these conditions on spermatogenesis using animal models to unravel the underlying mechanisms. In diabetic adult male rats subjected to high-fat diets, interventions with *Turneradiffusa* extract and Myristic acid led to significant enhancements in sperm count, motility, and viability, along with decreased oxidative stress and inflammation. Parallel assessments in male ICR mice on varied diets revealed that vitamin D deficiency, compounded by hypothyroidism and obesity, markedly impaired sperm quality, reducing motility and increasing DNA fragmentation. Key reproductive proteins, including PAWP, phosphotyrosine, SMAD2, and SMAD4, were notably downregulated in affected groups, highlighting disrupted signaling pathways crucial for spermatogenesis. The study further emphasises hormonal imbalances, with thyroxine treatment showing promise in reversing adverse outcomes. Investigations into the RANK/RANKL/OPG pathway underscore vitamin D's role in mediating testicular health. These findings reveal critical hormonal and molecular disruptions in diabetes and associated comorbidities, establishing a clear link to male reproductive dysfunction. Addressing these insights, the study advocates for personalised nutritional and hormonal interventions, particularly focusing on vitamin D supplementation and metabolic syndrome management, to mitigate infertility risks and enhance male reproductive health.



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Vermicomposting: A Tool for wastes management and self-employment

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Abstract

The abundant uses of chemical fertilizers and pesticides have caused more problems in soil fertility, human health and ecosystem. The animal, agro, kitchen wastes as well as weeds are serious problems for society, if they are not properly managed. Organic farming is a solution of all these problems. Vermicomposting is one of the best ways for production of biofertilizer which is produced through proper management of biological wastes with help of earthworm, *Eisenia fetida*. Vermicompost is an alternative of chemical fertilizers. It has positive effect on the growth and yield of crops and is less expensive, easily biodegradable and no hazard to human health and environment. Now, today need to aware farmers and youth for knowledge about the waste management and production, storage, use and its marketing. Production and marketing of vermicompost will provide self-employment to thousands of youths of weaker sections which will improve their socio-economic condition. In present time is need to trained Farmers and youth for waste management and production of vermicompost, storage, use and its marketing.



**α -Terpineol-D3, a bio-active compound derived from *Ocimumbasilicum*(L.)
extract's fraction OB-2 reduces LTC-4, COX-2, IL-6 and Lung
inflammation in Wistar albino rats *Rattus norvegicus*.**

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Abstract

Phytochemicals derived from medicinal plants serve as a leading bioactive compound in drug discovery and development. Since time immemorial, herbs have always been a principal ingredient of traditional medicines in India and have gained the importance globally. Plant *Ocimumbasilicum*(L) is well known for its medicinal properties in *Ayurveda* which was evaluated in the present study for the inhibition of leukotriene cystenyl-4, cyclooxygenase-2 in blood serum, Interleukin-6 in broncho alveolar lavage fluid and for reducing lung inflammation in ovalbumin induced inflammatory model of Wistar albino rats *Rattus norvegicus*.

The aim of the study is to evaluate anti-inflammatory activities of bioactive compound of plant origin for reducing lung inflammation in ovalbumin sensitized inflammatory model of albino rats. Purified fraction OB-2 of *Ocimumbasilicum* plant extract was tested on human leukemia-60 cell lines that shows maximum cytotoxicity $22.30 \pm 1.77\%$ at $150 \mu\text{g/ml}$ concentration ($p < 0.05$). Purified fraction OB-2 at the dose of 100 mg/kg body weight of albino rat shows leukotriene cystenyl-4 suppression maximum $374.00 \pm 05.09 \text{ pg/ml}$. Fraction OB-2 also shows cyclooxygenase-2 suppression maximum $271.16 \pm 10.46 \text{ pg/ml}$. *Ocimumbasilicum* fraction OB-2 was also tested at the dose of 50 and 100 mg/kg body weight on animal models and interleukin-6 level was also measured in broncho alveolar lavage fluid and significant reduction $3.714 \pm 0.19 \text{ pg/ml}$ and $2.29 \pm 0.089 \text{ pg/ml}$ were measured, respectively. On the basis of graphs of spectral analysis, a natural monoterpenoid compound viz. α -Terpineol-D3 (M.W. $\text{C}_{10}\text{H}_{18}\text{O}$) was structurally elucidated. α -Terpineol-D3, a monoterpenoid bioactive compound derived from *Ocimumbasilicum* shows promising leukotriene cystenyl-4 and cyclooxygenase-2 inhibitory activities. *Ocimumbasilicum* fraction OB-2 also shows reduction in interleukin-6 level in broncho alveolar lavage fluids. A natural monoterpenoid compound viz. α -Terpineol-D3 (M.W. $\text{C}_{10}\text{H}_{18}\text{O}$) was reported in the present study for reducing inflammation in Wistar albino rats *Rattus norvegicus*.



Role of Earthworms in Chromium Remediation and Soil Quality Enhancement in Tannery Effluent-Affected Soils

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Abstract

The study assessed the impact of two earthworm species on chromium contamination in tannery effluent-affected soils over 90 days. Six treatments were established to maintain experimental authenticity using natural soils from the study sites. T1 (highly contaminated soil + cow dung), T2 (partially contaminated soil + cow dung), and T3 (non-contaminated soil + cow dung) were inoculated with *Eutyphoeus waltonii*, while T4 (highly contaminated soil + cow dung), T5 (moderately contaminated soil + cow dung), and T6 (mildly contaminated soil + cow dung) contained *Metaphire posthuma*.

Soils from T1 and T2 exhibited moderate electrical conductivity, organic matter content, and alkaline pH, whereas T3 had low C%, N%, and EC. A neutral pH and high EC favoured nutrient availability. Vermicomposting significantly stabilized heavy metal-contaminated soils, as evidenced by decreased EC and pH, enriched organic carbon, and enhanced nitrogen retention throughout the experiment. Phosphate phosphorus availability increased in T3 and T6, while in highly contaminated soils (T1, T4), it initially rose before declining. Potassium levels declined in polluted soils but recovered after 90 days.

Earthworm activity significantly reduced Cr^{6+} concentrations and leachability across all treatments. *M. posthuma* demonstrated a higher chromium absorption rate, making it a valuable bioindicator for soil contamination. Improved organic matter, moderately alkaline pH, and higher EC values enhanced chromium solubility, increasing its accumulation in earthworm tissues, plants, and castings. These findings show that using earthworms and vermicomposting as a remediation approach can effectively manage chromium contamination in soils, lowering its mobility and toxicity while improving soil quality and mitigating environmental pollution.



Nature-inspired Algorithms: An Effective Routing Solution for Drones

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Abstract

Nature-inspired algorithms are the algorithms that mimic the behaviour of organisms. These algorithms have wide range of usage and have a lot of potential to solve complex problems. One such area of usage is in Flying ad-hoc networks or drones. These are the networks which are rapidly being used in various sectors such as agriculture, health services, military and disaster management etc. Till now, flying ad-hoc networks used traditional routing algorithms but traditional routing techniques are not ideal for addressing the dynamic nature of high-speed node mobility and topologies. They tend to exhibit poor adaptability and data handling. To overcome these challenges, Nature-Inspired Algorithms (NIAs) can be used. For this, a modified Firefly Algorithm (FA) and a hybrid approach combining Ant Colony Optimization (ACO) with FA is proposed. The hybrid approach achieves better performance and reduce the overall routing overheads in FANET environments. It also focuses on improving the packet delivery ratio (PDR) and reducing the end-to-end (E2E) delay. Extensive simulations were conducted using ns3.26 to evaluate the performance of the proposed algorithms. Significant enhancement was observed in terms of PDR, a reduction in E2E delay, and an increase in throughput compared to standard NIAs was also observed. The proposed algorithms greatly enhance network efficiency and reliability by minimizing energy consumption and improving data transmission. These are ideal for resource-constrained and time-sensitive applications. This work provides an algorithm which makes routing in drones well planned and structured.



Impact of Withaferin-A on diabetes mellitus induced female reproductive dysfunction mediated by GnRH-I in Brain and ERs in Ovaries of Swiss albino mice

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Abstract

Type 2 diabetes mellitus (T2DM) is a chronic metabolic disease, characterized by persistent hyperglycemia resulting from diminished response to insulin secretion or resistance. The present study evaluated the ameliorative effects of Withaferin-A (WA) on T2DM-induced reproductive dysfunction in female mice. For the same, mice were kept on high fat diet followed by Streptozotocin injection intraperitoneally, (40 mg/kg/day) for 5 consecutive days to induce DM. Mice were then treated with WA (8 mg/kg/day) both in normal and diabetic conditions (DM+WA). Next, blood glucose levels, oral glucose tolerance test (OGTT), oxidative stress and reproductive parameters were estimated. Immunofluorescent localization of GnRH-I in POA and PVN region of hypothalamus and ER α and ER β in ovaries was performed for reproductive performance. Diabetes mellitus triggered reproductive dysfunction is mediated by low *ir*-GnRH-I in the brain, ER α and ER β in the ovaries along with declined circulatory estradiol levels. Interestingly, treatment with WA significantly reduced the blood glucose levels and enhanced glucose clearance including oxidative stress in ovaries as indicated by low levels of H₂O₂ and MDA in DM+WA. Study indicates increase in reproductive immunity by WA mediated by IL-10 and IL-1 β and reduction in apoptosis exhibited by increased Caspase-3 and p53 in ovaries. The pharmacological effect of WA in T2DM-induced female reproductive dysfunction is mediated by increased estrogen receptors (ERs) in the ovaries. Overall, it can be concluded that WA can efficiently combat T2DM-induced reproductive dysfunction *via* enhancing endogenous estrogen and *ir*-GnRH-I in the brain via ER α and ER β in the ovaries of the T2DM mice.



Glutamate Decarboxylase and Metabolic Adaptation in Mycobacteria: Implications for Intracellular Survival and Drug Resistance

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Abstract

Host-driven metabolic adjustments are crucial for *Mycobacterium tuberculosis* (Mtb) to survive, persist, and develop resistance to antibiotics. Mtb's capacity to withstand the acidic environment of phagosomes and phagolysosomes indicates that its primary metabolic strategy involves mitigating acidic stress. Glutamate decarboxylase (Gad), an enzyme responsible for converting glutamate to GABA with the concurrent consumption of a proton, is pivotal in sustaining intracellular pH balance in bacteria.

This study examined the function of Gad in Mtb and *Mycobacterium smegmatis* (MS), encoded by *Rv3432c* (*gadB*) and *MSMEG_1574* (*gadA*), respectively. Gad expression was analyzed under acidic stress and macrophage infection. Genes linked to glutamate metabolism and the GABA shunt—including *glnA1* (glutamine synthetase), *gdh* (glutamate dehydrogenase), *gltD/B* (glutamate synthase), *gaba-at* (GABA-aminotransferase), *gabD1/gabD2* (succinic semialdehyde dehydrogenase), *kdh* (α -ketoglutarate dehydrogenase), and *sucA* (2-oxoglutarate dehydrogenase) were also assessed for coordinated responses. A *gadA* knockout strain (MS Δ gadA) was constructed using allelic exchange to determine functional relevance, while *gadB* was overexpressed in *Mycobacterium bovis* BCG to evaluate its role in improving survival. The findings revealed elevated Gad expression in both Mtb and MS under conditions of acidic stress and during macrophage infection. Genes involved in glutamate metabolism and the GABA shunt displayed coordinated expression changes under these conditions, highlighting Gad's role in acid stress adaptation. The MS Δ gadA strain exhibited reduced survival within macrophages, whereas overexpression of *gadB* in BCG, a strain naturally deficient in Gad, significantly improved intracellular survival.

These findings identify Gad as a critical factor in acid tolerance and intracellular adaptation in mycobacteria. By contributing to pH regulation and metabolic resilience, Gad emerges as a potential therapeutic target for impairing acid tolerance mechanisms and addressing antibiotic resistance in Mtb.



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Bioinformatics data analysis without using coding

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Abstract

Bioinformatics has emerged as a cornerstone of modern scientific research, enabling the integration and analysis of vast biological datasets across multiple disciplines. This session will provide an exploration of bioinformatics applications in these cutting-edge fields, featuring case studies that illustrate real-world impact. As advancements in multi-omics, microbiome research, immunotherapy, and personalized drug development continue to reshape biomedical sciences, bioinformatics serves as the key to unlocking meaningful insights from complex data. Participants will acquire valuable insights into advanced computational tools, cutting-edge data visualization methods, and robust analytical approaches, all of which are vital for research in both academic and industrial settings. Additionally, an interactive QandA session will address the evolving landscape of bioinformatics, highlighting opportunities for higher education, collaborative research, and career pathways in academia, biotech, and pharmaceutical industries. Join us to explore how bioinformatics is revolutionizing life sciences and shaping the future of data-driven discovery.



Genomics and Bioinformatics Insights into Nuclear Factor-Y (NF-Y) transcription factor in Finger millet

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Abstract

The Nuclear Factor Y (NF-Y) transcription factor (TF) family is ubiquitously present in most eukaryotes as a heterotrimeric complex protein. Finger millet (*Eleusine coracana* (L.) Gaertn) is one of the ideal crops for climate-smart agriculture, where genomics intervention has been made to characterize a few transcription factors. The interaction of PYL (Pyrabactin resistance1-like) receptor proteins with NF-Y transcription factor in the presence of phytohormones like abscisic acid (ABA) provides an insight related to the enhanced tolerance towards abiotic stresses under ABA-dependent signaling in finger millet crop. In the present study, 59 *EcNF-Y* genes comprising of 18 *EcNF-YA*, 23 *EcNF-YB*, and 18 *EcNF-YC* have been mined from genome of finger millet and substantially characterized using *in-silico* tools. The expression profiling of *EcNF-Ys* genes was performed in two finger millet genotypes, PES400 (dehydration and salt stress tolerant) and VR708 (dehydration and salt stress-sensitive), subjected to PEG-induced dehydration and salt (NaCl) stress at different time intervals (0, 6, and 12 h). The qRT-PCR expression analysis reveals that the six *EcNF-Y* genes, namely *EcNF-YA1*, *EcNF-YA5*, *EcNF-YA16*, *EcNF-YB6*, *EcNF-YB10*, and *EcNF-YC2*, might be associated with tolerance to both dehydration and salinity stress in early stress condition (6h), suggesting the involvement of these genes in multiple stress responses in tolerant genotype. At the same time, the expression of *EcNF-YA13* (target genes of Eco-miR169 members and Eco_N1) presented a downregulated trend under salinity and dehydration conditions compared to the control. Thus, the tissue-specific RNA-seq followed by expression analysis confirmed the antagonistic effect of Eco-miR genes on *EcNF-YA13*. This is the first report on the comprehensive characterization of the NF-Y TF family in finger millet and reveals a potential candidate for enhancing dehydration and salt tolerance.



Role of early signaling modules in plant adaptation to insect infestation

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Abstract

Plants continuously face challenges from various pathogens in environment but threats from herbivores are more detrimental to survival. Lepidopteron insect larvae voraciously feed on aerial tissues and can eat up whole plant in hours to days depending on the developmental stage of the plant and cause huge damage to crop yield worldwide. Climate change is further influencing insect physiology by short generation times, high reproductive rates, extensive mobility, and higher metabolism rate that lead to more insect feeding and crop losses. Calcium signaling is one of the early signaling events that take place within seconds after mechanical wounding and insect herbivory. Calcium signaling play critical role in activation of Jasmonate-mediated defense response at wounding sites as well as alarm the plant in distal tissues for future invasion. Through a transcriptomics approach, the *Arabidopsis cyclic nucleotide gated channel 19 (CNGC19)* was identified as a putative target of effectors found in insect oral secretions. CNGC19 is necessary to activate rapid calcium signals in plants subjected to herbivory, and that this channel is required to protect plants against caterpillars by governing Jasmonic Acid (JA) biosynthesis and the production of defense compounds such as aliphatic glucosinolates. Recently, a legume-type lectin receptor DORN1 was shown as upstream regulator of CNGC19. These findings have opened a new avenue to understand plant defense mechanisms against insect herbivores considering climate change and increasing abundance of insect pests in tropical agriculture.



Integrated Proteomics and Systems Biology analysis reveals mitochondrial associated proteins in Alzheimer's disease progression

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Abstract

Alzheimer's disease is the most common form of dementia and the sixth-leading cause of death in the US, affecting more than 5 million Americans with a healthcare cost of \$236 billion. By 2050, AD patients are projected to reach 13.8 million in the US and 100 million worldwide. Currently, AD diagnosis is based on patient's symptoms, memory and behavior tests, brain imaging, as well as post-mortem brain pathological assays. The requirements for a biomarker include the ability to measure a pathologic process, predict outcome, distinguish disease, or measure a pharmacological response to a drug treatment or therapeutic intervention. Here we present an unbiased proteomic profiling of these human samples has been initiated to identify many novel AD biomarker candidates and revealing consistent mitochondrial protein changes between control and AD samples. We present a comprehensive strategy to identify biomarker candidates of high confidence by integrating multiple proteomes in AD, including cortex, CSF, and serum. The proteomes were analyzed by the multiplexed tandem-mass-tag (TMT) method, extensive liquidchromatography (LC) fractionation and high-resolution tandem mass spectrometry (MS/MS) for ultradeep coverage. A systems biology approach was used to prioritize the most promising AD signature proteins from all proteomic datasets. Finally, candidate biomarkers identified by the MS discovery were validated by the enzyme-linked immunosorbent (ELISA) and TOMAHAQ targeted MS assays. We quantified 13,833, 5941, and 4826 proteins from human cortex, CSF and serum, respectively. In summary, 37 proteins emerged as potential AD signatures across cortex, CSF and serum, and strikingly, 59% of these were mitochondria proteins, emphasizing mitochondrial dysfunction in AD. Our results demonstrate that novel AD biomarker candidates are identified and confirmed by proteomic studies of brain tissue and biofluids, providing a rich resource for largescale biomarker validation for the AD community.



Molecular Determinants of FIKK Kinase(s) to Detect *Plasmodium falciparum*

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Abstract

Accurate malaria diagnosis is crucial for effective disease management as different *Plasmodium* species require specific treatment regimens. Current detection methods have limitations related to sensitivity and specificity. This is mainly due to employing similar targets such as 18S rRNA, Pf-lidh, Pf-hrp-2, and aldolase with significant homology to human counterparts. Targeting *Plasmodium*fikk kinases that are unique to *P. falciparum* offers a novel approach for developing potential biomarkers. We have identified exclusive regions of fikk kinases using in-silico PCR and later validated our findings using in-vitro PCR. We observed exceptional sensitivity with our designed primers of the targeted fikk kinases, with the detection limit going as low as 10–5 ng level of parasite DNA and 0.0003% parasitemia. The shortlisted primers also selectively identified *P. falciparum* in the presence of *Plasmodiumvivax* or several other bacterial, viral, and fungal pathogens. Detection of mock patient samples indicates that the fikk-based PCR diagnosis is giving accurate results, and it is much better than the existing method. Thus, we show that the fikk kinases from *P. falciparum* are excellent targets for developing novel biomarkers with high sensitivity and specificity.



Enhancing photosynthetic efficiency in crops to ensure food security under varied climatic conditions

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Abstract

Photosynthetic organisms produce the majority of the organic compounds required to sustain life on Earth. However, the process of photosynthesis is often disrupted under abiotic stress conditions, such as drought, high temperatures, low temperatures, and salinity. The photosynthetic machinery includes a variety of pigments/protein complexes, including photosystem (PSII), cytochrome b_6f (Cyt b_6f), and photosystem I(PSI), embedded in the thylakoid membrane of the chloroplast. Photosynthetic apparatus is exceptionally sensitive to varied climatic conditions or abiotic stresses. The present study aims to summarize the structural and functional cohesion of plants' photosynthetic machinery in response to various abiotic stresses. A significant decline in the photosynthetic pigments pool, lower yield parameters such as $\phi(P_o)$ and $\phi(E_o)$, efficiency $\psi(E_o)$ and performance indices $-PI_{abs}$ and PI_{total} , and accumulation of inactive reaction centers were observed under abiotic stresses. A further K-peak in the OJIP curve reflects damage at the oxygen-evolving complex (OEC) donor site in response to high/low temperature, high light intensity and salinity. A lower level of calculated electron transport from PSII to PSI indicates damage in the photosynthetic apparatus. In contrast, the enhanced δRo indicates that PSI is more tolerant as compared to PSII under abiotic factors. The chloroplasts' movement between mesophyll and bundle sheath cells is observed, with high light intensity causing chloroplasts to move toward bundle sheath cells in C4 crops. Despite the extensive efforts put into studying photo-systems (PSII and I), a huge gap exists especially in understanding photosynthetic electron flow in response to various abiotic factors. Now researchers should think and put more effort into translating this knowledge for a better understanding of the dynamics of the photosynthetic apparatus of plants in response to variable climatic conditions.



In Silico Identification of chilli Genome encoded MicroRNAs Targeting the Candidatus Phytoplasma trifolii

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Abstract

A potentially dangerous infection linked to witches' broom, phytoplasma is a disease-causing bacterium that harms the production of chillies and is economically detrimental. Plants infected with phytoplasma exhibit a range of symptoms that point to serious disturbances in their typical physiology and behavior. Phytoplasma-caused diseases are common and significantly affect crop output and quality. Using plant miRNA prediction algorithms, this study aims to discover and investigate chilli microRNAs (miRNAs) as possible targets against the 16S rRNA and SecA gene of *Candidatus Phytoplasma trifolii* (*Ca.P.trifolii*). The 16S rRNA and SecA genes were hybridized using mature chilli miRNAs that were gathered. Based on genetic agreement, four common chilli miRNAs were selected. Three algorithms applied in the present study suggested that the physiologically relevant, top-ranked miR169b_2 has a possibly specific site at nucleotide position 1006 for targeting the *Ca. P.trifolii* 16s rRNA gene. The circos algorithm was then utilised to create the miRNA-mRNA regulatory network. The free energy between the miRNA:mRNA duplex was also computed, and the best value of -17.46 Kcal/mol was obtained for CA-miR166c_2. Currently, there are no suitable commercial *Ca.P. trifolii*-resistant chilli crops. As a result, the expected biological data provide useful evidence for developing *Ca.P.trifolii*-resistant chilli plants.



Organophosphorus Pesticides: A Threat to Reproductive Health

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Abstract

In recent decades, there has been extensive use of strong chemicals that, while useful for their intended purposes, are also suspected of being reproductive toxicants. This amalgamation of environmental pollutants that may negatively impact human fertility comprises heavy metals (lead, mercury, arsenic), phthalates (plasticizers), bisphenol-A, polychlorinated biphenyls, dioxins, pesticides, and other substances. The fall in fertility is attributed to alterations in environmental conditions and lifestyle choices. Organophosphorus compounds represent a heterogeneous class of chemicals formulated explicitly for insect and plant disease control. Organophosphates are recognized for inducing reproductive toxicity, leading to a reduction in fertility rates in both humans and animals. The exposure to this sort of poison is not confined just to specific occupationally exposed individuals but also affects children and women. The principal toxicity linked to it is cholinergic crisis due to acetylcholinesterase inhibition. Nonetheless, these drugs exhibit several additional compound-specific chronic effects, including delayed polyneuropathy, immunotoxicity, carcinogenesis, and endocrine developmental and reproductive toxicity. This investigation encompasses our laboratory research on the male reproductive toxicity of various organophosphorus compounds, namely acephate, chlorpyrifos, diazinon, dimethoate, malathion, and monocrotophos, including their modes of action, clinical symptoms, and effects on male reproductive processes.



***Hepialus-cordyceps* Complex: A Wonder Drug in Himalayas**

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Abstract

Yartsagumba or dbyar-rtswa-dgun-bu is Tibetan title of an entomo-fungal combination between *Hepialusarmoricanus* (Lepidoptera; Hepialidae) hatchling and its parasitizing organism *Cordyceps sinensis* (Berk), which is customarily utilized in Tibetan and Chinese Framework of Medication (TCM). This restorative entomo-fungal item is known in Chinese as Dong Chong Xia Cao (winter worm and summer plant or grass in summer and worm in winter), Yarchagumba implies herbs of life in Nepal and Tochukaso in Japan. It is moreover known as Caterpillar mushroom and Caterpillar organism, and in India it is commonly known as Keera Ghas. This entomo-fungal combination is known to be utilized for numerous centuries as tonic, pharmaceutical and sexual enhancer and in devout ceremonies in China, Indonesia and Upper Himalayas. Yarsagumba is too known as the “Himalayan Viagra” or “Himalayan Gold” for its tall restorative and commercial esteem. It is basically utilized as a treatment for impotency in numerous nations. Various logical ponders uncover that it has properties of anti-microbial in it. *Cordyceps sinensis* is utilized for lung and respiratory disease, torment, sciatica and spinal pain. It too gives imperativeness and increments physical stamina of the body. Yarsagumba is utilized by the Chinese to remedy constant hepatitis B and resistant work clutter such as dysfunctioning of liver. Roughly 5 grams was stuffed into the stomach of a duck that was boiled until well cooked, at that point the *Cordyceps* was evacuated and the duck was gradually eaten, twice day by day, over a period of 8-10 days.



Diethyl Phthalate-Mediated Neurotoxicity: Insights into Mitochondrial Dysfunction and Behavioral Disturbances in Zebrafish

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Abstract

Neurodegeneration is a complex pathological process characterized by progressive neuronal loss, synaptic dysfunction, and mitochondrial impairment. Mitochondria play a critical role in maintaining neuronal homeostasis, and their dysfunction has been implicated in various neurodegenerative disorders. Emerging evidence suggests that environmental toxicants, including endocrine-disrupting chemicals, contribute to neurodegeneration by disrupting mitochondrial function and altering neurobehavioral responses.

Diethyl phthalate (DEP), a commonly used plasticizer, has been associated with neurotoxic effects, but its precise impact on mitochondrial homeostasis and behaviour remains poorly understood. Behavioural assessments revealed significant alterations, including hyperactivity, anxiety-like responses, and impaired exploratory behaviour, suggesting DEP-induced neurobehavioral dysfunction. Biochemical and molecular analyses further indicated that DEP exposure led to mitochondrial abnormalities, characterized by excessive reactive oxygen species (ROS) production.

To counteract DEP-induced neurotoxicity, we investigated the neuroprotective potential of genistein, a phytoestrogen with known antioxidant and mitochondrial-stabilizing properties. Genistein co-treatment effectively ameliorated DEP-induced behavioural deficits by restoring normal locomotor activity and reducing anxiety-like responses. At the cellular level, genistein significantly reduced mitochondrial ROS accumulation.

These findings demonstrate that DEP-induced neurotoxicity is mediated through mitochondrial dysfunction and behavioural impairments, while genistein exhibits promising neuroprotective potential by restoring mitochondrial integrity and normal behavioural patterns. Given the widespread human exposure to phthalates, further studies are warranted to explore genistein as a potential therapeutic agent against environmental toxin-induced neurodegeneration.



Mint as a Natural Insecticide: Its Effectiveness Against Cockroaches for Sustainable Pest Management

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Abstract

Cockroaches are persistent household and agricultural pests known for their resilience and ability to transmit pathogens. Conventional chemical insecticides used for cockroach control pose health and environmental risks, leading to the need for safer, eco-friendly alternatives. Mint (*Mentha* spp.), a well-known aromatic herb, has gained attention for its natural insecticidal and repellent properties against cockroaches. This study examines the effect of mint leaves on cockroach behavior, survival, and reproduction. Key bioactive compounds such as menthol, menthone, and pulegone exhibit neurotoxic effects on cockroaches, disrupting their nervous system, impairing mobility, and ultimately leading to mortality. Mint-based formulations also show strong repellency, reducing cockroach infestation in treated areas. Laboratory experiments demonstrate that exposure to mint powder significantly decreases cockroach activity, feeding behavior, and reproductive success. The fumigant and contact toxicity of mint extracts make them effective alternatives to synthetic insecticides. Using mint for cockroach management offers several advantages, including environmental safety, biodegradability, and reduced health risks for humans and pets. This study highlights the potential of mint as a natural, sustainable, and non-toxic solution for integrated pest management (IPM) strategies in urban and agricultural settings.



System Biology Approach in Targeted Therapy in Cancer

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Abstract

Traditional cancer therapies often target single molecules or pathways, yet may not account for the intricate interactions within biological systems. Systems biology offers a holistic perspective by integrating computational modeling, high-throughput data analysis, and network-based approaches to understand cancer at a systemic level. By mapping molecular interactions and signaling networks, researchers can identify key regulatory nodes and potential therapeutic targets. A major advantage of systems biology is its ability to predict drug responses and resistance mechanisms. Furthermore, systems biology facilitates immunotherapy advancements by elucidating immune-tumor interactions. Network-based approaches help identify novel immune checkpoints and enhance the understanding of tumor microenvironment dynamics, aiding in the development of effective immunotherapies. The systems biology approach is revolutionizing cancer treatment by shifting from reductionist strategies to network-based, personalized interventions, ultimately improving patient outcomes and advancing precision oncology. In herbal anticancer therapy, this approach is revolutionizing drug discovery and development by providing insights into the multifaceted effects of plant-derived compounds on cancer cells. Herbal medicine has long been used in traditional healing systems, and many plant-based compounds, such as curcumin (from turmeric), resveratrol (from grapes), and epigallocatechin gallate (from green tea), have demonstrated anticancer properties. Using systems biology approach, we have aimed to decode these interactions by utilizing omics technologies, genomics, proteomics, metabolomics, and transcriptomics to understand how herbal compounds influence cancer at the molecular level. By constructing network models, research can predict how herbal compounds modulate these pathways, leading to synergistic effects when combined with conventional therapies. For instance, some phytochemicals enhance the efficacy of chemotherapy while reducing drug resistance and toxicity. Furthermore, systems biology enables precision medicine by identifying biomarkers that predict patient responses to herbal treatments.



Impact of Various LED Light Spectra on Acrylamide Reduction in Post-Harvest Storage of Potatoes (*Solanum tuberosum* L.)

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Abstract

Acrylamide, a potentially hazardous substance produced when foods high in carbohydrates are cooked at high temperatures, is a major concern when it is synthesized to potato (*Solanum tuberosum* L.). This study investigates how various LED light spectra affect the reduction in acrylamide content in potatoes during post-harvest storage. In controlled storage conditions, potato tubers were exposed to various LED light treatments, such as red, blue, red+blue and white light. The results demonstrate that particularly red and blue light spectra having the greatest effect on reducing acrylamide content. It was shown that these light treatments affected the biochemical pathways that lead to the production of acrylamide, which helped to lower the content in stored potatoes. The study emphasizes how using LED lighting can be a sustainable and economical way to enhance the quality and safety of potatoes while they are being stored. This research provides valuable insights into innovative post-harvest management practices that could benefit the potato industry and public health.



Toxicological effects of 4-Octylphenol exposure on hematological parameters in the stinging freshwater catfish *Heteropneustes fossilis*: A comparative study across three reproductive cycle.

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Abstract

The study examines the toxic effects of 4-octylphenol (4-OP), a degradation product of alkylphenol polyethoxylates (APEs), on the hematological parameters of *Heteropneustes fossilis*. APEs are commonly used in industrial products such as pesticides, detergents and paints, leading to 4-OP's presence in environmental matrices like water, sediments and soil due to human activities. The 96-hour LC₅₀ for 4-OP in *Heteropneustes fossilis* was 0.9 mg/L and the study used 1/10th of this value (0.09 mg/L) for acute (7 days), sub-acute (28 days) and sub-chronic (60 days) exposure. After exposure, significant changes in blood parameters were observed. Red blood cell (RBC) count, hemoglobin (Hb), packed cell volume (PCV) and oxygen carrying capacity (OCC) decreased significant, while white blood cells (WBC) and clotting time (CT) increased significant when compared to the control group. Additionally, mean corpuscular volume (MCV) was significantly decreased in the prespawning phase for both sexes, while it increased in the resting and preparatory phases. A decrease in MCV was also observed in females during the sub-acute resting phase. In terms of mean corpuscular hemoglobin (MCH), significant increases were seen in various phases and exposure durations, though decreases were also noted, particularly in the prespawning phase. Similarly, mean corpuscular hemoglobin concentration (MCHC) showed increased values in some exposure groups but decreased in others, particularly in males during resting and preparatory phases. The results of this study suggests that 4-OP could have substantial impacts on the health and reproductive capacity of fish, which could have broader ecological implications in environments contaminated with this chemical.



Bacteria of Economic Importance Isolated from the rhizosphere of Triveni Plants Assembly

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Abstract

Rhizoremediation represents a promising and effective strategy that offers a sustainable solution for environmental contamination. Neem, Peepal and Bergad are medicinal plant that are grown together in very close vicinity in the Bhiwani district, Haryana and is known as Triveni. These three plants share the common rhizosphere soil, having strong possibility of presence of distinctive and specific type of microflora. Among the diverse microflora of Triveni soil, pesticide (Malathion) degrading bacteria were isolated. Out of several, five were characterized on the basis of their resistant upto 2000 ppm Malathion. They all are Gram positive and able to utilized catalase, citrate and urease and able to grow at high temperature up to 50⁰ C. The 16S rDNA gene sequencing of all the five bacterial isolates confirmed as *Exiguobacterium profundum*, *Bacillus aerius*, *Bacillus firmus*, *Bacillus flexus* and *Priestiaflexa*. GCMS analytical techniques indicated that the *P. flexa* able to degrade 81% Malathion in 96hrs, *B. flexus* 76% of Malathion in 96hrs and *E. profundum* able to degrade 71% of Malathion in 96hrs, suggesting their great potential to use as bioremediating tool to remove contaminants from the soil. This study provided valuable insights to use Triveni plant assembly microflora as a source of useful and beneficial microbes in agriculture field.



Impact of Drought on Global Food Security by 2050

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Abstract

Drought is a leading cause of agricultural production loss and is expected to increase in frequency and severity in the future. Though several studies have statistically examined the impact of historical drought on agricultural production data, no previous study has specifically examined the impact of drought on future global scale agricultural production. Wheat, maize, soybeans, and rice are some of the most widely grown and traded staple crops, making them crucial to global food security. This study simulated these four staple crops under drought and no-drought future scenarios using a process-based crop model within a global land surface model (CLM5). Our novel experimental design allowed for the isolation of drought as the sole cause of differences between the two simulated scenarios. The future conditions consisted of a middle of the road emissions scenario at mid-century. The study also included socio-economic factors to quantify the vulnerability of individual countries to agricultural drought impacts. The socioeconomic factors and drought induced production losses were used to calculate a country-level food insecurity index across the globe. The simulations showed that on a global scale, production losses due to drought would be relatively small, but that individual countries could see significant impacts. Due to the highly interlinked nature of global trade, production losses in one country could have significant impacts on the food security of its trading partners.



***Plasmodium* P25 proteins and their Interactions: Understanding malaria transmission blocking**

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Abstract

Malaria transmission blocking is a crucial strategy in combating malaria. It focuses on interrupting the transmission cycle of the disease, which is primarily caused by the bite of infected female *Anopheles* mosquitoes. By targeting these mosquitoes and preventing them from transmitting the parasite it is possible to significantly reduce number of new malaria cases without killing mosquitoes. Transmission blocking vaccines aim to stimulate an immune response in humans that targets the parasite stages within the mosquito, preventing it from developing and ultimately being transmitted to other individuals. Malaria transmission blocking is an essential component of malaria control strategies and can help us make significant progress towards eliminating malaria as a public health threat and can save countless lives. In this study we are focusing on *Plasmodium vivax* and *Plasmodium falciparum* P25 proteins. These proteins are expressed on the surfaces of ookinetes (elongated motile post zygote stage) of *Plasmodium* inside mosquito midgut. Antibodies against these proteins when present in the ingested blood bind to these proteins and such ookinetes are unable to cross mosquito midgut to form next developmental stage that is oocyst and are ultimately destroyed. Such mosquitoes will not lead to infection of next human subject. In other words malaria will not be transmitted through such mosquitoes. Structures of both the *Plasmodium* P25 proteins and mosquito midgut protein were taken from PDB database (<https://www.rcsb.org/>). Protein protein docking was performed between *Plasmodium falciparum* 25 (Pfs25) protein and mosquito midgut proteins. Interaction between the P25 protein and mosquito midgut proteins helps us understand the mechanism of transmission blocking. This study will give us insights about improving and materializing malaria transmission blocking vaccines for malaria elimination. *Plasmodium* P25 proteins are in phase III clinical trial for vaccine development at present and have a very promising future in this direction.



RNA seq analyses reveal species-specific expression of regeneration-inducing genes during hindlimb regeneration in the Indian Tree Frog *Polypedates maculatus*

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Abstract

Regeneration studies enhance our understanding of the strategies that replace lost or damaged organs and provide significant insights into regenerative medicine and engineering. Model amphibians such as *Xenopus* and axolotl are crucial for studying limb regeneration as they regenerate their limbs effortlessly. However, studies on non-model amphibians are gaining importance due to their species-specific differences in regenerating mechanisms. Such studies can give insights into alternate tactics for limb regeneration potentially leading to developing a variety of methods in regenerative medicine and engineering. In this study, we present the *de novo* transcriptome of intact limbs and three-day post-amputation limb blastemas of tadpoles and froglets of the Indian tree frog *Polypedates maculatus*. Differential gene expression analysis between an early tadpole and froglet limb blastemas discovered species-specific novel regulators of limb regeneration. The study reports upregulation of proteoglycans, such as epiphycan, chondroadherin, hyaluronan and proteoglycan link protein 1, collagens 2,5,6, 9 and 11, several tumour suppressors and methyltransferases in the *P. maculatus* tadpole blastemas. Differential gene expression analysis between tadpole and froglet limbs revealed that the upregulation of cysteine and serine protease inhibitors and downregulation of serine proteases, antioxidants, collagenases and inflammatory genes in the tadpole limbs were important for creating an environment that would support regeneration. Dermal myeloid cells were GAG⁺, EPYC⁺, INMT⁺, LEF1⁺ and SALL4⁺ and seemed to migrate from the unamputated regions of the tadpole limb to the blastema. On the other hand, the myeloid cells of the froglet limb blastemas were few and probably contributed to sustained inflammation resulting in healing.



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Role of Enzymes and Influence of Ecological Factors on Toxicity In Plants

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Abstract

Biotic and abiotic both ecological factors affect the bioavailability and metabolism of toxic substances in the environment, Biotic factors including microorganisms, plants and insects influence the toxicity. Plants can sequester toxins through their roots and are useful in phytoremediation of toxic soils. Plants can completely remove, transfer and stabilize, toxic compounds in the soil and groundwater. Plants roots secrete enzymes that degrade soil organic pollutants. Plants metabolism involve Phyto transformations. They degrade, inactive and immobilize pollutants, pesticides, solvents, industrial chemicals and xenobiotics in the environment. Hydrosimulation's useful in degrading hydrocarbons, polychlorinated biphenyls and polycyclic aromatic hydrocarbons.

The abiotic factors that influence toxicity include the temperature, pH, alkalinity, salinity, hardness and dissolved organic carbons. Certain toxic agents may be oxidized or reduced due to environmental conditions.



A Dose-Dependent Evaluation of Neurotoxic Impact of TBBPA in Neurobehavioral Impairment and Developmental Alterations in Zebrafish

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Abstract

Tetrabromobisphenol A (TBBPA), is a brominated flame retardant widely used in lamination for electric boards, coatings, and polystyrene foam. The increased production and consumption of TBBPA has raised concerns due to its potential neurotoxic effects. This study investigates the impact of TBBPA on zebrafish brain in a dose-dependent manner. The zebrafish and embryos exposed to low, medium, and high doses of TBBPA displayed neurobehavioral impairment and development disruptions. Behavioral parameters such as locomotor activity, thigmotaxis, and cognitive tasks were performed to observe the behavioral alterations in zebrafish exposed to different doses of TBBPA. Developmental deformities displayed morphological abnormalities, mortality, and survival rates.

The findings revealed significant dose-dependent effects of TBBPA resulting in impaired learning and anxiety-like behavior in zebrafish exposed to high dose of TBBPA. Subsequent behavioral alterations could also be observed in zebrafish exposed to a medium dose of TBBPA, however its low dose exerted subtle yet observable changes in the behavioral assessment. In the developmental studies, delayed hatching and structural malformations could be observed in medium and high doses of TBBPA. Thus, the study highlighted the potential neurotoxic effect of TBBPA in the brain, behavior, and development of zebrafish. It raises a serious concern to investigate and explore the human health implications of TBBPA due to its prolonged exposure. Its widespread presence in the environment and potential to exert neurobehavioral impairment and developmental disorder warrants in-depth investigation exploring the deeper mechanisms and pathways involved.



Evaluation of the optimal anaesthetic concentration for complete anaesthetization of *Channa punctatus* and *Channa gachua*

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Abstract

The relative efficacy of three anaesthetising agents viz. Clove oil, Paraldehyde and MS222 (Tricane methane sulphonate) on *Channa punctatus* and *Channa gachua* have been investigated. Experimental protocol was based on analysis of induction and recovery time with different concentrations of above anaesthetics to determine their optimum concentration. Histological studies were carried out to assess the stress induced changes caused by the above anaesthetics based on the release of mucus from mucous cells of gills and buccal tissue. Additionally, other changes such as epithelial uplifting, lamellar fusion, mucus exudation, desquamation and distorted epidermis were used to assess stressful conditions. Well acclimatized fishes, divided into three groups, were exposed to three different concentrations (Clove oil= 50, 100, 200 µl/l; Paraldehyde=3, 6, 9 ml/l; MS222= 75, 100, 200 mg/l) of these anaesthetics, respectively.

The present study clearly established that clove oil at 100 µl/l and 200 µl/l seem optimum for *C. punctatus* and *C. gachua*, respectively. Moreover, 200 mg/l of MS-222 and 9 ml/l of paraldehyde are considered to be optimum concentrations to induce total loss of equilibrium for both channid species. MS-222 is regarded as the best anaesthesia among the three as it caused minimum histological disruptions with appropriate induction and recovery time. The abovementioned optimum concentrations do not cause any architectural disruption or stress-induced changes in the target organs hence may regard as optimum concentrations for anaesthesia.



Revitalizing Soils and Improving Crop Yields with Nano-Microbial Solutions

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Abstract

Environmental stresses such as biotic and abiotic stress conditions pose a significant threat to global food security. During the last few decades, crop yield has been improved through better plant genetics, improved environment, and management practices, along with their interactions. However, the modern cultivars typically lack the needed genetic variability to withstand these environmental stresses, especially in changing climatic conditions. The rhizospheric microbiome, comprising bacteria, archaea, fungi, and viruses, is a complex ecological relationship that host plants establish. A microbiome is known to contribute to normal plant growth and development, besides maintaining homeostasis upon environmental stress. However, intensive agricultural practices coupled with climate change have disrupted microbial dynamics in soils, whereby hindering the benefits of such natural allies. Hence, the development of microbial populations, including plant growth-promoting rhizobacteria, endophytes, and mycorrhizal fungi, is of crucial importance to improve crop performance under suboptimum soil conditions. Here, we discuss the approaches how useful microbes in combination with nanomaterials help in improvements in nutrient uptake, production of higher antioxidant content, and stress effects reduction through tailored plant-microbe interactions. We also discuss how crop management and climate change affect soil health and microbial diversity and the strategies that can help regenerate the beneficial microbial community in challenging soils. We suggest the future potential research directions aimed at harnessing microbial diversity for sustainably raising crop productivity in marginal lands toward supporting global food security.



Larvae of Lepidopteran and Coleopteran Insects as an alternative to Plastic biodegradation.

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Abstract

Plastic is an artificial polymer obtained from conservative petrified oil, which is defiant to biodegradation. Of the total plastic, about 92% is PE (Polyethylene) and PP (polypropylene), both of which are widely used in wrapping and covering. With the overproduction and poor plastic waste management it's causing a trouble in environment. Since 1950, about five thousand eight hundred (5800) MN tons of primary plastic is discarded, which is no longer in use, and only nine percent has been recycled. By 2015, total 8,300 Mt of primary plastic produced globally out of it 500 Mt (~6%) were recycled, 700 Mt (~9%) were burned, 2,500 Mt (~30%) were still in use and 4600 Mt (~55%) were estimated to have been discarded, ultimately accumulating in landfills and natural environments. Research suggests that plastic waste was landfilled and only 18% recycled. With the uncontrolled application of plastics and rising insistence being put down on methods convenient for plastic wither disposal, the call for biodegradation of plastic and biodegradable plastics wastes has presumed growing significance lately. Plastic biodegradation can be described as degradation of plastic films by microbes present in the gut of some insect species belonging to order Coleoptera and Lepidoptera. The well-known examples of Insects that can degrade plastic is the *G. mellonella* (wax moth), a lepidopteran and *T. molitor* (mealworm), a coleopteran. Hence to understand the whole mechanism of synthetic and natural polymer biodegradation, it is necessary to view the microbes and enzymes involved in it. Some studies have suggested that the larvae of mealworms can consume and break down certain types of plastic, such as polystyrene foam, into smaller fragments by chewing, which is then further broken down in their gut by micro biome. The larvae of *G. mellonella* can also break down certain types of plastic, particularly polyethylene. The enzymes and gut microbes play an important role in biodegradation of polyethylene.



Breaking the Complexity: Identifying Two different Species of earthworm in the *Metaphirehoulleti* Complex through Integrative Taxonomy

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Abstract

The classification of pheretimoid earthworms has been challenging due to limited diagnostic traits and widespread homoplasy. This study employed an integrative taxonomic approach, combining morpho-anatomical characteristics and mitochondrial COI data, to resolve the taxonomic complexities of the *Metaphirehoulleti* species complex and clarify phylogenetic relationships among Indian pheretimoids. As a result, we identified two distinct *Metaphire* species within the *M. houlleti* complex from Manipur, northeastern India, exhibiting morphological similarities to *M. houlleti*. The newly described species, *Metaphiremanipurensis* Tiwari and Yadav, 2025 belongs to the *M. houlleti* group, characterized by three pairs of spermathecal pores (6/7–8/9) and an absence of post-clitellar markings. In contrast, *Metaphirechurachandpurensis* Tiwari and Yadav, 2025 lacks spermathecal pores but possesses stalked genital marking glands. Phylogenetic analysis of COI data strongly supported the species placements, validating their delineation through congruent operational taxonomic units (OTUs). These findings contribute to the understanding of the phylogenetics and evolutionary trajectory of the group, though expanded COI datasets are necessary for broader insights.



Omics Insight of Microbe-Driven Contaminant Degradation of Emerging Concern

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Abstract

Crop production is boosted by pesticides used in agricultural areas to manage pests, notably organophosphorus pesticides (OPPs); yet, overuse of these pesticides affects human health and biodiversity and alters natural soil microbiomes. Determining the appropriate remediation technique and appreciating the interactions between soil microorganisms and pesticides involves unraveling the metabolic network of microbial populations and environmental factors at the degraded region. However, due to limits in development processes, the precise mechanism of microbe-mediated pesticide breakdown and its impacts on the environment are still unclear. In this work, we used metagenomics and metabolomics techniques to use high-throughput sequencing to taxonomically and functionally characterize microbial communities and also to unravel the degradation pathways. The data obtained were used to locate novel biodegradation genes (BDGs) as well as pesticide degradation genes (PDGs) at two sites namely natural soil (NS) and pesticide-contaminated agricultural soil (PCAS). These findings demonstrated the phylum's relative supremacy. Compared to natural soil, the following categories exhibited greater levels: Proteobacteria (30–36%) > Actinobacteria (15–20%) > Firmicutes (13–14%) > Bacteroidetes (7–13%) (NS-1, NS-2). Furthermore, 30 PDGs and 14 BDGs were evaluated. Bacterial populations are necessary for pesticide metabolism, as indicated by the functional analysis of the pesticide-contaminated agricultural soil and natural soil by using Galaxy PICRUSt2 function. The metabolic response of *Eudrilus eugeniae* (earthworms), exposed to sub-lethal concentrations of 3, 6, and 12 mg/kg (chlorpyrifos-CHL, cypermethrin-CYP, glyphosate-GLY, and Combined-C (all three pesticides)) was determined in a different experiment and GC-MS-based untargeted metabolomics was used. The results reveal that pesticides may find a new path into the food chain via earthworms. Overall our results indicated the importance of employing omics approaches to anticipate microbially aided repair in the ecology of polluted settings.



Lead induced toxicity and haematological alterations with erythrocyte morphological anomalies in stinging catfish, *Heteropneustes fossilis*

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Abstract

The impact of heavy metals on aquatic fauna is attracting global attention, especially in studies linked to industrial contamination. Fishes constitute an important link in the food chain and their contamination by heavy metals imbalances the aquatic system. Therefore, the present study was aimed to examine the toxicological effects in blood on long term exposure of lead nitrate ($\text{Pb}(\text{NO}_3)_2$) in freshwater fish *Heteropneustes fossilis* as the test model. The 96 hours LC_{50} value for $\text{Pb}(\text{NO}_3)_2$ was found to be 300 mg/l by Probit analysis. The mortality of the fishes is directly proportional to the concentration and statistically it was found to be 280.074 mg/l using SPSS 21 software. The fishes were then exposed to $1/5^{\text{th}}$ of the sublethal concentration of $\text{Pb}(\text{NO}_3)_2$ for 30 days. Results revealed significant alterations in haematology. There was decrease in parameters like red blood cells count, haemoglobin and packed cell volume while the white blood cells count and erythrocyte sedimentation rate increased on long term exposure. Slight changes were also observed on calculated haematological indices i.e., mean corpuscular volume, mean corpuscular haemoglobin and mean corpuscular haemoglobin concentration.

Erythrocytes of *H. fossilis* showed morphological anomalies such as membrane invagination with irregular contraction. Few erythrocytes also exhibited shrinkage or displacement of the nucleus to the other side causing pyknosis and a deformed nucleus. They also showed stress symptoms and impairment in the circulatory system at even low concentration of $\text{Pb}(\text{NO}_3)_2$. The study also demonstrated that the observed changes depended on the type of metal, concentration and time of exposure.



N-Methyl-D-Aspartate (NMDA) Receptors: Therapeutic Target against Cancer

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Abstract

Glutamate mainly acts as an excitatory neurotransmitter in the central nervous system controlling variety of neuro-physiological functions like synaptic signaling, learning, memory, etc. However, uncontrolled or excessive production of glutamate is neurotoxic and can damage neurons by over activation of glutamate receptors termed as “glutamate excitotoxicity”. Apart from excitatory neurotransmitter role of glutamate, some recent observations suggest that glutamate can act as a potential growth factor for tumor development. Till date suitable therapy for cancer is lagging behind due to several side effects. Regulation of cancer cells by NMDARs is an emerging or evolving concept and recently link between ionotropic glutamate receptor i.e. N-methyl D-aspartate (NMDA) receptors (NMDARs) and the development and progression of cancer has been demonstrated. Besides neurons, NMDAR subunits are expressed in various types of cancer cells including liver cancer. Based on our findings, we suggest that NMDARs could serve as a therapeutic target against liver cancer.



Investigating Hippocampal Proteome and the Role of Fetuin-A in Aged Rats with Minimal Hepatic Encephalopathy

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Abstract

Minimal hepatic encephalopathy (MHE) is a subclinical yet progressive neurological disorder commonly associated with chronic liver dysfunction, particularly in aging populations. Despite its prevalence, the molecular mechanisms underlying MHE-induced neurodegeneration remain unclear. This study investigates hippocampal proteome alterations in aged rats with MHE and explores the role of Fetuin-A, a liver-derived glycoprotein, in neuroinflammation and cognitive impairment. Using a label-free quantification (LFQ)-based LC-MS/MS approach, proteomic profiling of hippocampal tissues was conducted in young (2-3 months) and aged (16-18 months), and aged rats with MHE. Differentially expressed proteins (DEPs) were identified, followed by pathway enrichment and interactome analysis. Western blotting, qPCR, and immunofluorescence were employed for validation. Proteomic analysis identified 30 DEPs in aged MHE rats, with key proteins involved in synaptic plasticity, neuroinflammation, and gliogenesis. Fetuin-A, Intersectin-1, and P23 were significantly upregulated, with Fetuin-A emerging as a critical factor in MHE pathogenesis. Fetuin-A mediated neuroinflammation via the TLR4/Myd88/NFκB signaling axis, triggering increased expression of IL-6 and TNF-α. Aged MHE rats exhibited significant neuronal loss, dendritic atrophy, and cognitive deficits, as demonstrated by Golgi-Cox staining and Novel Object Recognition (NOR) tests. This study identifies Fetuin-A as a critical mediator of neuroinflammation in aged MHE and demonstrates its role in hippocampal synaptic dysfunction and cognitive decline. Pioglitazone effectively attenuates MHE-induced neurodegeneration, highlighting the potential of Fetuin-A inhibition as a therapeutic strategy for MHE and other age-associated neurodegenerative conditions.



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A definitive Compendium of the *Araneae* of Sagar: An Ecological Survey

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Abstract

Spiders (Araneae) represent a globally ubiquitous and ecologically significant group of entomophagous predators. As members of the class Arachnida, they exert substantial influence on ecosystem stability through the regulation of insect and other invertebrate populations. Their diverse foraging strategies, encompassing web construction, active predation, and ambush tactics, coupled with their adaptability to a wide range of habitats, render them valuable models for investigations in dispersal ecology and biogeography. This study presents a preliminary checklist of spider diversity in Sagar, Madhya Pradesh, compiled from existing literature. The survey identified 52 species distributed across 11 families within the Sagar region. This contrasts markedly with the broader diversity documented for Madhya Pradesh, which comprises 336 species from 30 families, thereby underscoring the necessity for comprehensive arachnological research in Sagar. Notably, the type locality of one recorded species is situated within Sagar, further emphasizing the region's importance for biodiversity studies and the potential for novel discoveries.



A Systematic Review of Centipede (Chilopoda) Diversity in Madhya Pradesh, India: Annotated Checklist and Biogeographical Insights into Knowledge Gap

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Abstract

Centipedes (Class: Chilopoda), predaceous arthropods of pivotal ecological significance, exert a substantial regulatory influence on insect populations, thereby contributing to endemic pest suppression across diverse ecosystems. A preliminary checklist of centipede species within Madhya Pradesh has been synthesized based on a critical appraisal of extant literature. Madhya Pradesh, a biogeographically diverse central Indian state, remains comparatively understudied regarding its Chilopodan diversity. To date, only eight species, representing four genera within the family Scolopendridae, have been cataloged for the region. Conspicuously absent are documented occurrences of the orders Geophilomorpha, Scutigleromorpha, and Lithobiomorpha, underscoring substantial lacunae in our current understanding of the state's centipede fauna. This compilation underscores the imperative for comprehensive field surveys and rigorous taxonomic investigations to elucidate the true extent of Chilopoda diversity in Madhya Pradesh. Future research, incorporating systematic sampling protocols across a spectrum of habitats, coupled with integrated molecular and morphological analyses, is indispensable for a holistic comprehension of the region's centipede fauna.



Repurposing PDE5 inhibitor tadalafil and sildenafil as anticancer agent against the hepatocellular carcinoma

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Abstract

Hepatocellular carcinoma (HCC) has emerged as one of the most common and lethal cancers worldwide and is caused due to contamination of diets with aflatoxin B1 and chronic viral hepatitis. Recent reports suggest that phosphodiesterase-5 inhibitor (PDE5i) exhibits anticancer properties against several forms of cancer but extensive studies have not been performed against HCC. In the present investigation, we evaluated the anticancer property of phosphodiesterase-5 inhibitors (PDE5i) tadalafil and sildenafil against aflatoxin B1 induced HCC. Rats of HCC group were fed with 5% alcohol via drinking water for 3 weeks, followed by administration of AFB1 (1mg/kg/bw, i.p.) at an interval of two subsequent days. PDE5i (tadalafil and sildenafil, 10mg/kg bw) was administered along with drinking water after 6 weeks of treatment with AFB1 for 2 weeks. Research suggested an elevation in the level of SGOT, SGPT, ALP, and urea vis-à-vis activity of key glycolytic enzyme LDH and mRNA expression of c-myc, Akt, LDH-A, and PFKFB3 in HCC group. Similarly, the level of multidrug resistance protein (MDR) and breast cancer resistance protein (BCRP/ABCG2) was elevated along with increased expression of angiogenesis marker (HIF-1 α , VEGF, and TGF- β 1) in HCC. Post-treatment with PDE5 inhibitor (tadalafil and sildenafil) downregulated and brought back the above parameters towards normal and out of two PDE5i (tadalafil and sildenafil), sildenafil effect was more potent as compared to tadalafil. Our findings demonstrate for the first time that PDE5 inhibitors tadalafil and sildenafil were able to prohibit the development and progression of aflatoxin B1 induced HCC.



Genetic diversity of *Boswellia serrata* in Madhya Pradesh

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Abstract

Boswellia serrata Roxb. belongs to family Burseraceae (Torchwood family) is endemic to India. It is Indian it is distributed to Chhattisgarh, Madhya Pradesh, Maharashtra and Orissa. The *Boswellia serrata* species thrives in very dry teak forests or in dry mixed deciduous. However, *B. serrata* has been over exploited and exhibits scarce regeneration due to very poor seed set and germination arising from post-fertilization abortiveness of seeds, leading to fruits without seeds. A threatened species exhibits declining number of populations and the situation arises because of genetic drift and fragmentation of populations. Recently, DNA based molecular markers have played a significant role in determining the genetic diversity at population and species level. In present study DNA samples from 20 trees each of 12 natural populations of M.P. were used for amplification with 10 primers each of ISSR. Molecular study reveals moderate ($F_{st}=0.087$) level of genetic diversity in M.P. by ISSR analysis and therefore, exhibiting divided/fragmented population of the species. Variation among populations was 8.77% and 91.22% among genotypes within the population in M.P. Damoh-Mandla, Chhatarpur-Chhindwara, Panna-Shivpuri are the genetically close populations whereas Balaghat, Jabalpur, Gwalior, Khandwa, SheopurDhamtari, Narayanpur and Sarguja are genetically more distinct from other populations of their respective state. Analysis at genotypic level reveals formation of different cluster with admixing of genotypes found in M.P. which is due to the gene flow across the agroclimatic zones and geographic boundaries of populations which reveals great genetic differentiation among the populations.



Ameliorative effect of curcumin on polystyrene-induced ovarian toxicity in a teleost fish, *Channa punctatus* (Bloch)

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Abstract

Polystyrene (PS), a synthetic thermoplastic derived from styrene, is extensively used in a variety of applications. It breaks down, becomes embrittled, and fragments into smaller pieces due to the combined action of physical abrasion, UV light, and microbial activity. The particles <5 mm in any dimension are often defined as microplastics (MPs). Studies have shown that PS-MPs have the ability to penetrate the ovary and interfere with its normal functioning, which can harm reproductive health. PS-MPs induce oxidative stress and inflammation and also accumulate in several other vital organs of organisms. Curcumin (CUR) is a yellow polyphenolic compound extracted from the rhizomes of turmeric (*Curcuma longa*). It has been shown to have beneficial effects on a number of chronic illnesses linked to inflammation and oxidative stress. CUR has phytoestrogenic properties, which means it, can interact with the endocrine system to correct these problems by influencing the hypothalamic-pituitary-ovarian axis. The present study was therefore planned to investigate the ameliorative role of curcumin on polystyrene-induced ovarian toxicity in a teleost fish *Channa punctatus* (Bloch). The fish were divided into four groups: Group I (control), Group II (300 µg/L PS), Group III (600 µg/L PS), and Group IV (600 µg/L PS + 3 mg/L CUR). Half of the fish were dissected after 30 days and the remaining half on completion of 60 days of treatment. Ovaries of all the groups were processed for histology following standardized protocol. The results showed that exposure to 300 µg/L and 600 µg/L of PS (Group II and III) significantly impaired ovarian architecture, leading to follicular atresia, oocyte vacuolization, and disruption of follicular development. The ovaries of fish in Group IV, however, exhibited a marked improvement in structure, with a reduction in vacuolization, enhanced follicular organization, and healthier oocyte development. The curcumin-treated group therefore exhibited a significant amelioration of histopathological changes induced by PS, suggesting curcumin's potential as a protective agent against environmental pollutant-induced reproductive toxicity.



Protective Effects of *Boerhaaviadiffusa* on Hyperglycemia and Diabetic Kidney Damage in a Hamster Model

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Abstract

Diabetes is a widespread metabolic disorder that leads to serious complications, including damage to the heart, kidneys, eyes, and nerves. *Boerhaaviadiffusa*, or Punarnava, is a traditional Ayurvedic medicine known for its multiple health benefits, including antidiabetic and hepatoprotective properties. This study evaluated the anti-hyperglycemic effects of the ethanolic extract of *B. diffusa* roots and its protective role against kidney damage in a hamster model of diabetes. Treatment with *B. diffusa* significantly reduced serum glucose levels and increased insulin concentration, along with elevated muscle and liver glycogen. It also improved the lipid profile by decreasing total cholesterol (TC) and low-density lipoprotein (LDL-C), while increasing high-density lipoprotein (HDL-C). Antioxidant enzyme activities, such as superoxide dismutase (SOD) and catalase (CAT), were enhanced, and lipid peroxidation (LPO) levels decreased in the kidneys. Furthermore, *B. diffusa* lowered serum creatinine, urea, and alkaline phosphatase (ALP) levels, while histopathological analysis showed regeneration in renal structures. These findings indicate that *Boerhaaviadiffusa* has potential therapeutic effects in mitigating diabetes-related kidney damage.



Metoclopramide modulates photic signals in descending contralateral motion detector neurons in the grasshopper

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Abstract

Several serotonergic receptor subtypes contribute to photic resetting. These express cyclically across the day at different levels of expression. Any investigation into serotonergic resetting of the photic pathway is a momentary snapshot of a dynamic and complicated picture. Artificial light at night (ALAN) is a circadian disruptor, and affects diurnal and nocturnal animals differently. Diurnal grasshoppers occupy the same living space as humans, and are exposed to ALAN. Time-of-the-day effects in the modulation of photic responses by pharmacological interventions are thus useful to know.

In this preliminary study, studied the effects of metoclopramide injections in the vicinity of descending contralateral motion detector neurons under cold anesthesia. We counted spikes before and after exposure to a white LED light, moving from side to side, with or without metoclopramide injections to the corresponding contralateral thoracic region. We observed a clear reduction in spike counts with metoclopramide at night, and an increase during the day, compared to saline and pre-injection values. The underlying mechanism may involve cyclic changes in underlying neurotransmitter or receptor density in the grasshopper. Our results indicate that serotonergic interventions can cause different effects during the day and night in a diurnal model.



Association of coiled-coil-helix-coiled-coil-helix domain-containing protein2(*CHCHD2*) gene variants with Parkinson's Disease in the northern India

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Abstract

Parkinson's disease (PD) is a progressive neurodegenerative disorder primarily affecting movement due to the degeneration of dopaminergic neurons in the substantia nigra. A combination of genetic and environmental factors plays a crucial role in disease susceptibility. Recent studies have identified *CHCHD2* (coiled-coil-helix-coiled-coil-helix domain-containing protein2) as a potential risk gene for Parkinson's Disease. It encodes a mitochondrial protein involved in oxidative stress response and energy metabolism, and mutations in this gene have been linked to PD in certain population, but their role in the Indian population remains unexplored. In this context, the present work explores the association of *CHCHD2* variants with PD risk in the north-Indian population. DNA samples from PD patients and healthy controls has been analyzed for genetic variations using PCR, ARMS-PCR and Sanger sequencing methods. Statistical comparisons will determine whether specific *CHCHD2* variants are more common in PD patients and if they influence disease characteristics such as age of onset and severity. Additionally, bioinformatics tools will be employed (*in silico* analysis) to predict the functional impact of identified mutations. This study in turn will contribute in better understanding of PD's genetic basis in north Indian patient cohort.



Mechanistic Insights into Antioxidant Pathway Alteration by Microcystin-LR and the Protective Role of Coenzyme Q10

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Abstract

Microcystin-LR (MC-LR), a potent cyanotoxin, is known to induce oxidative stress by disrupting cellular antioxidant defence mechanisms. This study investigates the mechanistic alterations in the antioxidant pathway induced by MC-LR and the protective role of Coenzyme Q10 (CoQ10) in mitigating its toxic effects. Using native PAGE and enzymatic activity assays, we analyzed the expression and activity of key antioxidant enzymes, including superoxide dismutase (SOD), catalase (CAT), glutathione S-transferase (GST), lactate dehydrogenase (LDH), and hydrogen peroxide (H_2O_2) levels in different experimental groups. Our results reveal a significant decrease in SOD and CAT activity in the MC-LR exposed group, indicating a compromised antioxidant defence. However, CoQ10 supplementation in the MC-LR treated group restored SOD and CAT activity toward normal levels, suggesting its protective role in scavenging reactive oxygen species (ROS). In contrast, GST and LDH activities, along with H_2O_2 levels, showed an opposite trend, with a marked increase in the MC-LR group, signifying heightened oxidative stress and cellular damage. Notably, CoQ10 co-administration significantly reduced GST, LDH, and H_2O_2 levels, reinforcing its ameliorative effect against MC-LR-induced toxicity. Native PAGE further confirmed alterations in the protein expression patterns of these antioxidant enzymes. These findings provide mechanistic insights into the disruption of oxidative homeostasis by MC-LR and demonstrate the potential of CoQ10 in restoring antioxidant balance, thereby mitigating cyanotoxin-induced cellular damage. Understanding these pathways could contribute to the development of therapeutic strategies against MC-LR-mediated toxicity.



Lactational exposure effect of brexpiprazole on the body weight of albino mice

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Abstract

Brexpiprazole (BREX) is an atypical antipsychotic drug (AAPD) approved recently for the treatment of schizophrenia, major depressive disorder (MDD), and agitation associated with dementia due to Alzheimer's disease. BREX is considered to be a successor to the most commonly prescribed AAPD, aripiprazole. BREX has been associated in both clinical and preclinical investigations with metabolic side effects, including weight gain in adults. However, studies on the impact of this drug on body weight during fetal or neonatal development received little attention. The present study investigated lactational exposure effects of BREX on the body weight of mice neonates. In this study, female albino mice were administered BREX during the lactation period, and the offspring were monitored for changes in body weight and growth patterns. Post-partum female mice along with their pups were divided into four groups: three groups received BREX (1, 2, and 5 mg/kg body weight) via gavaging, while the control group was exposed to a placebo. Body weight measurements were recorded at regular intervals from birth until the separation of pups at weaning. The results indicated a sex-related differential response in the body weight gain of BREX-exposed offspring compared to the control group. These findings suggest that lactational exposure to BREX may disrupt normal body weight regulation in developing offspring. The potential long-term metabolic consequences of such exposure require further investigation, as they may influence susceptibility to obesity or other metabolic disorders later in life.



Hibiscus as a natural insecticide against rice weevil: A green alternative to synthetic pesticides

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Abstract

The rice weevil, *Sitophilus oryzae* L. (Coleoptera: Curculionidae), is the most widespread and destructive insect pest of stored rice throughout the world. Female riceweevil oviposits directly into the seeds and completes larval development inside the seeds and emerge as adults. To control this pests, synthetic insecticides are used during storage of grains which causes residual pollution of the environment, toxicity to consumers and residues on grains. To combat this problem, botanicals are gaining attention. In this study, different parts of Hibiscus plant will be used to see its efficacy against rice weevil, *Sitophilus oryzae*. To conduct this experiment, *Sitophilus oryzae* adults will be collected from naturally infested rice grains. Adult insects will be exposed to the different concentrations of Hibiscus leaf powder, petal powder, commercial essential oil and mortality will be assessed after different time intervals. This study aims to check the toxicity, antifeedant activity and repellent activity of Hibiscus on *Sitophilus oryzae*. The hibiscus extracts may have a range of chemicals which can be isolated and used for pest control thereby reducing residual pollution, increasing the shelf life of rice, reduced economic loss.



From Temperature to Humidity: How Climatic Factors Influence Insect Communities

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Abstract

Insects are the most diverse group of animals on earth, with millions of species inhabiting nearly every terrestrial and aquatic habitat. Their behaviour is strongly influenced by climatic factors such as temperature and humidity. Temperature plays a vital role in determining insect behaviour. At low temperatures, insect metabolism slows down, resulting in reduced mobility, feeding, and reproduction. Conversely, higher temperatures can accelerate their metabolic rate, increasing activity levels and speeding up life processes. Humidity, the amount of moisture in the air, significantly affects insect physiology and behaviour. High humidity promotes egg hatching, larval development, and mating in many insect species. However, excessive humidity can lead to fungal and bacterial growth, which may negatively impact insect populations. The field of area is the botanical garden of Dr. Harisingh Gour University, Sagar M.P. First the insects will be collected and they will be preserved in the laboratory by several methods either dry or liquid preservation with using pinning and stretching etc. They will be identified morphologically by using taxonomic keys. By analysing the insect diversity in a standardised temperature and humidity we could check whether the ecosystem is sustainable or not.



Endemic Earthworm Diversity in Madhya Pradesh: A Study of Distribution in Nauradehi Wildlife Sanctuary

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Abstract

Madhya Pradesh exhibits a notable diversity of earthworms, harboring 49 species across 7 families. The taxonomic composition of this fauna includes 29 endemic species, 5 sub-endemic species, 7 native peregrine species, and 11 exotic peregrine species. Recent taxonomic revisions have subsumed the family Octochaetidae within Acanthodrilidae, which now represents the most speciose family. This study investigates the diversity and distribution of earthworm species within Nauradehi Wildlife Sanctuary, the largest sanctuary in Madhya Pradesh. This sanctuary, a critical biodiversity hotspot spanning the districts of Sagar, Damoh, Narsinghpur, and Raisen, encompasses a range of ecosystems, including dry deciduous forests, grasslands, and riverine habitats, supporting a rich assemblage of flora and fauna.

The research identified three earthworm families within the sanctuary, distributed across its six ranges. The earthworm community is dominated by the family Acanthodrilidae Claus, 1880, which also exhibits a high degree of endemism. While the findings indicate a substantial level of endemism within the sanctuary and Madhya Pradesh as a whole, the presence of exotic earthworm species raises concerns regarding potential invasion. The introduction of exotic species poses a threat to native biodiversity, and the spread of these species is often associated with climate change and anthropogenic activities. Consequently, the presence of alien species serves as an indicator of habitat disturbance within Madhya Pradesh.



Molecular Mechanism of Phytochemical-Mediated Gut-Brain Axis Regulation, Depression Treatment, and Neuroprotection: A Comprehensive Review

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Abstract

The burgeoning field of the gut-brain axis (GBA) has illuminated the profound bidirectional communication between the enteric and central nervous systems, revealing its pivotal role in neurological health and dysfunction. Within this context, phytochemicals, a diverse array of bioactive compounds derived from plants, have emerged as promising therapeutic agents, garnering significant attention for their neuroprotective and psychotropic potential. Characterized by a rich tapestry of metabolites, including curcumin, resveratrol, and flavonoids, these compounds have demonstrated, through both preclinical and clinical investigations, the capacity to exert holistic therapeutic effects. Specifically, they appear capable of modulating both peripheral and central mechanisms implicated in neurological disorders, offering a multifaceted approach to addressing the complex interplay of factors contributing to these conditions. Beyond their direct interactions with neuronal targets, phytochemicals have been shown to influence gut microbiota composition, stimulate the production of neuroactive metabolites such as short-chain fatty acids, and regulate neurotransmitter pathways, thereby fostering neuroprotection and ameliorating mental health conditions. This intricate interplay between phytochemicals, the gut microbiome, and the nervous system underscores the potential for these natural compounds to serve as powerful tools in the prevention and treatment of a spectrum of neurological and psychiatric disorders.



Artificial inoculation of *Cordyceps militaris* (medicinal caterpillar mushrooms) to observe its pathogenicity from low altitude area lepidopteran insect *Bombyx mori* (silkworm)

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Abstract

This study was carried out to investigate pathogenicity (or infection rate) of hyphal bodies of *Cordyceps militaris* on larvae and pupae of the silkworm *Bombyx mori*. It was observed that infection in pupal body was more than that of larval bodies. The 9-day-old to 11-day-old pupae showed the best incidence of infection with a 100 µL injection volume with a hyphal suspension concentration 2×10^5 colony-forming unit (cfu). Silkworm pupae injected with a hyphal suspension concentration of 2×10^5 colony-forming unit (cfu) recorded a greater than 96% incidence of infection. Also, fruit bodies of *C. militaris* were induced and produced at a light intensity between 500 and 1,000 lx.



Protective Role of Coenzyme Q10 Against Microcystin-LR-Induced Oxidative Stress in Mice

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Abstract

Microcystins are a group of cyclic heptapeptide toxins produced by cyanobacterial bloom. More than 100 microcystin analogues have been identified, among which microcystin-LR (MC-LR) is the most abundant and toxic variant. Present study was designed to reveal whether potential human carcinogen microcystin-LR could imbalance the oxidative status of kidney, heart and brain of mice and also to explore the amelioratory effect of coenzyme Q10. BALB/c mice were randomly divided to 3 groups with 5 mice in each group. The animals of normal control group (N) received water and normal diet *ad libitum* and (MC-LR as well as MC-LR+Q) group received MC-LR (10 µg/kg bw/day, ip) for 14 days. After two weeks of MC-LR treatment, mice of (MC-LR+Q) received coenzyme Q10 (10 mg/kg bw, im) for 14 days. In microcystin-LR treated mice as compared to control, significant increase in the level of lipid peroxidation, hydrogen peroxide, protein carbonylation, advanced oxidation protein product was observed with a concomitant decrease in the level of glutathione. These parameters thereby suggest microcystin-LR induced toxicity *via* modulation of oxidative pathway. In conclusion, coenzyme Q10 alleviated MCLR-induced tissue toxicities by mitigating oxidative stress markers.



The UPR pathway in liver cirrhosis and hepatic encephalopathy: A critical connection

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Abstract

Alcohol use disorders rank among the leading causes of death worldwide. Acetaminophen is commonly abused to alleviate hangover. Synergistic augmentation of liver injury results from concurrent consumption of alcohol and acetaminophen, the unfolded protein response (UPR) play central roles in the pathogenesis of liver cirrhosis and hepatic encephalopathy. Natrum sulphuricum (NS) and Natrum phosphoricum (NP) were previously utilized for liver dysfunction treatment. This research aimed at the characterization of nanoparticles from NS and NP and their analysis regarding therapeutic utility to modulate the UPR pathway. Characterization of the nanoparticles was determined with Fourier-transform infrared (FTIR) and UV-Vis spectrophotometer. Behavioral tests were performed as well. To evaluate the hepatoprotective and neuroprotective effect of NS and NP, liver cirrhosis in rats were caused by chronic exposure to 4.5% alcohol and acetaminophen (300 mg/kg body weight) for seven days. Five groups of animals were used: normal control, alcohol control, liver cirrhosis (LC), LC+NS (50 mg/kg), and LC+NP (50 mg/kg). Administration of treatments via drinking water continued for four weeks. Quantitative RT-PCR, western blot, and IHC were employed to analyze key UPR markers. The findings established the existence of sodium sulfate and sodium phosphate nanoparticles in NS and NP. Behavioral analysis indicated cognitive impairment of hepatic encephalopathy in liver cirrhosis, whereas treatment of NS and NP improved brain function. Treatment with NS and NP also assisted in reversing levels of UPR affected by liver cirrhosis. This is the first report to show that NS and NP are effective in preventing protein misfolding and modulating UPR-related gene expression in chronic alcoholism and acetaminophen-induced liver cirrhosis.



Impact of Synbiotics on Estrogen Receptors Affecting Reproductive Physiology male *Coturnix coturnix japonica*.

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Abstract

Addressing infertility challenges and promoting reproductive health are vital for fostering a balanced and thriving society. The current study investigates the synergistic effects of dietary probiotics and prebiotics (synbiotics) on immune function and reproductive physiology in mature male Japanese quail (*Coturnix coturnix japonica*). For this, mature male quails were administered orally with 1% *Lactobacillus rhamnosus*, *Bifidobacterium longum* and mannan-oligosaccharides each with a standard diet, for 4 weeks in different supplemented groups. Oxidative stress and antioxidant parameters (MDA, H₂O₂, AOPPs; SOD, Catalase, GSH), immune modulators (IL-1 β , IL-10, NF- κ B), apoptotic indicators (caspase-3, caspase-7), semen parameters, steroidal hormones (Testosterone, FSH, LH) and reproductive physiology modulators immuno-localization (ER α , ER β , 3 β HSD) performed in testes. Probiotics in combination with prebiotics as well as individually significantly reduce oxidative stress, increase antioxidant status, improve testicular development, sperm quality, plasma steroids levels. Further, significant changes in the expression of ER α and ER β in the testes and subsequent modulation of cytokines and apoptotic markers, indicate a potential mechanism through which probiotics and prebiotics elevate infertility. This investigation suggested that supplementation of probiotics and prebiotics support the overall growth and reproductive physiology of Japanese quails, a potential dietary intervention to enhance poultry health and reproductive efficiency.



MC-LR-Induced Modulation of Unfolded Protein Response-Related Gene Expression in Mice and the Ameliorative Role of Coenzyme Q10

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Abstract

Microcystin-LR (MC-LR), a potent cyanotoxin, is known to induce endoplasmic reticulum (ER) stress, leading to the activation of the unfolded protein response (UPR). This study investigates MC-LR-induced modulation of UPR-related gene expression and evaluates the protective effects of coenzyme Q10 (CoQ10) in a murine model. We analyzed the mRNA expression levels of key UPR markers—GRP78, GRP94, IRE1, XBP1s, PERK, eIF2 α , ATF4, and ATF6—using real-time PCR. MC-LR exposure led to significant upregulation of GRP78 and GRP94, indicating increased chaperone activity in response to ER stress. Moreover, elevated expression of IRE1, XBP1s, PERK, eIF2 α , ATF4, and ATF6 suggested activation of UPR signaling pathways. CoQ10 administration effectively modulated these gene expression changes, reducing UPR activation and restoring markers closer to baseline levels, suggesting its protective role. These findings highlight that MC-LR disrupts ER homeostasis by inducing UPR-related gene expression changes, while CoQ10 exerts potential ameliorative effects. This study provides insights into the molecular response to MC-LR toxicity and supports CoQ10 as a promising therapeutic candidate against ER stress-related damage.



Parasitic Helminth Diversity in Fish of the Ganges and Betwa Rivers: A Comparative Morphological Study

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Abstract

This research explores the parasitic helminth diversity within fish populations of the Ganges River at Prayagraj, Uttar Pradesh, and the Betwa River at Sagar, Madhya Pradesh, emphasizing morphological distinctions that highlight unique faunal compositions. Examining the intestinal parasites of *Mastacembelus armatus* from the Betwa River revealed the presence of *Eustrongylides* sp. larvae, serving as intermediate hosts, characterized by a simple, gradually transitioning muscular-to-glandular esophagus without a distinct bulb. Conversely, fish from the Ganges River, including *Bagarius bagarius*, harbored *Dacnitoidea* sp. and *Truttaedacnitis* sp., displaying a markedly different esophageal morphology: a swollen anterior region, a central constriction, and a more pronounced glandular posterior section. Additionally, the reproductive structures differed significantly, with *Eustrongylides* larvae lacking developed spicules, while *Dacnitoidea* and *Truttaedacnitis* exhibited prominent spicules and caudal papillae. Furthermore, an unidentified nematode in *M. armatus* from the Betwa River was noted, distinguished by prominent cephalic papillae and an exceptionally long left spicule. These findings highlight the geographical variation in helminth fauna between the two river systems, roughly 400-600km apart, reflecting differences in environmental conditions, host specificity, and parasite life cycles, underscoring the importance of comparative morphology in understanding helminth biodiversity within these distinct freshwater ecosystems. Unidentified cestode species were also noted in the Betwa river specimens.



Targeted Isolation and Characterization of Phosphate-Solubilizing Rhizobacteria: Development of Bioinoculants for Optimized Phosphorus Acquisition and Sustainable Crop Production

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Abstract

Phosphate-solubilizing bacteria (PSB) are recognized for their pivotal role in enhancing phosphorus bioavailability, stimulating plant growth, and improving soil fertility, thereby contributing significantly to sustainable agricultural practices. This study investigated the screening and characterization of rhizosphere-associated PSB, specifically *Bacillus stercoris*, *Bacillus velezensis*, *Bacillus tequilensis*, and *Bacillus subtilis*, to evaluate their functional attributes and agronomic potential. Soil samples were collected from diverse rhizosphere environments, and bacterial isolates were subjected to screening for phosphate solubilization using selective media. The most proficient strains were further characterized through morphological, biochemical, and molecular analyses. These PSB exhibited plant growth-promoting traits, including the production of indole-3-acetic acid (IAA), siderophores, and organic acids, which collectively enhance soil microbial activity and nutrient accessibility. Application of these PSB resulted in improved phosphorus uptake, increased soil fertility, and enhanced crop productivity, concomitantly reducing reliance on synthetic fertilizers. The findings underscore the potential of these *Bacillus* species as biofertilizers for sustainable agriculture. This research highlights the significance of utilizing indigenous PSB as an ecologically sound and resource-efficient strategy to promote soil health, stimulate plant growth, and ensure long-term agricultural sustainability.



The Efficacy of Daidzein on Enzymic Antioxidants and Cytotoxicity Induction in cultured ovarian cancer cell line

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Abstract

Oxidative stress occurs when the body's natural balance between free radicals and antioxidants is disrupted, leading to cellular damage. Interestingly, researchers have harnessed oxidative stress as a therapeutic strategy to combat diseases like cancer, achieving notable clinical success. Certain plant-based compounds, known as phytochemicals, have shown remarkable antioxidant as well as pro-oxidant properties. This study focused on Daidzein, a naturally occurring isoflavone found in soybeans and legumes, to investigate its potential in enhancing antioxidant and pro-oxidant actions in ovarian cancer cells. The piece of research work involved treating cultured ovarian cancer cells with varying doses of Daidzein and assessing the impact on antioxidant enzyme activity. The results were compared to untreated control cells. Additionally, Daidzein's cytotoxic effects were also analysed using MTT assay along with DNA fragmentation assay (cell cycle analysis) to determine whether apoptosis was induced or not at certain concentration of daidzein. The findings revealed that the isoflavonoid compound Daidzein significantly boosted antioxidant enzyme activity up to a certain concentration, beyond which it decreased. Notably, the treatment inhibited ovarian cell growth in a dose-dependent manner, inducing apoptosis and highlighting Daidzein's potential as a therapeutic agent. This study opens up new avenues for naturally occurring plant-based antioxidants in cancer research and therapy, suggesting that phytochemicals like Daidzein may play a crucial role in developing innovative cost effective and side effect free therapy for such devastating diseases.



Ornithological Survey of the Gangetic Region in Kanpur District: Diversity and Distribution Patterns

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Abstract

Birds are diverse, beautiful, and crucial in ecosystems. They are valuable bioindicators for environmental issues because they offer services such as pollination, scavengers, seed dispersers, and pest control. The Ganga, a diverse refuge, contributes to bird diversity, ecosystem services, and cultural values for its migratory and resident waterbird species. The present study attempted to assess the avifauna of different sites located alongside the Ganga River stretch in the Kanpur district. Four different ecological sites, Brahmavrat Ghat (Patthar Ghat), Atal Ghat (Boat Club), Ganga Ghat (Permat) and Siddhnath Ghat were selected and surveyed. The study collected data on species, including date, time, GPS location, species name, number of individuals, and feeding habits. An avian survey in the selected study area revealed that habitats have rich bird diversity, resulting from various food sources. According to the present study, the Gangetic region of Kanpur has a sufficiently diverse and rich bird population. 44 bird species were detected in the current survey. A maximum of 29 avian species was recorded from the Brahmavrat Ghat (Patthar Ghat) and a minimum of 11 avian species were recorded from the Siddhnath Ghat. An assessment of the feeding habits of birds shows that most of the species in the Ganges were Insectivorous (18 species) followed by omnivorous (11 species), Carnivorous (5 species), Granivorous (5 species), Frugivorous (4 species), Nectivorous bird (1 species). This study is a pioneering effort to establish a comprehensive framework for understanding the avifaunal diversity and distribution in the Gangetic region of Kanpur District.



Chitosan Nanoparticle-Mediated Delivery of Earthworm Extract: Investigating the Therapeutic Potential in Allergic Asthma through *In Vivo* Regulation of NF- κ B and Histone Deacetylase Activity.

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Abstract

Eudrilus eugeniae, commonly referred to as the "African Nightcrawler," is valued for its high protein content and potential pharmaceutical applications. However, limitations in delivery prompted this study to investigate a novel approach: encapsulating *Eudrilus eugeniae* extract within chitosan nanoparticles (EECNP) to enhance stability, drug delivery, and therapeutic efficacy for respiratory disorders, specifically asthma, without observed toxicity. Ionic gelation, optimized using Design of Experiments (DoE), facilitated the formation of EECNP within the 100-200 nm range. Scanning Electron Microscopy (SEM) and Transmission Electron Microscopy (TEM) revealed a reduction in particle size and improved dispersibility, while Fourier Transform Infrared (FTIR) spectroscopy suggested electrostatic and hydrogen bonding interactions contributing to this enhanced dispersion, indicating increased bioavailability. The therapeutic potential of EECNP was evaluated in an ovalbumin (OVA)-induced allergic asthma model in Balb/c mice. EECNP, administered at 50 mg/kg, was assessed for its effect on NF- κ B p65 and HDAC1 signaling pathways, key mediators of inflammation. Inflammatory parameters were analyzed using immunofluorescent localization, hematoxylin and eosin (H&E) staining, and enzyme-linked immunosorbent assay (ELISA) for pro-inflammatory cytokines (IL-13, IL-4, IL-5, and TNF- α) in bronchoalveolar lavage fluid (BALF). Results demonstrated that EECNP treatment significantly suppressed the elevated expression of HDAC1 and NF- κ B p65 observed in the asthmatic group. This suppression correlated with a reduction in pro-inflammatory cytokines in BALF, indicating that EECNP effectively mitigates airway inflammation and asthma severity by modulating HDAC1 and NF- κ B p65 in the OVA-induced asthmatic mouse model.



Repurposing of Shukramatrika Bati to Develop Novel Anti-Cancer Therapy

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Abstract

Traditional ayurvedic medicine restores intrinsic balance within our body to protect us from disease conditions and improve our health. Triphala is a well-known ayurvedic concoction and several ayurvedic formulations contain Triphala as a component due to its therapeutic properties. Anti-cancer activity of Triphala containing 14 Ayurvedic formulations were tested and among them Shukramatrika Bati was exhibiting the best anticancer activity. Shukramatrika Bati was ground to powder, dissolved in ultrapure water to extract the bioactive compounds and then phytochemical analysis was performed. Shukramatrika Bati aqueous extract (SBAE) is composed of polyphenols; flavonoids; terpenoids, tanins and small amounts of protein. HPLC fractionation of the extract indicated several bioactive compounds present in six prominent peaks. HRMS analysis of the HPLC peaks indicate that the molecular weights of the bioactive compounds range from 143 to 701 g/mol. SBAE is reducing the cellular viability of different cancer models (Breast Cancer, Osteosarcoma, Colorectal Adenocarcinoma, Cervical cancer) with an IC_{50} ranging from 26 to 50 μ g/mL. Cancer cells treated with SBAE accumulate ROS which in turn impairs cell cycle and cell migration. In addition, it disturbs the mitochondrial membrane potential to release cytochrome-c in the cytosol to induce apoptosis following the intrinsic pathway involving caspase-3 and caspase-9. In summary, our study indicates that SBAE has several bioactive agents that are reducing the cellular viability, disturbing cell cycle and hampering the ability of cell to invade neighboring tissues. Hence, Shukramatrika Bati has anti-cancer potential and it can be repurposed to develop an effective and affordable therapeutic option to treat cancer patients.



Assessment of Plankton Diversity and Hydrological parameter of Lokpal Sagar Lake

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Abstract

Biodiversity refers to the genetic and biological diversity of populations, species, communities, and ecosystems. The term "biodiversity" refers to the differences between living things and the ecological systems in which these differences have occurred. This considers the diversity within and among species and the species that comprise an ecosystem. Plankton are tiny, plant-like organisms that inhabit lakes, rivers, and oceans. There is billions of plankton in the oceans, more than stars in the sky. According to their size, habitat, life cycle, and dietary requirements, plankton are categorized. Depending on what they need to eat, they are primarily classified as phytoplankton or zooplankton. Photosynthesis-capable prokaryotes or phytoplankton significantly influence biomass and primary production in aquatic environments. These creatures are essential to marine life because they form the foundation of the food chain. Zooplankton, the primary consumer in the energy transfer between phytoplankton and higher trophic levels, is the other important component. Plankton is frequently used as an environmental indicator. Based on nutrition, phytoplankton is distinguished from other autotrophic plankton. Zooplankton and primary producers of photosynthetic organisms are examples of heterotrophic, primary, or secondary consumers.

Water is necessary for life and our survival. Our Lakes are one of the most significant water sources. The effect of physicochemical conditions on the structure and composition of the phytoplankton community in Lokpal sagar Lake. They reported that the most critical factors affecting phytoplankton distribution are water temperature, free CO₂, chloride, transparency, TDS, alkalinity and dissolved oxygen. The hydrological study of the lake freshwater body of Lokpal sagar (Panna) and revealed that temperature, transparency, pH, electrical conductivity, free CO₂, total hardness, calcium, magnesium, total alkalinity, chlorides and dissolved oxygen showed monthly variations. All the parameters were within the acceptable limit, and it concluded that water from the reservoir is of potable quality and suitable for commercial fishing as the pool.



Assessment of Pulmonary Function and Respiratory Health of women and children exposed to Indoor Air Pollution in villages of Darbhanga, Bihar

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Abstract

The connection between environment and health has become a growing concern for people today, surpassing the attention it received in the early 1990s. As a global issue with the developing countries, indoor air pollution has been found to be associated with multiple health hazards in women and children especially, in rural areas of the nation. This piece of research investigates the impact of indoor air pollution on the respiratory health of women and children residing in urban-style and rural-type households in Village Madhopatti, Darbhanga district. A comprehensive assessment of indoor air pollution was conducted by collecting air quality measurements from 20 homes, evenly split between rural and urban-type dwellings. To evaluate pulmonary function, a Peak Flow Meter was utilized. The findings reveal that rural households, characterized by indoor kitchens using biomass fuels without proper ventilation, exhibit higher levels of indoor air pollution compared to urban households with separate, ventilated kitchens using LPG. Notably, the study also found lower Forced Vital Capacity (FVC%) and Forced Expiratory Volume (FEV%) among members of rural households, particularly those aged 40-60, compared to their urban counterparts. To effectively combat indoor air pollution, it's essential to tackle the social hurdles that perpetuate this issue, rather than just focusing on technical solutions. Raising awareness through community education campaigns can encourage healthier kitchen habits, safeguard infants, and promote the use of cleaner fuels. Moreover, economically sustainable alternatives, such as biogas plants and subsidized cleaner fuels, can ease the transition to cleaner energy sources. Notwithstanding the well-documented connection between indoor air pollution and poor health outcomes in India. To address the adverse effects of indoor air pollution, various strategies have been employed to minimize pollutant concentrations. Furthermore, emerging technologies, including advanced sensor materials, IAQ-monitoring systems, and smart home innovations, hold promise for enhancing indoor air quality (IAQ) in the future.



Incidence of Urinary Tract infection in Pregnancy

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Abstract

A cross-sectional study was conducted among pregnant women attending antenatal clinics. Midstream urine samples were collected and analyzed for bacterial growth. Identification of microorganisms was done using standard microbiological techniques, and antibiotic susceptibility was assessed using the Kirby-Bauer disk diffusion method. The incidence of UTIs among pregnant women was found to be 12%. The most common uropathogens isolated were *Escherichia coli* (66.6%), *Klebsiella pneumoniae* (16.6%), *Pseudomonas aeruginosa* (8.3%) and *Staphylococcus aureus* (8.3%). Higher infection rates were observed in women aged 18-22 years compared to other age groups. Gestational analysis revealed that UTIs were more prevalent in the Ist trimester. Primigravida women had a slightly higher risk compared to secundigravida and multigravida. Antibiotic susceptibility testing showed high sensitivity to nitrofurantoin and fosfomycin, while resistance was noted against ampicillin, amoxicillin and trimethoprim-sulfamethoxazole. UTIs in pregnancy remain a significant health concern, with *E. coli* being the predominant pathogen. Maternal age and gestational period influence infection rates, and antibiotic resistance is an emerging challenge. Routine screening and tailored antibiotic therapy are essential for effective management.



Eco-Friendly Fe₃O₄ and MnO₂ Nanoparticles Synthesized Via *Beetroot* (*Beta vulgaris* L.) Extract: As an Antioxidant, Antidiabetic, Antimicrobial and Nano-Catalyst Agent

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Abstract

The emergence of antimicrobial-resistant strains and water contamination due to the excessive use of colouring dyes in the textile industry have become causes of various infectious diseases and, in general, pose severe threats to public health worldwide. Nanotechnology offers a promising and sustainable solution to this problem. In this study, metal oxide nanoparticles, such as iron oxide (Fe₃O₄) and manganese oxide (MnO₂) nanoparticles (NPs), were synthesized using a green synthesis method employing beetroot aqueous extract. The resulting NPs were characterized by UV-Vis spectroscopy, FTIR, XRD, SEM-EDX, and TEM, confirming their nanoscale size and the role of beetroot biomolecules as reducing and capping agents. The synthesized NPs were evaluated for antioxidant, antidiabetic, antimicrobial, and catalytic activities. Both Fe₃O₄ and MnO₂ NPs demonstrated antioxidant and antidiabetic potential via DPPH and alpha-amylase inhibition assays, respectively. The NPs exhibited antibacterial activity against both gram-negative and gram-positive bacteria, with higher efficacy against *E. coli* (DH5α) compared to the other bacterial strains used. Furthermore, they showed antifungal activity against *Phytophthora infestans*, the potato late blight pathogen. The catalytic and photocatalytic degradation of Congo red dye was investigated using NaBH₄ and fluorescent light irradiation. Fe₃O₄ NPs exhibited superior catalytic and photocatalytic performance compared to MnO₂ NPs. Overall, biogenic Fe₃O₄ NPs demonstrated stronger antibacterial, antifungal, catalytic, and photocatalytic activities than MnO₂ NPs. These findings suggest that biogenic metal oxide NPs hold potential as antioxidant and antidiabetic agents, broad-spectrum antimicrobials, and effective bioremediation tools for removing toxic dyes from contaminated water.



Nitro-oxidative stress: Bioaccumulation-based toxicity of Indium (In) on Moth bean [*Vigna aconitifolia* (Jacq.) Marechal]

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Abstract

The rising consumption of electronic goods has led to an intensification of e-waste in the environment. Indium (In), a geologically scarce “post-transition critical metal,” is widely used in the manufacturing of flat panel displays (FPD). The element indium has an atomic number of 49 and a density of 7.31 g/cm³. Increased consumption contributes to a rise in the e-waste that contaminates air, water, and soil and, finally, enters living organisms' bodies, including plants, showing bioaccumulation and bio-magnification. Therefore, the rising Indium contaminant warranted an urgent investigation into the toxic effects on the physio-biochemistry of plants. The impacts of Indium exposures were studied on the model system, Moth bean [*Vigna aconitifolia* (Jacq.) Marechal], a neglected and underutilized legume crop (NUC). The Inductively Coupled Plasma Mass Spectrometry (ICP-MS) based analysis showed that the Moth bean uptakes a decent amount of In, which is mainly restricted to the root. Still, a fair amount of Indium translocation to shoot is also detected. This translocation is significant in influencing vital physio-biochemical processes of the plant and the possibility of accumulating in the edible portion of plants that can contribute to bio-magnification. The results showed that Indium can induce nitro-oxidative responses in a dose-dependent manner. Excess Indium accumulation occurs in plant root tissue, which restricts plant growth, delays development and leads to morphological alteration. The accumulation showed enhancement of reactive oxygen and nitrogen species (ROS/RNS), lipid peroxidation and decreased soluble protein content, and increased antioxidant enzyme activities (CAT, GPX), which is visible through biomarkers trends in MDA, H₂O₂, NO, and proline contents, suggesting that Indium causes nitro-oxidative stress. The preliminary results have encouraged further study to understand the physio-biochemical responses, transporter and storage of Indium in plants. This has become very important, especially considering the increasing demand for Indium industrial production of electronic gadgets and the semiconductor industry and helps avoid negative impacts on the ecosystem and the health of living organisms, including humans.



Rising e-waste-based environmental contaminant: Assessment of bioaccumulation and toxicity of Indium (In) on Moth bean [*Vigna aconitifolia* (jacq.) Marechal]

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Abstract

Current economic trends for consumer goods show increased demand and consumption of electrical and electronic equipment (EEE). This EEE uses flat panel displays (FPDs) such as high-definition televisions (HDTVs), computer monitors, laptops, mobile and digital equipment screens, and solar panels. Flat panel display production requires a geologically scarce “post-transition critical metal” called Indium (In), having atomic number 49 and a 7.31 g/cm³ density. The harmful impacts of Indium exposures were studied on the model system, Moth bean [*Vigna aconitifolia* (Jacq.) Marechal], a neglected and underutilized crop (NUC), has excellent potential as a future crop. To ascertain this possibility, plant growth (root, shoot, secondary root), biomass (fresh weight, dry weight), relative water content (RWC), electrical conductivity (EC), photosynthetic pigments (chlorophyll a, b, total chlorophyll and carotenoids) contents, membrane damage (MDA), Hydrogen peroxide (H₂O₂), proline, nitrate reductase (NR), total soluble protein, antioxidant enzymes (CAT, GPX, SOD) and NO content was analysed. The results showed that Indium induces responses in a dose-dependent manner. Excess accumulation occurs in plant root tissue, which restricts plant growth, delays development and leads to morphological alteration. The enhancement of ROS, lipid peroxidation and protein content, and enzyme activities was visible along with MDA, H₂O₂, NO, and proline content, suggesting that Indium causes oxidative stress. The preliminary results have encouraged us to dive deeper into studying and understanding the physio-biochemical responses, transporter, and storage of indium in plants. This has become very important, especially considering the increasing demand for Indium industrial production of electronic gadgets and the semiconductor industry. The results may help to develop precautionary cum preventive approaches to mitigate the harmful effects of Indium and save from the emergence of chemical catastrophe as seen with DDT or diclofenac drugs.



Tunable effect of divalent cations on tendrill patterning during swarming motility of *Pseudomonas aeruginosa* through chemical engineering approach

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Pseudomonas aeruginosa shows swarming motility, a group motility behaviour to colonize diverse environment. It involves formation of dendritic like colony morphology called tendrill patterns. While this colonization ability is beneficial for bioremediation, it poses significant challenges during host infection. The lack of a standardized swarming media has hindered our understanding of how to fine-tune this group- motility behaviour to meet specific requirements. We sought to determine if environmental engineering could effectively tune *Pseudomonas aeruginosa* swarming motility. Here, we engineered a swarming minimal media (SM). Using this single media, we demonstrated that dose-dependent divalent cations especially magnesium and calcium, can tune *P. aeruginosa* swarming motility. Mechanistic insights reveal that divalent cations at colony edges stimulate cell growth and trigger quorum-sensing, leading to reduced surface charges on cells and heterogeneous rhamnolipid secretion without changing flagella number on cells. These events create a dynamic environment where bacterial cells with varying surface charges and active flagella are suspended in an aqueous-rhamnolipid colloidal solution, promoting swarming motility. To accommodate increased cell growth and differential surface charges within this colloidal solution, the bacterial community responds by increasing the number of tendrills rather than their thickness, possibly due to changes in surface tension. This adaptive strategy raises further questions about the sophisticated ways in which bacteria respond to environmental cues. The significance of our study lies in modulating the environmental distribution of divalent cations to allow or restrict the distribution and colonization of the growing bacterial population in different contexts.



Photodynamic Control of *Pseudomonas aeruginosa* by nanocomposites between iron nanoparticles and Triphenylmethane-based dyes

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Abstract

Triphenylmethane, a colorless solid, serves as the precursor to several dark-colored dyes, including crystal violet (CV) and fast-green FCF (FG). While CV is known for its antimicrobial properties, the specific mechanisms underlying its antimicrobial action remain unclear. Additionally, it remained elusive whether the synergistic modulation of such antimicrobial properties is possible. To address this, we have synthesized iron nanoparticles using a chemical co-precipitation method. Characterization by Powder X-ray diffraction (XRD) confirmed the successful synthesis of Fe₃O₄ nanoparticles. Dynamic light scattering (DLS) measurements indicated the presence of dispersed aggregates ~600nm in aqueous buffer, while scanning electron microscopy (SEM) revealed spherical-shaped nanoparticles under 50nm in size. The synthesized iron nanoparticles were highly biocompatible with *Pseudomonas aeruginosa* under both dark and light conditions. CV exhibited low antimicrobial activity against *P. aeruginosa* in both conditions. Interestingly, a nanocomposite formed between iron nanoparticles and CV demonstrated significantly enhanced antimicrobial activity under white light irradiation and not in dark conditions, suggesting a photodynamic effect. This observation indicates the potential for synergistic modulation of CV's antimicrobial properties through nanocomposite formation. Notably, this synergistic effect was not observed with FCF, which shares the same parent molecule as CV. Mechanistically, the nanocomposite of CV and iron nanoparticles exhibited reactive oxygen species (ROS)-driven antimicrobial activity when exposed to white light. These in-vitro findings pave the way for future studies on the application of magnetite-based nanocomposites in photo-mediated wound healing in various species, such as mice, zebrafish and mammals.



Feasible Bioremediation Approaches to Mitigate Polluting Substances in Sagar District of Madhya Pradesh (MP) for Sustainable Environment

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Abstract

In day to day life, the polluting substances are increasing in the environment through human activities such as agriculture, litter burning, inappropriate management of chemical substances, and plastic wastes, etc. Population growth, industrialization, urbanization, and improper drainage management are the roots of environment pollution. It adds organic and inorganic pollutants, heavy metal, and greenhouse gases (GHGs) to the environment. This leads to air, soil, and water pollution. Environmental pollution can cause harmful effects on humans, animals, plants, and microorganisms. In Sagar district of Madhya Pradesh (MP), these pollution causing activities are found in several places. Although several remediation methods, such as chemical and physical methods have been adopted for years, the drawbacks and challenges associated with them have promoted the need of alternatives, which is bioremediation. Bioremediation is the remediation method using biological agents such as microorganisms, and plants to remove or reduce the environmental pollutants. Microorganisms are used primarily because of their rapid growth and the ability to easily manipulate them. Commonly used microorganisms are bacteria, fungi, algae etc. Bioremediation strategies used in fields include mushroom farming, formation of compost, biofuel generation, and valorization. This report will give an idea about various types of pollutants found in Sagar, and devising possible bioremediation strategies to remediate the environmental pollutants. Bioremediation techniques also conserve the environment for future generations. Also, it aims to make the people be aware of the potential of bioremediation, and to take possible steps towards sustainable development.



Effect of air pollution on pollination ecology

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Abstract

Human-driven processes are increasing the concentration of air pollutants (such as SO₂, O₃, NH₃, VOC's, Diesel exhaust etc.) in the atmosphere. This is disrupting the ecological balance and causing adverse environmental impacts. This phenomenon causes obstacles in the essential plant physiology and plant-pollinator interactions required for pollination, impacting agricultural yield and disrupting ecosystem-based food production. I have analysed review-based evidence to elucidate the confluence of air pollutants, plants and their pollinators, taking cues from plant hormonal activity, pollen structure (quality and quantity), and floral fragrance. These interferences are known to exhibit cognitive impairments, including memory dysfunction and neural system weakness in pollinators resulting in a significant decline in their population dynamics. Although this predicament presents a significant challenge to global food security, yet research in this field remains limited and insufficient. Questions like – What are the long-term effect of ozone on plant health and The chemical composition of floral scent undergoes changes need to be answered. I present a review on the above mentioned, in a comprehensive manner, which can be utilized for further research.



Intraspecific floral variations in plant-pollinator interactions

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Abstract

Differences between floral variants within a species, such as differences in shape, colour, fragrance, and reward quality within intraspecific populations, play an important role in structuring plant-pollinator relationships. This review looks into how such variation in flowers affects pollinator behaviour, visitation patterns, and ultimately, plant reproductive fitness. Here, I investigate the ecological determinants of intraspecific floral variation, focussing on environmental and phenotypic factors. According to research, intraspecific floral features can operate as a mechanism for lowering competition, improving pollination efficiency, and encouraging co-habitation within communities. However, question remains about the relative roles of biotic and abiotic variables in mediating these interactions. This study reveals the relevance of recognising intraspecific variation as a crucial component of plant-pollinator interactions, as it provides insights into pollination systems' resilience in the face of environmental change and the potential for adaptive evolution in response to shifting pollinator landscapes. Future study directions are suggested to better understand the functional implications of intraspecific floral variety in sustaining biodiversity and environmental stability.



Cadmium toxicity and management by gasotransmitters, Nitric oxide (NO) and Hydrogen sulfide (H₂S) imparting cadmium stress tolerance in Moth bean [*Vigna aconitifolia* (Jacq) Marechal]

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Abstract

Nitric oxide (NO) and hydrogen sulfide (H₂S) are well-established key gaseous signalling molecules. These gasotransmitters also impart a cytoprotective role against various abiotic stresses, including heavy metals (HMs). Cadmium (Cd) is an emerging heavy metal contaminant released heavily from e-waste (electrical and electronic), metallurgical activities, and industrial processes, apart from natural sources. Many crops are reported to accumulate Cd, making its easy entry into the food chain, which can cause serious concerns for public health. In our experimental work, Cd stress treatment shows dose-dependent responses in Moth bean [*Vigna aconitifolia* (Jacq) Marechal]. The adverse effects were seen as reduced seed germination, seedling growth, and plant biomass, reduced photosynthetic pigments, relative water content (RWC), electrolyte leakage, increase in non-enzymatic antioxidants and activation of antioxidant enzymes (CAT, POX, SOD). The linear increase in reactive oxygen species (ROS) in response to Cd stress treatment and consequent membrane damage in increased MDA content were reported. Apart from adverse effects on the physio-biochemistry of the moth bean plant, endogenous levels of gasotransmitters (NO and H₂S) were found to be induced at low doses of Cd stress treatment in the Moth bean. To confirm the alleviatory role of these gasotransmitters, exogenous applications of NO donor (sodium nitroprusside, SNP) or H₂S donor (sodium sulfide, Na₂S) conferred improved cadmium stress tolerance. Compared to SNP-based NO, H₂S showed better responses in alleviating the adverse effects. This revealed that endogenously generated NO and H₂S are involved in cadmium stress response, and preferably, H₂S donors can be applied as adaptive strategies to overcome and reduce the toxic effects of Cd in moth bean.



Artificial Leaf Technology: A Biomimetic Approach for Sustainable Energy Conversion

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Abstract

Harnessing nature's design, artificial leaf technology replicates photosynthesis to generate clean energy and mitigate carbon emissions. The artificial leaf is a revolutionary technology that replicates photosynthesis, turning sunlight, water, and carbon dioxide into clean fuels. It is important to note that this technology is not a substitute for natural plants but an alternative solution for clean energy. Ultra-thin, floating artificial leaves have been developed by recent work at the University of Cambridge utilizing perovskite-based light absorbers and cobalt catalysts to produce syngas—a critical precursor to liquid fuels. The cost of carbon capture is estimated at \$145 per ton, below the U.S. Department of Energy's goal of \$200 per ton. Advancements in perovskite halides and CaCO₃-based systems have significantly improved charge separation and transport, enhancing the system's overall efficiency. The technology combines fluorine-doped tin oxide (FTO), anatase and rutile TiO₂, potassium carbonate (K₂CO₃), and platinum (Pt) catalysts to maximize charge separation and reactions. The outcome is an extremely efficient, low-cost method for the production of carbon-neutral fuels. With the use of abundant resources, artificial leaf technology offers a sustainable, scalable, and economically competitive means of curbing fossil fuel reliance and curbing greenhouse gas emissions, representing a revolutionary step toward global energy sustainability.



Impact of *Mucuna pruriens* seed extract on lifespan, locomotion, mating behavior, and metabolic profiles across different age cohorts of the wild-type and Parkinsonian model of *Drosophila melanogaster*

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Abstract

Parkinson disease (PD) is a common neurological disorder that generally strikes in the old age. A few genes have been linked to familial PD, such as SNCA, LRRK2, PARK7, PINK1, or PRKN. Despite the fact that mutations in recessive PD genes like PINK1, DJ-1, and Parkin are rare in the PD patients, they are responsible for the majority of most cases of juvenile PD. Presently, *Drosophila* flies are used to understand the intricacies of Parkinson's disease as its ortholog genes are also present in these flies and the mutational changes in them trigger physiological changes similar to humans. The main objective of the present work is to study the lifespan, locomotion, mating behavior, metabolic profiling with aging in wild type (WT) and PD model of *D. melanogaster* in response to 0.05% *Mucuna pruriens* (Mp) seed extract. Administration of 0.05% Mp significantly improves the life span and negative geotaxis of WT and PD flies. From the results of mating behavior experiments, we found that with aging, number of mating decreases in wild as well as PD strains and after administering 0.05% Mp extract mating propensity increases in 30days old WT and all the three age cohorts (5,10 and 30 days) of PD model. Results show that Mp extract leaves its significant effect on triglycerides level in males and females flies of WT and PD flies among three age cohort but it does not impact on glucose level. Thus, we can conclude that 0.05%Mp improves the lifespan, locomotory behavior and mating propensity in wild as well as PD strains of *D. melanogaster* flies.



Ecological Niche Modeling of Bird Species in Tropical Deciduous Forests: Implications for Conservation and Management

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Abstract

Birds are a diverse group of the class Aves. They are characterized by feathers, beaks without teeth, and the ability to lay hard-shelled eggs. Most birds have wings, which allow them to fly, though some species, like ostriches and penguins, have adapted to life on land or in water. Birds are warm-blooded vertebrates that are unique due to their ability to fly, although some species are flightless. They have feathers covering their bodies, which help in flight, insulation, and camouflage. Birds play a vital role in the ecosystem by maintaining biodiversity, acting as pollinators, seed dispersers, and indicators of environmental health. Researchers use basic formulas and tools like Excel or R to analyze and visualize this information through graphs, such as bar charts or line graphs, showing how diversity changes across different habitats or seasons. Accurate data collection is important, as it helps in understanding bird populations and guiding conservation efforts. In the month of January and February (during our bird watching sessions), we observed a fascinating variety of birds, each contributing to the richness of the environment. We spotted chirping Sparrows, the social Seven Sisters, and the melodious Bulbul and Nightingale. The striking Black Drongos, Magpie Robin, and Copper Smith Barbet stood out, while Sunbirds in shades of black and gold hovered near flowers. In conclusion, bird diversity is essential for maintaining ecological balance, supporting biodiversity, and benefiting both nature and human society. Birds play vital roles in pollination, seed dispersal, and pest control, making them key contributors to healthy ecosystems. However, threats like habitat destruction, pollution, and climate change endanger their survival. Protecting bird species through conservation efforts, habitat restoration, and awareness is crucial for preserving the natural world. By safeguarding birds, we not only protect wildlife but also ensure a healthier planet for future generations.



Bioremediation of heavy metal contaminated waste water through integrated microbial- chemical treatment

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Abstract

Acid mine drainage from coal mines causes adverse environmental effects leading to contamination of water bodies. The acidic effluents contain toxic heavy metals such as iron, lead, arsenic, zinc, cadmium, chromium, nickel, cobalt, sulphate, lead, manganese, copper etc. The contaminants cause severe threats to both biotic and abiotic components of the environment affecting soil, water, and living organisms. The toxicity of heavy metals affect the groundwater and surface water quality, making it unfit for human consumption and agriculture. Conventional methods such as lime neutralization, alum coagulation, and bleaching are widely employed for removal of heavy metals. However, microbial approaches offer an eco-friendly, cost-effective and sustainable way for remediation of acid mine drainage. The microbes play a significant role in removal of heavy metals. Mechanisms such as biosorption, bioaccumulation, bioreduction by microbial films contribute to the removal of heavy metals. The remediation of acid mine drainage employs a systematic methodology including sampling, microbial isolation, heavy metal resistance assessment, and antioxidant analysis. Water samples collected from acid mine drainage sites are subjected to physiochemical characterization. Microbial strains are isolated using selective media which is then followed by screening of heavy metals resistance by minimum inhibitory concentration to determine their tolerance limits. Both mixed and pure are evaluated for their efficiency in heavy metal removal including scavenging activities. Additionally, some microbial strains are evaluated for their antioxidant enzyme activity which reduce oxidative stress caused by heavy metal toxicity.



Foraging Behavior of Birds in a Tropical Deciduous Ecosystem: A Study of Resource Utilization and Predator Avoidance

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Abstract

Birds have evolved to fill just about every ecological niche from the north pole to south pole. Each of these niches impose a different set of challenges and opportunities for foraging and feeding. Foraging behaviour in birds we will selection of site, select major species of bird in site, food availability, predation risk, or social behaviour from Campus of Dr. Hari Singh Gour University Sagar, north central region of Madhya Pradesh. It is situated between $23^{\circ}10'$ and $24^{\circ}27'$ north latitude and between $78^{\circ}4'$ and $79^{\circ}21'$ east longitude. Calculating foraging patterns in birds involves studying their behavior, habitat, and food sources. Foraging behavior in birds refers to the strategies and techniques they use to search for, find, and obtain food. In birds, the brain region responsible for controlling foraging patterns is the Hypothalamus (also known as the Visual Wulst). However, other brain regions like the Basal Ganglia, Septum, and Hippocampus also play important roles in regulating foraging behavior. These brain regions interact and coordinate to regulate foraging patterns in birds, allowing them to adapt to changing environments and optimize their foraging behavior. Our study Aims to identify foraging pattern adapted by the birds in a specific environment.



The Impact of Lifestyle Factors on Menstrual Cycle Dysregulation in Adolescent Girls and Young Women

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Abstract

Menstruation is a normal physiological phenomenon occurring in females. Menstrual disorders frequently affect the quality of life in young women. It is found that consumption of junk foods, lack of physical activities and skipping of meals mostly breakfast are the major causes of menstrual disorders which are on increasing trend amongst the young girls. So, it becomes imperative to study the effects of these factors on menstrual cycle. The research investigates the relationship between food determinants and various risk factors that can affect menstrual health and lead to myriad of menstrual disorders. A cross-sectional study was conducted among the females of urban and rural area to analyse the association of dietary habits with menstrual disorders. A structured questionnaire was used to collect the data regarding the menstrual history, dietary habit, fast food intake and food skipping behaviour. Visual Analogue Scale (VAS) was used to assess the intensity of dysmenorrhea. This also includes assessment of BMI and hip to waist ratio as an indicator of menstrual health. Through a comprehensive analysis of epidemiological data, the study identifies key risk factors contributing to menstrual disorders in the region. Utilizing both cross sectional and longitudinal data the research evaluates the impact of these risk factors on menstrual cycle and modifications particularly decreasing the intake of junk food and promoting healthy eating habits should be emphasized amongst the females for a healthy menstrual cycle. This study aims to contribute a better dynamics of menstrual health dynamics in Madhya Pradesh and offers evidence-based recommendations for public health interventions. Therefore, this investigation presents an epidemiological study focusing on the effects of food determinants on menstrual cycle in India with a specific emphasis on the state Madhya Pradesh.



Anatoxin-a: A Neurotoxic Cyanotoxin Disrupting Antioxidant Defense and Inducing Oxidative Stress.

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Abstract

Anatoxin-a (ATX-a) is a potent neurotoxin produced by cyanobacterial species such as *Dolichospermum*, *Aphanizomenon*, and *Oscillatoria*. Structurally, it is a bicyclic alkaloid that irreversibly binds to nicotinic acetylcholine receptors (nAChRs), leading to sustained neuronal excitation, respiratory paralysis, and fatality in severe cases. ATX-a is widely distributed in freshwater ecosystems, particularly in eutrophic water bodies, where environmental factors like temperature, light, and nutrient levels influence its production. Beyond its neurotoxicity, ATX-a also induces oxidative stress by disrupting antioxidant **defence** pathways. It promotes excessive reactive oxygen species (ROS) generation, leading to the depletion of key antioxidants such as glutathione (GSH), superoxide dismutase (SOD), and catalase (CAT). This oxidative imbalance results in lipid peroxidation, protein oxidation, and DNA damage, contributing to cellular apoptosis and neurodegeneration. Chronic exposure may enhance the risk of neurodegenerative disorders, yet its long-term effects remain poorly understood.

Exposure to ATX-a occurs through ingestion, inhalation, or dermal contact with contaminated water, posing significant health risks to humans and animals. Clinical manifestations range from dizziness and muscle twitching to severe convulsions and respiratory failure. Detection methods such as high-performance liquid chromatography (HPLC) and liquid chromatography–mass spectrometry (LC-MS) is essential for monitoring ATX-a contamination. Mitigation strategies include algicidal treatments, water filtration, and bioremediation, along with preventive approaches like nutrient management and early warning systems. This review highlights ATX-a's toxicity, emphasizing its role in oxidative stress, antioxidant disruption, and neurodegeneration, underscoring the urgent need for advanced research and regulatory policies.



Microbiome dysbiosis as a driver of liver disease and hepatic encephalopathy

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Abstract

The gut microbiome plays a crucial role in maintaining host's liver health through the gut-liver axis, a bidirectional communication pathway that regulates metabolic, immune, and inflammatory processes. Disruptions in gut-liver axis contribute to liver dysfunction and inflammation. An imbalance in the gut microbiome leads to the development and progression of diseases like liver cirrhosis and hepatic encephalopathy. Microbiome dysbiosis microbial imbalance is identified as a major force underlying liver disease, such as non-alcoholic fatty liver disease (NAFLD), liver cirrhosis, alcoholic liver disease (ALD), and hepatocellular carcinoma. Dysbiosis causes liver injury by inducing systemic inflammation, intestinal permeability, and endotoxemia, which increase hepatic injury. Additionally, in severe liver disease, microbiome dysregulation is associated with a neuropsychiatric disorder hepatic encephalopathy (HE) caused by the accumulation of gut-derived neurotoxins like ammonia. Toxic metabolites impair neurotransmission, trigger neuroinflammation, and contribute to cognitive dysfunction in patients of HE. Understanding the role of microbiome dysbiosis in liver disease progression and HE pathogenesis is critical for developing targeted microbiome-based therapies, such as probiotics, prebiotics, faecal microbiota transplantation, and gut-directed antibiotics. This mainly highlights the mechanisms by which gut microbiome dysbiosis influences liver disease and HE, emphasizing the need for novel interventions aimed at restoring microbiome homeostasis to improve patient outcomes and could lead to new treatments.



Assessment of Polycyclic Aromatic Hydrocarbons (PAHs): A step towards river monitoring and conservation

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Abstract

This thesis investigates the levels of Polycyclic Aromatic Hydrocarbons (PAHs) in freshwater bodies and aims to provide an analysis on their hazardous effects on environment and humans. PAHs are a group of organic compounds that are ubiquitous in nature and known for their persistence and carcinogenicity. This study involves collection of water, sediment, and tissue samples from multiple locations of a fresh water body, followed by the extraction and quantification of PAHs using High-Performance Liquid chromatography (HPLC), a sensitive and trustworthy technique for detection and quantification of PAHs. The resulting data is then to be statistically analysed and compared to regulatory standards to evaluate the degree of contamination. This paper also focuses on correlation between PAH levels and various water quality parameters such as Temperature, pH, dissolved oxygen, alkalinity, and nutrients enrichment to identify potential contamination sources and pathways. The research will be helpful in understanding of PAH distribution in fresh water ecosystems and the need for regular monitoring of PAH contamination and future management strategies to safeguard aquatic environment and public health.



Genistein induced Alteration of Enzymic Antioxidants and Cytotoxicity Induction in cultured breast cancer cell line

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Abstract

Humans are constantly exposed to oxidative stress, which can lead to cellular damage and increase the risk of chronic diseases like cancer, cardiovascular disorders and neurodegeneration. The integrity of our genetic material is under constant threat from oxidative stress, which can wreak havoc on our metabolism and pave the way for a host of debilitating diseases, including cancer. Fortunately, nature has provided us with an arsenal of plant-based compounds, such as Allicin, Diadzein, Genistein, and Rosamirinic acid, which have been shown to possess remarkable antioxidant as well as pro-oxidant properties, now called nutraceuticals. This piece of study focuses on the potential Genistein, a soy-derived isoflavonoid, to alter antioxidant activities and combat cancer. The research involved treating breast cancer cell lines with Genistein and assessing its impact on non-enzymic antioxidant activity by way of analysis of Hydroxyl radical scavenging activity, Superoxide radical scavenging activity and reduction of glutathione as compared to untreated control in a dose dependant manner. The results were compared to untreated cells and additional tests were conducted to evaluate Genistein's cytotoxic potential by MTT assay. The findings revealed that Genistein significantly boosted antioxidant activity, but beyond a certain point, it exhibited pro-oxidant properties. Notably, Genistein demonstrated a promising ability to inhibit cancer cell growth and induce cytotoxicity. This study highlights the potential of Genistein as a cost-effective, readily available, and side-effect-free alternative to synthetic anticancer drugs. The results also pave the way for future research into targeted delivery systems for phytochemicals like Genistein, which could revolutionize cancer therapy.



Bioremediation of Microplastics in Soil: A Metagenomic and Culturomics Approach

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Abstract

The escalating production of plastics, driven by global population growth, has resulted in significant environmental accumulation, particularly in soil, posing a substantial threat to both human and soil mesofauna health due to inadequate waste management practices. Microplastics, defined as plastic particles smaller than 0.5mm, arise from the weathering and fragmentation of larger plastic debris, becoming pervasive pollutants that persist in soil, bioaccumulate within food webs, and ultimately impact human well-being. To mitigate this pervasive pollution, effective strategies are imperative, with bioremediation emerging as a promising sustainable approach. This process leverages microorganisms, such as bacteria, to degrade microplastics into harmless byproducts like water, carbon dioxide, and biomass. Advanced omics technologies, including metagenomics and culturomics, are pivotal in facilitating this process by identifying microbial communities and genes involved in plastic degradation; metagenomics aids in the discovery of plastic-degrading microorganisms, while culturomics enables their high-throughput isolation. The integration of these techniques supports Sustainable Development Goals 12 and 15 by promoting responsible waste management and ecosystem conservation. This study delves into the bioremediation of microplastics, utilizing metagenomics and culturomics to characterize soil microbial communities and their role in the degradation process, offering insights into potential solutions for this growing environmental challenge.



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Impact of Circadian Rhythm on Silk Fiber Production in Bagworms: A Study of Pendent Cocoon Spinning Behavior and FESEM Characterization

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Abstract

Bagworm moths are notable pests that affect palm trees and other vegetation. The larval stage of these moths constructs protective cases from various plant materials, such as leaves and bark, securing them to branches using robust silk. This study investigates the diurnal rhythm in the behavior of bagworm larvae, particularly in their pendent reeling and spinning of cocoons. Observations over seven consecutive days, verified by independent volunteers, demonstrated a rhythmicity in their behavior with a period of 12.30 hours, indicative of a biphasic pattern likely linked to dawn and dusk oscillators. Additionally, we examined the morphology of bagworm silk fibers using Field Emission Scanning Electron Microscopy (FESEM) to gain insights into their ecological functions and potential applications. The combined findings on larval behavior and silk analysis underscore the significant adaptations of bagworm moths to their diurnal environment and their ecological importance.



Metabolomic Profiling of Eugenol-Loaded Chitosan Nanoparticles in Allergic Airway Inflammation: Targeting NF-Kb, MAPK and HDAC Pathways Through *In Vivo* and *In Silico* Investigations

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Abstract

Eugenol, a major phytochemical of *Syzygium aromaticum* L., possesses potent anti-inflammatory properties and has been shown to mitigate asthma-related inflammation in various pharmacological studies. The goal of the study is to enhance eugenol's thermal stability and therapeutic efficacy through chitosan nanoparticle encapsulation. To improve stability and delivery, eugenol was incorporated into chitosan nanoparticles via ionic gelation, optimized using the Design of Experiment (DoE) methodology. The resulting eugenol-loaded chitosan nanoparticles (EUGCNP), ranging from 50 to 200 nm in size, demonstrated enhanced dispersibility due to electrostatic hydrogen bonding between eugenol and chitosan. SEM and TEM analyses confirmed this improved dispersibility, suggesting potential for increased bioavailability and therapeutic efficacy in respiratory disease management. To induce an allergic asthma phenotype, Balb/c mice were sensitized and challenged with ovalbumin (OVA). EUGCNP (10 mg/kg) was then administered to examine its impact on NF- κ Bp65, MAPKp38 and HDAC1 signaling. Immunofluorescent localization and hematoxylin and eosin (H&E) staining were employed to assess inflammatory changes. Metabolomic analysis of bronchoalveolar lavage fluid (BALF) and lung tissues identified metabolic alterations linked to EUGCNP intervention. ELISA quantified pro-inflammatory cytokines (IL-13, IL-4, IL-5, and TNF- α), while molecular docking and dynamic simulations elucidated EUGCNP's interaction with key regulatory molecules. The elevated expression of NF- κ Bp65 and HDAC1 in the asthma group was significantly reduced following EUGCNP treatment, suggesting its role in alleviating airway inflammation.



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Examining Daily Fluctuations in Cognitive Abilities: A Study of Rural vs. Urban Populations

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Abstract

Circadian rhythms play a crucial role in regulating various physiological and genetic factors, including cognitive function. This study investigates the non-invasive measurement of these rhythms and assesses cognitive performance at different times of the day using cognitive test batteries. We analyzed visual reaction time and executive functioning through Stroop testing, comparing results between rural and urban populations, particularly among tribal groups. Our findings reveal significant differences in Stroop task performance related to chronotype, correlating performance with sleep quality and sleep pressure, as measured by standardized questionnaires. The results suggest that tribal individuals migrating from rural to urban environments may experience cognitive disadvantages due to altered light exposure and misalignment of their chronotype with ambient lighting conditions.



Acute toxicity of an organophosphorus pesticide, chlorpyrifos and its effect on the behavior of a freshwater fish *Channa punctatus*

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Abstract

In India, pesticides constitute an important component in agriculture development and protection of public health since the tropical climate is very conducive to pest breeding. Contamination by pesticides in aquatic ecosystem is a serious problem and fishes are more frequently exposed to these pollutants and may taken in through gills, skin and contaminated foods. Chlorpyrifos is a widely used organophosphate pesticide, second largest selling in India and used for more than a decade to control pests on cotton, paddy field, pasture and vegetable crops. Aquatic contamination of pesticides causes acute and chronic poisoning in fish and other organisms directly or indirect via food chain. A bioassay experiment was carried out to determine the acute toxicity of chlorpyrifos (Commando 20% EC) on freshwater *Channa punctatus* for different time interval viz; 24h, 48h, 72h and 96h. The LC₅₀ were determined by the probit analysis method using Finney's table. The 96 h LC₅₀ values was found 6.27µl/L. The present study was aimed to determine the acute toxicity of chlorpyrifos and its effect on the behavior of *Channa punctatus*. During experiment fish show erratic and jerky movement. It is observed that the fish show decrease opercular movement, increase surface air gulping and decrease resting time, respiratory trouble and excess secretion of mucous from all over the body and gills. The behavioral changes observed in chlorpyrifos induced *Channa punctatus* indicate that this pesticide is toxic and are highly sensitive to this chemical.



Earthworm Metabolomics and Soil Health: A Meta-analytical Review of Environmental Stress Impacts

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Abstract

This comprehensive meta-analysis synthesizes two decades of research examining the impact of diverse environmental pollutants on earthworm metabolomes, a crucial area of study given earthworms' pivotal role in soil health and ecosystem functioning. The analysis encompasses a broad spectrum of contaminants, including, but not limited to, Atrazine, Imidacloprid, Thiacloprid, Pyrene, Arsenic, Cypermethrin, Triclosan, Tebuconazole, Carbofuran, Tri-n-butyl phosphate, carbon nanomaterials, Copper, BDE 47, and Chlorpyrifos, reflecting the diverse range of anthropogenic stressors impacting soil environments globally. To provide a nuanced understanding of the complex metabolic responses elicited in earthworms upon exposure to xenobiotic compounds, the analysis incorporates studies employing advanced analytical techniques such as ¹H NMR, GC-MS, LC-MS, and UPLC-QTOF-MS, which enable detailed profiling of metabolite changes. Inclusion criteria mandated investigations utilizing environmental metabolomics methodologies to assess xenobiotic impacts on earthworms within the past twenty years, ensuring a focus on contemporary research and methodologies, while excluding studies lacking comprehensive metabolomic analyses or addressing non-xenobiotic-related effects to maintain a clear focus on the study of pollutant impacts. The synthesis of this diverse dataset reveals the multifaceted nature of pollutant-induced metabolic perturbations in earthworms, including alterations in key metabolic pathways and biomarkers, underscoring the imperative for a holistic understanding of soil ecosystem dynamics. This knowledge offers critical insights for the development of effective conservation strategies, informing risk assessments and remediation efforts. Furthermore, this meta-analysis elucidates the intricate interplay between pollutants and earthworm metabolomes, demonstrating the potential for earthworms as sensitive bioindicators of soil contamination, thereby highlighting the urgent need for a comprehensive, interdisciplinary approach to mitigate the cascading ecological consequences of soil pollution and safeguard soil biodiversity.



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Addressing Menstrual Hygiene and Cultural Taboos among University-Going Tribal Girls in Koraput District: A Call for Comprehensive Education and Research

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Abstract

Understanding menstrual hygiene practices is a vital component of health education for women. This study focuses on university-going tribal girls in the Koraput district, highlighting the disparity between academic knowledge and cultural beliefs regarding menstruation. Despite their education, these young women are often constrained by taboos and superstitions, resulting in a significant lack of awareness about the scientific aspects of menstruation. Proper hygiene during menstruation is essential for women's health, and neglecting it can lead to serious health complications. Consequently, it is crucial to educate these individuals about the scientific realities of menstruation, dispel harmful myths, and promote proper hygiene practices to protect against reproductive tract infections. Furthermore, research is needed to investigate the factors contributing to menstrual irregularities among girls in Koraput following COVID-19 infection and vaccination.



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World Cancer Day

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Abstract

Cancer is a global health challenge, but with awareness, early detection, and prevention, we can fight its impact. This World Cancer Day 2025 poster delivers a powerful message: "Cancer may have started the fight, but we will finish it," emphasizing resilience, unity, and medical advancements in the battle against cancer. The visual representation of people standing together in brightly colored shirts with awareness symbols signifies solidarity and collective action. The quote, "Be the one for the change – Let's finish this war together and come back stronger, happy, and healthy," encourages individuals to take charge of their health through early screenings, healthy lifestyle choices, and spreading awareness. The background, filled with nature and greenery, symbolizes hope, healing, and a positive future. This poster serves as a reminder of the importance of cancer prevention, regular medical check-ups, and supporting those affected by the disease. By promoting education on risk factors, symptoms, and treatment advancements, it urges communities to work together to reduce cancer mortality rates. On this World Cancer Day, let us unite, raise awareness, and take proactive steps toward a cancer-free future.



Addressing Socio-Economic Disparities in HPV-Driven Cervical Cancer: Insights from GLOBOCAN Data and Strategies for Global Prevention

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Abstract

Cervical cancer, primarily caused by persistent Human Papillomavirus (HPV) infections, remains one of the leading causes of cancer-related mortality among women worldwide. However, its burden is not uniformly distributed—socio-economic disparities play a crucial role in incidence, survival, and access to preventive healthcare. This study leverages GLOBOCAN and SURVCAN data to analyze the global impact of HPV-driven cervical cancer across different income groups, revealing stark inequalities in healthcare access and outcomes. Our findings indicate that HPV accounts for 55.9% of all infection-attributable cancers among women, with disproportionately high incidence rates in low-income countries. While HPV-related cervical cancer cases in high-income nations have declined due to widespread vaccination and early screening, projections suggest a 121.2% increase in cases by 2045 in low-income regions, compared to just 5.3% in high-income countries. Similarly, mortality rates are expected to rise by 124.4% in low-income settings, underscoring the urgent need for intervention. Survival analysis further highlights disparities—India's 5-year survival rate for cervical cancer is just 53.8%, significantly lower than global averages. Factors such as late diagnosis, limited access to Pap and HPV tests, poor healthcare infrastructure, and lack of vaccination coverage contribute to this widening gap. To address these challenges, we propose targeted public health strategies: expanding subsidized HPV vaccination programs, implementing mobile screening clinics, strengthening healthcare infrastructure, and integrating sexual health education into national policies. Additionally, cross-border collaborations and funding initiatives are crucial for narrowing the healthcare divide. Cervical cancer is largely preventable with the right interventions. By bridging socio-economic disparities, scaling up vaccination efforts, and ensuring equitable access to screening, we can move towards eradicating HPV-driven cervical cancer globally. This study underscores the urgent need for data-driven policies and global cooperation to turn this vision into reality.



Endocrine Disruptors and Fish Reproductive Health: A Review of Hormonal Disruptions, Ecological Consequences, and Regulatory Challenges

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Abstract

Endocrine-disrupting chemicals (EDCs) such as Bisphenol A (BPA) and phthalates are emerging contaminants that pose significant threats to aquatic ecosystems by interfering with hormonal regulation in fish. These chemicals, widely used in plastics, industrial processes, and personal care products, enter water bodies through wastewater discharge, leading to widespread exposure among aquatic organisms. This review explores the impact of EDC exposure on fish reproductive health, focusing on hormonal disruptions, gonadal deformities, impaired gametogenesis, and altered reproductive behaviours. Research has shown that BPA and phthalates mimic or antagonize natural hormones, disrupting estrogenic and androgenic pathways, which can lead to intersex conditions, fertility reduction, and developmental defects in fish offspring. Molecular studies have further revealed significant alterations in the expression of genes associated with endocrine function, suggesting long term epigenetic consequences. Beyond individual health effects, prolonged EDC exposure has population-level implications, including skewed sex ratios, decreased reproductive success, and potential evolutionary adaptations to persistent chemical stressors. Such disruptions can destabilize aquatic food webs, leading to biodiversity loss and ecosystem imbalance. Despite extensive research highlighting the adverse effects of EDCs on fish reproduction, regulatory frameworks for controlling these pollutants remain inconsistent, and many wastewater treatment facilities lack the capacity to effectively remove them from the environment. This review underscores the urgent need for comprehensive policies to regulate the production and disposal of EDCs, as well as the development of advanced water purification technologies. Additionally, future research should focus on long-term ecological monitoring, biomarker development for early toxicity detection, and exploring safer chemical alternatives. Understanding the mechanisms by which EDCs impair fish reproduction is essential for mitigating their impact and preserving aquatic biodiversity in the face of increasing environmental pollution.



Glycyrrhizin as a Natural Shield Against UVB-Induced Damage

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Abstract

Ultraviolet-B (UVB) radiation, a natural component of sunlight, plays both beneficial and harmful roles in human health. While essential for vitamin D synthesis, excessive exposure can damage multiple organs, particularly the skin, eyes, and immune system. The skin, as the body's primary defence, is most affected, with prolonged UVB exposure leading to sunburn, accelerated ageing, and an increased risk of skin cancers such as melanoma, basal cell carcinoma, and squamous cell carcinoma. UVB-induced DNA damage and reactive oxygen species (ROS) production contribute to harmful mutations, as highlighted by the World Health Organization's concerns over rising skin cancer rates. The eyes are also vulnerable, with excessive UVB exposure causing cataracts, pterygium, and photokeratitis, which can impair vision and, in severe cases, lead to blindness. Additionally, UVB radiation weakens immune function by altering cytokine production and suppressing antigen-presenting cells, increasing susceptibility to infections and immune-related disorders. Glycyrrhizin, a bioactive compound derived from *Glycyrrhiza glabra* (licorice root), has shown promise in counteracting UVB-induced damage due to its antioxidant, anti-inflammatory, and anti-immunomodulatory properties. Research suggested that glycyrrhizin can protect skin cells (keratinocytes) from oxidative stress and DNA damage, potentially lowering skin cancer risk. While these findings are encouraging, further studies are needed to fully understand glycyrrhizin's therapeutic potential. Meanwhile, integrating natural protective agents like glycyrrhizin with sun safety practices—such as sunscreen, protective clothing, and UV-blocking eyewear—could help mitigate the harmful effects of excessive UVB exposure.



Analyzing the Symbiotic Interaction between Insects and Microorganisms in the Degradation of Pesticides and their Prospective Application in the Detoxification of Agricultural Ecosystems: A Systematic Review

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Abstract

Pesticides have become a central component of modern agriculture; however, extensive usage has been found to create immense environmental problems such as pesticide resistance and ecosystem contamination. Recent studies suggest that insect-microbe symbiosis may represent a viable pathway for pesticide biodegradation as part of the process of detoxification in an ecosystem. This systematic review outlines the complexity of interaction that exists between insect and symbiotic microorganisms with respect to the metabolic and enzymatic mechanisms of pesticide breakage. This review will address the roles of major groups of insects (Lepidoptera, Hemiptera, Diptera, and Coleoptera) and their microbial partners in the degradation of major classes of pesticides: organophosphates, organochlorines, carbamates, and pyrethroids. This study highlights the possible application of co-symbiotic systems in sustainable agriculture and reduced chemical inputs and environmental impact. This work integrates genomics, metabolomics, and synthetic biology to advance real-world implementation of insect-microbe symbiosis for promoting agricultural sustainability and ecosystem health.



Unraveling the T Cell Enigma: Pathophysiological Changes in Cervical Cancer and Emerging Therapeutic Strategies

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Abstract

Cervical cancer, primarily driven by persistent human papillomavirus (HPV) infection, presents a substantial global health challenge, with approximately 570,000 new cases and 311,000 deaths annually. The immune system plays a critical role in managing HPV infection and preventing tumor progression. However, cervical cancer cells utilize sophisticated immune evasion strategies, disrupting the balance between immune surveillance and tumor development. This study provides a detailed examination of the interactions between tumor cells, immune cells, and the tumor microenvironment in cervical cancer. The research emphasizes the pivotal role of T cells in controlling HPV infection and explores emerging therapeutic approaches focused on restoring immune function, enhancing anti-tumor immunity, and improving clinical outcomes. The findings highlight potential therapeutic targets and strategies, including immunotherapy, targeted therapies, and epigenetic approaches, offering new avenues for personalized cervical cancer treatment.



DNA BARCODING: A useful tool in species identification to resolving taxonomic conflicts in lotic ecosystem of Madhya Pradesh

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Abstract

DNA barcoding is a technique for comprehensive identification of animals, plants and fungus using *cox1*, *mtk&rbcl* and *its* respectively. In animals, that primarily depends on the mitochondrial gene cytochrome oxidase subunit I (COI-5) 5' region, DNA barcoding can reliably distinguish between species with strikingly similar morphologies and identify the species at any stage of development. Understanding the taxonomy and systematics of fish species is a prerequisite for sustainable management of genetic resources. A freshwater *Ompokbimaculatus* (a butter catfish) has been considered as Near Threatened (NE) in 2010 in IUCN Red List Database, because it declining very fastly due to many anthropogenic activities in rivers and also overexploitation by excess capturing from their habitat due to highly tasty food. During the investigation, the DNA barcoding method was utilized to identify the samples that were collected from three different rivers of Madhya Pradesh which are Narmada, Chambal, and Betwa. Total 08 individuals of *Ompokbimaculatus* were collected and studied for molecular characterization. Targeted cytochrome oxidase c subunit I gene (*cox1*) was amplified and obtained amplicons size as 621 bp using the universal primer (FishF1/FishR1), sequenced, submitted, and successfully generated the accession numbers PP813420, PQ394644 and PQ394651 on NCBI (National Center for Biotechnology Information), USA. MEGA-X software was used to build the Maximum Likelihood (ML) tree based on the Kimura-2 Parameter method for pairwise distance and phylogenetic analysis. Partial sequence of the mitochondrial cytochrome-c oxidase subunit-I gene within mitochondrial DNA to overcome the phenotypic plasticity of *O. bimaculatus* with the same genera and the development of DNA barcodes. Furthermore, the DNA barcodes were successfully developed for *O. bimaculatus* by BOLD systems. The study aimed to evaluate the morphology, meristic traits, and DNA barcoding of *O. bimaculatus* from Madhya Pradesh's rivers and it contributes as an ideal study for scientists to conservation management.



Microarray Data Analysis of Oral Squamous Cell Carcinoma (OSCC) Patients

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Abstract

OSCC is a serious malignancy with high morbidity and mortality compelling to understand the molecular mechanisms underlying it, as well as identification of potential diagnostic biomarkers and therapeutic targets through exhaustive analysis of publicly available GSE37991 microarray data. The microarray dataset contains transcriptomic profiles from OSCC tissues and their adjacent normal tissues, an avenue through which differential expression can be massively strengthened. Utilizing GEO2R, we identified the top 250 differentially expressed genes (DEGs) ranked by adjusted p-value. Statistical significance was determined using adjusted p-values to account for multiple testing corrections, and log2 fold change values were calculated to assess the magnitude of expression differences. Enrichment analysis indicates that the up DEGs show a strong association with ECM organization, focal adhesion pathways, and modification of immune response, while the down DEGs are associated with metabolic processes and muscle contraction. Cross-dataset comparisons also showed that there were 261 overlapping DEGs common to many studies on OSCC, which evidence their specific potential as major regulators in tumorigenesis. Some noteworthy cases have been the genes FOXM1 and TPX2, among others, which played significant roles in cell proliferation and immune modulation; thus, they could be prime candidates for further experimental validation. The present study thus extends the knowledge on OSCC biology and sets the pace for the future translational research endeavor in precision oncology.



Therapeutic Potential of Naringin: Pharmacological Properties and Clinical Prospects

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Abstract

Naringin, a bioactive flavonoid glycoside commonly found in citrus fruits, has been extensively studied for its therapeutic properties over the past decades. Early research identified its potent antioxidant and anti-inflammatory effects, contributing to its protective role against oxidative stress-related diseases. Studies from the 1990s highlighted its cardioprotective potential, demonstrating its ability to reduce cholesterol levels and improve endothelial function. Subsequent investigations in the early 2000s established its neuroprotective effects, particularly in mitigating neurodegenerative conditions like Alzheimer's and Parkinson's disease by modulating oxidative stress and neuroinflammation. Naringin has also been recognized for its anti-diabetic and anti-obesity effects, with research from the early 2010s indicating its role in glucose metabolism regulation, insulin sensitivity enhancement, and adipogenesis inhibition. Furthermore, its anti-cancer potential has been documented, with earlier studies showing its ability to induce apoptosis, inhibit cell proliferation, and suppress angiogenesis in various cancers, including breast, liver, and lung carcinomas. Despite promising preclinical evidence, the bioavailability and pharmacokinetics of naringin remain a challenge, necessitating further research on advanced delivery systems and clinical trials. This review revisits the previous research about naringin, highlighting its therapeutic potential and the need for future investigations to bridge the gap between experimental findings and clinical applications.



***Salvia hispanica* Seed Extract Mediated Synthesis of ZnO Nanoparticles for Enhanced Antioxidant, Antidiabetic, Antimicrobial, and Dye Degradation Activities.**

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Abstract

This study introduces a novel, eco-friendly method for synthesizing zinc oxide nanoparticles (ZnONPs) using *Salvia hispanica* seed extracts, exploring their diverse applications. A key advancement is the controlled synthesis of distinct ZnONP morphologies (NP- α to NP- η) by varying the zinc nitrate precursor molarity, a previously unreported approach. Comprehensive characterization via UV-Vis, FTIR, XRD, SEM-EDX, and TEM confirmed successful synthesis. Scherrer equation analysis revealed crystallite sizes ranging from 4.83 nm to 24.45 nm, while TEM showed particle sizes within 40-80 nm, demonstrating consistent morphology. Precursor molarity significantly influenced ZnONP size and shape. The synthesized ZnONPs exhibited promising antibacterial activity against *Staphylococcus aureus*, significant α -amylase and α -glucosidase inhibition (potential antidiabetic applications), antioxidant properties, and Congo red dye degradation, highlighting their potential for antimicrobial, antidiabetic, and environmental applications. This research presents an efficient, green synthesis of ZnONPs with tailored morphologies and versatile functionalities.



Effect of Different Combinations of Feed Materials on the Population Dynamics of Earthworms

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Abstract

Chemical fertilizers and synthetic pesticides seriously threaten human and animal health and the environment. Animal dung and municipal solid wastes cause various problems if they are not properly managed. Vermicomposting of these wastes is a suitable solution for the proper management of biological wastes. The combinations of different animal dung with municipal solid wastes significantly enhance the population of *Lampitomaauritii* and *Eutyphoeuswaltoni*. The combination of buffalo dung with municipal solid wastes (1:1 ratio) significantly increases the growth, development, and reproductive capacity of *Lampitomaauritii* and *Eutyphoeuswaltoni*. A significant decrease in pH, Electric conductivity, C: N ratio was noted in the final vermicompost whereas, increased total Kjeldhal nitrogen (TKN), total available phosphorus level (TAP), total potassium, and calcium ultimately affect the growth of earthworms *Lampitomaauritii* and *Eutyphoeuswaltoni* population. The use of buffalo dung with sewage sludge is a suitable combination for better growth, reproduction, and development of *Lampitomaauritii* and *Eutyphoeuswaltoni*. The significant increase in the number of earthworms with the help of a combination of wastes as feed material, will be helpful for more conversion of more municipal solid wastes into beneficial vermicompost



Soil Detoxification Through Earthworms: Heavy Metal Accumulation Potential

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Abstract

Heavy metals are released into the environment by volcanic activity, erosion of rocks, forest fires, human activity, paper mills, and waste products of various industries. Abundant use of chemical fertilizers and pesticides in agricultural fields also increases the heavy metals in the environment. These heavy metals caused ill effects on different flora and fauna as well as on human health. Generally, the human body is exposed to heavy metals by breathing, drinking, and eating polluted air, water, and food, which leads to the accumulation of heavy metals in vital organs such as the brain and kidneys. Continuous accumulation of lead leads to the death of an affected person. In pregnant women accumulation of the lead may cause miscarriage. Sperm production in male human beings is also reduced by lead exposure. Cadmium and Nickel accumulation in the body is encountered in the workers of industries of pigment, metal plating, plastic, and batteries. These heavy metals enter the human body by ingestion of contaminated foodstuffs, especially grains, cereals, and leafy vegetables. These metals cause respiratory irritation lung diseases, cancers, and kidney problems. Accumulation of chromium in the human body breathing problems such as asthma, cough, and wheezing. Even skin contact may result in skin ulcers. Chronic exposure can damage the liver, kidney, blood cells, and nerve tissues. Oral intake of cobalt causes hypercholesterolemia in human beings. Arsenic acts as a carcinogen and may cause cancer of the skin, lungs, liver, and bone marrow. In a food chain of an active ecosystem, there is a continuous accumulation of successive trophic levels. This phenomenon is called biological magnification or biological amplification. Generally, different heavy metals like cobalt (Co), nickel (Ni), cadmium (Cd), chromium (Cr), lead (Pb), and mercury (Hg) may accumulate in the human body on various routes and cause different hazards. Complete removal of these heavy metals in the contaminated environment is a difficult task. The earthworm *Lampitoma auritii* plays a very important role in reducing the heavy metals accumulation in foodstuffs. The worms can accumulate various heavy metals viz Pb, Ni, Cd, and Cr in their body. They can accumulate the metals by transferring the heavy metals from the soil in their body so that it will reduce the movement of hazardous metals in crops and vegetables. This remediation of soil will produce good quality consumable agricultural products.



Effects of arsenic on the behaviour of freshwater stinging catfish *Heteropneustes fossilis* (Bloch, 1794)

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Abstract

Environmental pollutants such as metals, pesticides and other organic chemicals present significant risks to aquatic organisms. Toxic metals, in particular, accumulate in the environment due to human activities and arsenic along with its compounds, is a notable and potent contaminant. Arsenite and arsenate are considered the most toxic and prevalent arsenicals found in nature. In this context, a bioassay experiment was conducted to evaluate the acute toxicity of sodium arsenite on the freshwater catfish *Heteropneustes fossilis* over various time intervals (24, 48, 72, and 96 hours). Sodium arsenite was directly dissolved in test containers and 20 fish (10 fish per 10-liter glass jar) were exposed to the chemical. A concentration of 1 mg/l of sodium arsenite was added to the water daily for four consecutive days. After 96 hours both control and treated groups of fish were observed for behavioral changes. The results indicated that exposure to sodium arsenite induced erratic movement and hyperexcitability in the fish. The fish exhibited excessive mucus secretion from their gills and bodies. Additionally, they showed signs of agitation, with rapid operculum movement and occasional air gulping. Ultimately, the fish lost their equilibrium, showing clear signs of distress due to the exposure to the chemical. This study highlights the severe physiological and behavioral impacts of arsenic contamination on aquatic life, emphasizing the need for effective management of such pollutants in aquatic ecosystems.



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Chronotype among Scheduled Tribes: Differences between urban and rural populations

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Abstract

Chronotype is the common inclination of our body to sleep at a particular time and exhibits interpersonal variation depending on age, genetics, and other environmental factors and geographical location. Chronotypes are generally divided into owls (late), larks (early), and intermediate types. The chronotype of urban populations has often been studied. However, studies regarding the chronotypes of tribal populations in urban and rural settings are very few. We found certain trends in tribal populations that were different from non-tribal populations. An overwhelming proportion of the tribal populations (N=500) studied were of the morning type. Older individuals (belonging to the Scheduled Tribes) in rural settings were consistently of the morning type. This differed significantly from younger individuals in urban settings. They also reported more daytime sleepiness. Such differences indicate that urban lighting schedules may act as mistimed cues that would differentially affect tribal populations, leading to health complications.



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Toxicants and Their Effects on Human Body

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Abstract

Ecotoxicology involves the study of toxicants on living system Human beings are exposed to different substances everyday through the air, water, soil and some of them may exert toxic effects. Environmental pollutants are increasingly introduced in the environment due to human activities such pollutants can exert various effects on the different organs in our system. We can be exposed to toxicants at any stage of our life. If our immune system is good enough then we may be able to overcome the toxic effects. It depends on our metabolism and genetical make up. Some toxicants can be bio transformed by the liver and excreted from the system Some other toxicants can be lodged permanently in the various organs and it may be even fatal.



Formulation and characterization of Eugenol loaded solid lipid nanoparticles and evaluate their antimicrobial activity against pathogenic fungi and bacteria.

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Abstract

Bioactive compounds like eugenol, derived primarily from clove (*Syzygium aromaticum*), offer significant benefits for both plant and human health due to their potent antimicrobial and antioxidant properties. However, their application is often limited by poor solubility in polar solvents and susceptibility to degradation via photolysis and hydrolysis. Nanostructured systems, particularly solid lipid nanoparticles (SLNs), provide a promising solution by enhancing solubility, stability, and bioavailability while protecting these compounds from degradation. Despite their potential, the development of such systems faces challenges, including the selection of optimal synthesis methods, nanomaterials, and the need for rigorous toxicological evaluation. In this study, eugenol was encapsulated in a solid lipid nanomatrix using an emulsification and low-temperature solidification method. The aim was to enhance the stability, controlled release, and bioavailability of eugenol for potential therapeutic applications. The synthesized eugenol-loaded nanoparticles (Eu-SLNs) were characterized using transmission electron microscopy (TEM), UV-Vis spectroscopy and Zeta potential analysis. The nanoparticles exhibited a spherical morphology, high encapsulation efficiency ($87.91\% \pm 5.12\%$) and significant drug loading capacity ($29.3 \pm 2.51\%$). Antimicrobial, antioxidant, and anti-biofilm assays demonstrated the potent inhibitory effects of Eu-SLNs against pathogenic microorganisms, including *Pseudomonas aeruginosa* and *P. infectans*. In vivo analysis further confirmed the efficacy of Eu-SLNs in reducing infection and biofilm formation in plant models. The results underscore the potential of Eu-SLNs as an effective delivery system for eugenol, improving its stability and bioavailability while displaying significant biocidal activity against various pathogens. This study highlights the potential of Eu-SLNs for use in targeted drug delivery, antimicrobial formulations, and sustainable agricultural practices, providing a safe and efficient alternative to conventional methods.



Extraction and Evaluation of Mycological Dyes for Textile Industry and their Antifungal Activities.

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Abstract

Since ages, colours have been an integral part of humankind whether it belongs to foodstuff, clothing, or day-to-day living. Colorants find social and commercial applications in cosmetics, food, pharmaceuticals, textiles, and other industrial sectors. A dye is a coloured substance that has an affinity to the substrate to which it is being applied. The majority of natural dyes are from plant sources – roots, berries, bark, leaves, and wood, and also from animals and microbes. Moreover, their antioxidant and antimicrobial nature further add to their positive effects. The main idea of extracting dyes from natural sources from fungi is to avoid environmental pollution and also to avoid toxic and allergic reactions associated with synthetic dyes. Natural dyes have emerged as an important alternative to synthetic dyes. In the present study, mycological dyes were screened for their potential application in textiles, and for these fungal strains like *Trichoderma* sp., *Aspergillus* sp. and *Fusarium* sp. were isolated from soil using PDA plates. The fungal cultures were grown under the static condition in PDB for the production of pigment. These pigments were tested for their colour production properties by taking absorbance at different time intervals during the incubation period. A set of 3 pieces of cloth (Cotton, Silk & Terrycot) were used for dyeing with the fungal pigments. The fungal extracts have an antifungal activity that is checked by a food poisoning test.



Neurotoxic Effects of Pentylenetetrazole in Zebra Fish: Mechanisms, Implications, and Potential Therapeutic Interventions

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Abstract

Pentylenetetrazole (PTZ) is a widely used chemical compound known for its ability to induce seizures and alter neurophysiological functions, making it a crucial model in studying epileptogenesis and neurotoxicity. This study explores the mechanisms underlying PTZ-induced neurotoxicity, examining both the neurophysiological and molecular pathways involved in its toxic effects on the central nervous system (CNS). Through a combination of behavioral assessments, electrophysiological recordings, and molecular analyses, the study aims to identify key alterations in neuronal activity, neurotransmitter systems, and cellular integrity following PTZ administration. Furthermore, the research investigates the role of oxidative stress, neuroinflammation, and excitotoxicity in mediating these toxic effects. By providing a deeper understanding of the pathological processes associated with PTZ exposure, this study seeks to contribute to the development of targeted therapeutic strategies for managing PTZ-induced neurotoxicity and related neurological disorders, including epilepsy and neurodegenerative diseases.



Population Genetics of *Drosophila ananassae*: Latitudinal trends in morphometry, triglyceride content and microsatellite variants

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Abstract

Latitudinal variation plays a crucial role in shaping genetic diversity and adaptation in natural populations of terrestrial animals. *Drosophila ananassae* is a cosmopolitan and domestic species of fruit fly, distinguished by several unique characteristics. To investigate potential latitudinal differences, we sampled these flies from northern and southern regions of India and analyzed their morphometric, biochemical (lipid content), and genetic (microsatellite) parameters. Morphometric analysis revealed significant differences in thorax size and metathoracic tarsus length between females from different geographical locations, whereas wing length and wing width showed no significant variation. However, among males, none of the measured traits exhibited significant differences. Within-population comparisons showed that flies from lower latitudes displayed significant variation in thorax length and wing size between the sexes, while metathoracic tarsus length remained unchanged. In contrast, populations from higher latitudes (northern India) exhibited significant sexual dimorphism in thorax length, metathoracic tarsus length, wing length, and wing width. These variations suggest a potential latitudinal clinal pattern in the morphological traits of *D. ananassae*. Biochemical analysis of total lipid content across populations revealed a positive correlation with latitude; lipid content increased with increasing latitude. Genetic polymorphism studies were conducted by analyzing microsatellite variation between geographically distant populations. Three primers were used to amplify the target loci, and all loci were found to be polymorphic. Based on genotype analysis, allele frequencies and heterozygosity levels were determined. The results indicated clinal variation in allele frequencies and heterozygosity, further supporting the presence of latitudinal genetic structuring in *D. ananassae*.



The effect of multigenerational exposure of sodium arsenite on behavioral traits and biochemical parameters in isofemale lines of *Drosophila ananassae*

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Abstract

Arsenic remains a major public health concern and a significant risk factor in many parts of the world. Inorganic arsenic, particularly in its trivalent form, is highly toxic, and its exposure has been linked to the development of various diseases, including cognitive impairment, cardiovascular failure, and multiple types of cancer. While several studies have examined the effects of arsenic exposure in a single generation of *Drosophila*, the impact of sodium arsenite (NaAsO_2) across multiple generations remains unclear. Additionally, the role of genetic variation in responding to arsenic toxicity has been scarcely explored. To address these gaps, we used *D. ananassae* to investigate the effects of continuous multigenerational exposure to a sub-lethal dose of sodium arsenite (0.08 mM) on longevity, fecundity, and mating propensity in genetically diverse isofemale lines. Furthermore, we analyzed the impact of arsenic exposure on metabolic profiles, specifically lipid and protein levels, in this species. Our multigenerational study revealed that all isofemale lines exhibited reduced mating propensity, fecundity, and longevity compared to the control group. Also, significant differences in these traits were observed among some of the isofemale lines. Notably, from the F3 generation onward, the lines showed a similar response to sodium arsenite in terms of mating behavior, fecundity, and longevity. Additionally, biochemical analysis indicated a significant impact of sodium arsenite exposure on the treated lines compared to the controls.



Assessing Human Astrovirus Contamination in Wastewater: A droplet digital PCR Based Epidemiological Study

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Abstract

Human Astrovirus (HAsV), a leading cause of acute gastroenteritis, poses significant public health risks through waterborne transmission, yet conventional detection methods lack sensitivity and quantitative precision. This study addresses this gap by developing and validating a droplet digital PCR (ddPCR) assay for the rapid, accurate detection and quantification of HAsV in wastewater, while evaluating its performance against TaqMan real-time RT-PCR and SYBR Green RT-PCR. Primers and probes were selected through systematic literature review and validated via NCBI BLAST for specificity. Optimal ddPCR conditions (800 nM primer, 400 nM probe in 20 µL reactions) were established through iterative optimization. To assess viral prevalence and load, the assay was applied to 50 wastewater samples from nine treatment plants (WWTPs) in Bhopal, India. The ddPCR assay demonstrated superior sensitivity and precision, detecting HAsV RNA in 50% of Char Imli and Neelbad WWTPs samples, and 42.85% from Chunnabhatti, with notable variability across sites. Comparative analysis revealed ddPCR's enhanced accuracy in viral quantification over TaqMan and SYBR Green methods, which exhibited lower sensitivity and inconsistent detection rates. These findings underscore HAsV's persistent presence in local wastewater systems, highlighting risks of environmental contamination. This approach enhances public health preparedness by improving contamination monitoring and informing wastewater-based epidemiology strategies for early disease detection and mitigation. Further validation across diverse geographic regions is recommended to expand its utility in outbreak prediction and resource allocation.



Green Synthesis of Copper Oxide Nanoparticles Using *Beta vulgaris* Extract: Characterization and Application in *Alternaria solani*-Induced Early Blight Management

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Abstract

Alternaria solani is known for its devastating impact on various plant species, especially those belonging to the Solanaceae family, causing a significant threat to global agricultural productivity. To counter this problem, farmers and agriculturists use conventional chemical fungicides, which contribute to environmental pollution, bioamplification, health hazards, and fungicide resistance, creating an alarming issue, thus emphasizing the need for eco-friendly solutions. “Biogenic or plant-based nanotechnology” is an advanced method that offers an efficient, eco-friendly alternative source to overcome such problems. In the present research, we have fabricated biogenic copper oxide nanoparticles (CuO NPs) using *Beta vulgaris* (beetroot) through a bottom-up approach, and its characterization through UV-Vis, XRD, and FTIR confirmed successful synthesis, while TEM analysis revealed a nanoplates structure. Dye reduction and DPPH antioxidant assays validated their catalytic efficiency and functionality. The bioactive antifungal effectiveness of CuO NPs against *A. solani* was assessed using the agar diffusion method, with IC₅₀, MFC (Minimum fungicidal concentration), and MGI (Mycelial growth inhibition) values of 0.2%, 0.4%, and 53.7%, respectively, demonstrating significant fungal inhibition. Antimicrobial activity against *Pseudomonas aeruginosa*, *Bacillus cereus*, and methicillin-resistant *Staphylococcus aureus* showcased NPs versatile utility. Thus, this study presupposes the potential of beetroot-extract-derived CuO NPs candidature as a new generation of antifungal agents for *Alternaria solani*-induced early blight management approach supporting global initiatives in sustainable agriculture and advancements in nanotechnology.



Gene Therapy and approach in the treatment of Amyotrophic Lateral Sclerosis

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Abstract

Amyotrophic lateral sclerosis (ALS) is a neurodegenerative disease with progressive loss of motor neurons and resultant weakness, paralysis, and death. The existing treatments have limited efficacy, emphasizing the necessity for novel therapeutic strategies. Gene therapy has been proposed as a promising therapeutic option for ALS, with the potential to address the inherent genetic and molecular mechanisms of the disease. This strategy entails the delivery of therapeutic genes, including those that encode for neuroprotective factors, antisense oligonucleotides (ASOs) to suppress mutant genes (e.g., SOD1, C9ORF72), or CRISPR-based gene-editing reagents to repair genetic flaws. Preclinical research in animal models has shown the promise of gene therapy to slow disease progression and enhance motor function. The most recent developments in viral vector technology, specifically adeno-associated viruses (AAVs), have increased the delivery and targeting of gene therapies to the central nervous system. Encouraging safety profiles and initial efficacy have been observed in early-phase clinical trials, although there are still issues to be addressed with optimizing delivery, reducing immune reactions, and tackling the genetic diversity of ALS. Gene therapy has the potential to dramatically change the course of ALS treatment and possibly provide disease-altering therapies for this debilitating disease. More studies and clinical proof of concept are needed to unlock its full potential.



Mechanistic insight into Glycerol induced Fluorescence enhancement of *Catharanthus roseus* Carbon dot and their specific interaction with Dead Yeast Cells.

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Abstract

The distribution of live and dead microbes under a treatment regime can give an estimate of its efficacy. There are so many methods to determine this distribution, however, optical imaging through optical probes is preferred method due to its ease and rapid results. Currently, live-dead investigation of microbes is done using colorimetric dyes or organic molecules based fluorescent dyes. Due to their high cost and significant toxicity to live cells, alternative optical probes are required. Here we have synthesized a nitrogen-doped, carbon dot based optical probe to distinguish live and dead population of yeast cells. This probe was called as CRCD and it was synthesized through hydrothermal treatment of *Catharanthus roseus* flowers with ethylene-di-amines. Under UV light, CRCD emits blue-green fluorescence. High-resolution TEM imaging shows a quasi-spherical size of CRCD with an average diameter of less than 10 nm. FTIR spectroscopy shows presence of prominent presence of several functional groups like carboxylic acid, amine, and sulphonamide in CRCD. Photo-luminance spectra show pH sensitivity and excitation-dependent emission properties. Though, CRCD shows limited photostability and poor fluorescence signals in aqueous medium, but their photostability and signal-to-noise ratio increases significantly in viscous medium. CRCDs were found to specifically label dead yeast cells over live cells. This highlights their potential as an alternative to traditional dyes, particularly for non-invasive and long-term imaging applications.

The use of plant biomass-derived carbon dots represents a sustainable, cost-effective, and eco-friendly approach to bioimaging, aligning with the growing demand for green nanotechnology and microbiology.



Fabrication, Characterization and Application of Terpeneol-Loaded Zein Nanoparticles for Controlling Fungal Diseases in Potato

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Abstract

Nanotechnology is increasingly applied in agriculture and food science to enhance the effectiveness and longevity of bioactive compounds. One such advancement is nano-encapsulation, which improves the solubility, stability, and bioavailability of these compounds, while extending their shelf-life. Zein, a corn-derived protein, offers an ideal matrix for nano-encapsulation due to its biocompatibility and controlled-release properties, making it valuable in both pharmaceutical and agricultural applications. In this study, terpeneol, a monoterpene with strong antioxidant, antimicrobial, and antifungal activities, was encapsulated using zein nanoparticles (TerZNPs) prepared via an antisolvent precipitation method. Characterization of TerZNPs through UV-Vis spectroscopy, FTIR, TEM, and zeta potential analysis revealed spherical nanoparticles with a hydrodynamic diameter close to 200 nm and a PDI < 0.2. The encapsulation efficiency and loading capacity reached 71.47% and 11.87%, respectively, highlighting the suitability of the zein matrix for terpeneol encapsulation. In vitro antifungal assessments demonstrated significant inhibition of *Phytophthora infestans* and *Alternaria solani* pathogens responsible for major crop losses. Additionally, TerZNPs reduced the severity of late blight disease in potato plants, leading to enhanced plant health and tuber yield. To investigate the mechanism behind the antifungal action of the nanoparticles, fluorescent zein nanoparticles were prepared by encapsulating fluorescein diacetate (FDA) to confirm nanoparticle penetration into plant cells. Further, antioxidant assays revealed that TerZNPs significantly increased the activity of defence enzymes (SOD, CAT, POD), mitigating oxidative stress caused by *Phytophthora infestans*. Moreover, Terpeneol's direct antifungal activity, combined with its controlled release from the zein matrix and confirmed plant cell penetration, resulted in decreased fungal loads and improved crop health and productivity. These findings suggest that TerZNPs represent a promising biofungicidal strategy, leveraging terpeneol's bioactivity to strengthen crop resilience and yield.



Exploring the Antioxidant and Antibacterial potential of Shatavari (*Asparagus racemosus*) root extract.

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Abstract

Shatavari (*Asparagus racemosus*), often referred to as the Queen of Indian Ayurveda, is widely recognized for its medicinal properties. This study aimed to evaluate the antioxidant and antibacterial effects of different solvent extracts derived from the roots of Shatavari. The antioxidant activity of these extracts was assessed using the DPPH (2,2-diphenyl-1-picrylhydrazyl) and FRAP (Ferric reducing antioxidant power) method. Additionally, the antibacterial activity was determined using the agar well diffusion method, specifically focusing on the inhibition of *Pseudomonas aeruginosa* growth. Among the tested extracts, the butanol and hexane extract of Shatavari roots exhibited significant antioxidant activity, reducing DPPH radicals by 55% and 62%, respectively. Furthermore, the ferric reducing power assay demonstrated a concentration-dependent increase in reducing power for both the butanol and hexane extracts. Additionally, the hexane extract displayed the highest zone of inhibition against *P. aeruginosa*. These findings underscore the therapeutic potential of Shatavari root extracts as potent antioxidants and antibacterial agents, depending on the solvent used for extraction.



Different Methods Used in Weed Management

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Abstract

Weeds are plants that possess undesirable traits and are invasive to our lawns and gardens. It is a plant that grows where it is not wanted, including plants that were not intentionally sown or those that are more competitive and interfere with human activity. Weeds spread out of control, often to areas where you don't want them, and may harm garden plants by depriving them of water, nutrients, or sunlight. Weeding is the process of removing weeds from a field, which is an efficient approach to crop protection and agricultural production management. Methods for weed control include pulling, digging, disking, plowing, and mowing. The effectiveness of these mechanical control methods depends on the life cycle of the target weed species. Regardless of the number and species of weeds in our yards, it is not realistic to attempt to eradicate all weeds. An integrated approach to weed management uses a combination of cultural, physical, biological, and chemical methods to provide the best possible weed management in each situation. Integrated weed management is more environmentally sound and more effective than complete reliance on chemical management (i.e., herbicides). While not all management methods are useful for all weed species, taking an integrated approach to weed management can greatly increase the effectiveness of your efforts while reducing the expense associated with herbicide use. Weed management can be achieved through physical and chemical methods. Physical methods include hand weeding, cultivation, mulching, mowing, flaming, hand-removal, mulches, and soil solarization. Chemical methods include the use of herbicides. Weeds can be managed through avoidance, control, and eradication. To control weeds, it is important to prevent them from developing seed and perpetuating the weed problem. Weeds need to be controlled from planting until the crop canopy closes.



Advancements in Microbial Enzyme Technology for Soil Pollutant Removal: A Critical Review

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Abstract

Soil contamination poses a significant and persistent environmental challenge globally, primarily due to its limited self-purification capacity, extended degradation periods, and the high costs associated with remediation. Contaminants present in soil can enter biological systems through dust or water pathways, potentially inducing adverse health effects. Recent research has highlighted the promising potential of microbial consortia for the remediation of contaminated soils. This approach leverages the effective elimination, bio-adsorption, or carbonated precipitation of both organic and inorganic pollutants, including pesticides, plastics, and polycyclic aromatic hydrocarbons (PAHs), by synergistic microbial communities. The widespread use of pesticides and other pollutants, coupled with the subsequent accumulation of residues in soil, has emerged as a critical global concern. Past agricultural practices have resulted in the pervasive dissemination of pesticides and nanofertilizers throughout the environment, leading to significant contamination. This article provides a comprehensive review of the bioremediation of pesticide compounds in soil utilizing microbial enzymes, encompassing enzymatic degradation pathways and recent advancements in enzyme-mediated bioremediation. The superior degradation capabilities of microbial consortia, compared to single bacterial strains, are attributed to distinct synergistic mechanisms and the coordinated action of matching microorganisms. These consortia achieve enhanced degradation through mechanisms such as increased synergistic activity, reduced accumulation of intermediate products, in situ crude enzyme production, and self-regulation. This review offers valuable insights into the application of microbial consortia for the effective removal of soil pollutants.



Pyridoxine Powerhouse: Metabolic Engineering of potato (*Solanum tuberosum* L.) for Enhanced Vitamin B6 Biosynthesis and Stress Resilience via *PDX1.3* and *PDX2* Co-Expression

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Abstract

Vitamin B6, an indispensable micronutrient that cannot be endogenously synthesized by humans, is pivotal in a myriad of metabolic pathways, necessitating its acquisition from dietary sources such as plants and plant-derived products. Potato (*Solanum tuberosum* L.), a globally staple crop, presents a promising candidate for biofortification strategies aimed at mitigating vitamin B6 deficiency. This investigation focused on augmenting vitamin B6 levels and bolstering stress resilience in potato through genetic engineering. The *PDX1.3* gene from *Brassica napus* and the *PDX2* gene from *Arabidopsis thaliana* were co-expressed in potato via *Agrobacterium*-mediated transformation. Biochemical analyses revealed a substantial elevation in vitamin B6 content within transgenic tubers, with increases ranging from 107% to 205% relative to wild-type counterparts. Additionally, transgenic lines displayed enhanced salinity stress tolerance under NaCl-induced conditions. Spectrophotometric evaluations of antioxidant enzyme activities, including ascorbate peroxidase (APX), catalase (CAT), superoxide dismutase (SOD), and dehydroascorbate reductase (DHAR), indicated markedly higher enzymatic activities in transgenic lines. These results underscore that the co-expression of *PDX1.3* and *PDX2* genes in potato not only augments vitamin B6 content but also imparts improved abiotic stress tolerance. This dual enhancement holds significant potential for the development of nutritionally enriched and environmentally robust potato cultivars, addressing both dietary deficiencies and agricultural challenges.



Unveiling Vertebrate Development: Zebrafish as a Key Model Organism

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Abstract

The zebrafish (*Danio rerio*) has emerged as a model organism for developmental biology due to its transparency, rapid development, and genetic similarities to humans. The developmental stages of zebrafish span from fertilization to adulthood, encompassing critical processes such as embryogenesis, organogenesis, and morphogenesis. The fertilized egg develops externally, enabling direct observation of early developmental stages. Key processes include the formation of the blastoderm, gastrulation, neurulation, and somitogenesis, which lead to the establishment of the body plan. Zebrafish undergo organ development in a highly synchronized manner, and organs such as the heart, liver, and kidneys begin functioning early in development. The zebrafish embryo is particularly valuable in studying cellular behaviors like migration, differentiation, and patterning, as well as in modeling human diseases and drug discovery. Advances in genetic manipulation, including CRISPR/ Cas9, have further enhanced the zebrafish's utility in understanding gene function during development. The organism's ability to regenerate tissues and organs, such as the heart and spinal cord, also holds promise for regenerative medicine. The zebrafish model provides an invaluable framework for understanding vertebrate development and offers critical insights into human health and disease. Key Word: Zebra fish, development stage, CRISPR/Cas9, regenerative medicine, human health and disease, Organ Development



Allyl Sulphide Loaded Lipid Nanoparticles as Targeted Therapeutics Against Breast Cancer Cell Lines

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Abstract

Garlic oil (GO), a potent source of bioactive organosulfur compounds including Allyl sulphide (AS), Diallyl disulphide (DADS), Diallyl trisulphide (DATS) etc, has demonstrated significant antimicrobial and anticancer properties. However, its hydrophobic nature and instability limit its therapeutic application. In this study, we successfully encapsulated AS into lipid nanoparticles using the emulsification-solvent diffusion technique coupled with low-temperature solidification, providing enhanced stability and delivery. Physicochemical characterization of the AS-SLNs revealed uniform spherical morphology with mean particle size of 120 nm and encapsulation efficiency of approximately 79.15±3.67%. Structural confirmation and AS retention were validated through UV-Vis spectroscopy, nuclear magnetic resonance (NMR), and Fourier-transform infrared spectroscopy (FTIR). Colloidal stability was confirmed via zeta potential analysis, while morphological assessment was conducted using transmission electron microscopy (TEM). The nanoparticles demonstrated potent antibacterial activity against multidrug-resistant (MDR) bacterial strains, including *Bacillus cereus* and *Methicillin-resistant Staphylococcus aureus* with minimum inhibitory concentrations (MIC) significantly lower than free AS. In-vitro anticancer studies utilizing sulforhodamine B (SRB) assay revealed dose-dependent cytotoxicity against MCF-7 breast cancer cell lines, with AS-SLNs inducing significant apoptotic response. These findings elucidate the potential of lipid-based nanocarrier systems in enhancing the bioavailability, stability and therapeutic efficacy of AS, presenting a promising approach for addressing MDR pathogens, fungal infections and hormone-responsive mammary carcinoma. This investigation establishes the utility of lipid nanoparticulate systems as effective delivery vehicles, offering solutions to critical challenges in antimicrobial resistance and cancer therapies.



Applications of Next Generation Sequencing in Metagenomic Research

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Abstract

Soil harbors a complex microbial community essential for plant health, nutrient cycling, and ecosystem sustainability. Medicinal plants, known for their bioactive compounds, interact closely with soil microbiota, influencing their growth and therapeutic potential. Traditional microbial studies rely on culturable techniques, leaving a vast majority of unculturable microbes unexplored. Metagenomics, a culture-independent approach, enables the comprehensive profiling of microbial communities by directly extracting and sequencing environmental DNA. Next-generation sequencing (NGS) has revolutionized metagenomic studies, offering high-throughput, cost-effective, and precise characterization of microbial diversity. NGS platforms such as Ion Torrent technology facilitates whole-genome sequencing and 16S rRNA amplicon sequencing, aiding in taxonomic and functional profiling. Ion Torrent sequencing is a next-generation sequencing (NGS) platform that uses semiconductor sequencing technology to detect nucleotide incorporation in real-time. It measures changes in pH caused by the release of hydrogen ions during DNA polymerization. The application of metagenomics to medicinal plant rhizospheres can reveal plant-beneficial microbes involved in biocontrol, biofertilization, and secondary metabolite production.



Ant Pheromones as biocontrol Agents: Exploring their Mechanisms and cross- species interactions

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Abstract

Ants rely on chemical communication, particularly trail pheromones, for foraging, nest coordination and colony defence. This study aims to extract, characterize and assess the behavioural effects on ant trail pheromones on other insects, with potential application in sustainable insect pest management. Pheromones will be extracted using solvent-based methods and their chemical composition will be identified through Gas Chromatography-Mass Spectrometry (GS-MS). Behavioural assays, including Y-Tube olfactometer test and artificial trail following experiments, will be conducted to evaluate the response of both conspecific (same species) and heterospecific (other insect species individuals). This study will explore the specificity of ant pheromones and their potential influence on pest species providing insights in to chemical – ecology-based pest control strategies. By identifying pheromones that affect insect behaviour, this research could contribute to the development of eco-friendly pest management solutions, such as pheromone traps, deterrents and biorational insects control techniques. Understanding the chemical interactions between ants and other insects can lead to novel biocontrol strategies that reduce the reliance on synthetic pesticides and mitigate the environmental impact.



Detection of microplastics in water samples

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Abstract

Microplastics, defined as plastic particles smaller than 5 millimeters, had become a significant environmental issue due to their persistence and widespread distribution across ecosystems. These particles were primarily produced through the degradation of larger plastic debris. Due to their small size, durability, and widespread use, microplastics had infiltrated nearly every part of the planet, including marine, freshwater, and terrestrial environments, as well as the air. They posed risks to wildlife, human health, and ecosystem functioning. Identifying and characterizing microplastics in complex environmental samples was essential for understanding their sources, distribution, and impacts. In this research, various analytical techniques will be employed to detect and characterize microplastics effectively. FTIR spectroscopy will be used to identify the polymer types of microplastics by analyzing their unique molecular vibrational patterns. Additionally, Gas Chromatography-Mass Spectrometry will be utilized for a highly sensitive analysis, breaking down microplastics through thermal degradation and identifying the resulting chemical compounds, offering detailed insights into polymer composition. Density separation techniques, often combined with hydrogen peroxide digestion, will be applied to isolate microplastics from environmental samples by exploiting differences in density between plastics and other materials. This study aimed to integrate these methods to provide a comprehensive approach to microplastic detection and characterization, advancing our understanding of their environmental impact and contributing to strategies for mitigating pollution.



Formulation and characterization of Eugenol loaded solid lipid nanoparticles and evaluate their antimicrobial activity against pathogenic fungi and bacteria

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Abstract

Bioactive compounds like eugenol, derived primarily from clove (*Syzygium aromaticum*), offer significant benefits for both plant and human health due to their potent antimicrobial and antioxidant properties. However, their application is often limited by poor solubility in polar solvents and susceptibility to degradation via photolysis and hydrolysis. Nanostructured systems, particularly solid lipid nanoparticles (SLNs), provide a promising solution by enhancing solubility, stability, and bioavailability while protecting these compounds from degradation. Despite their potential, the development of such systems faces challenges, including the selection of optimal synthesis methods, nanomaterials, and the need for rigorous toxicological evaluation. In this study, eugenol was encapsulated in a solid lipid nanomatrix using an emulsification and low-temperature solidification method. The aim was to enhance the stability, controlled release, and bioavailability of eugenol for potential therapeutic applications. The synthesized eugenol-loaded nanoparticles (Eu-SLNs) were characterized using transmission electron microscopy (TEM), UV-Vis spectroscopy and Zeta potential analysis. The nanoparticles exhibited a spherical morphology, high encapsulation efficiency ($87.91\% \pm 5.12\%$) and significant drug loading capacity ($29.3 \pm 2.51\%$). Antimicrobial, antioxidant, and anti-biofilm assays demonstrated the potent inhibitory effects of Eu-SLNs against pathogenic microorganisms, including *Pseudomonas aeruginosa* and *P. infectans*. In vivo analysis further confirmed the efficacy of Eu-SLNs in reducing infection and biofilm formation in plant models. The results underscore the potential of Eu-SLNs as an effective delivery system for eugenol, improving its stability and bioavailability while displaying significant biocidal activity against various pathogens. This study highlights the potential of Eu-SLNs for use in targeted drug delivery, antimicrobial formulations, and sustainable agricultural practices, providing a safe and efficient alternative to conventional methods.



Bioprospection of fungal secondary metabolites from fungi with a focus on therapeutic application

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Abstract

One of the most significant areas of study nowadays is the creation of novel medications, particularly in the field of infectious diseases. Natural product chemists are paying more and more attention to fungal isolates because of their unique and varied chemicals, which make them intriguing options for medication development. Well-known mycotoxins called macrocyclic trichothecenes are made by a number of fungal genera, including *Stachybotrys*, *Myrothecium*, and *Cylindrocarpon*. During the course of working on fungal metabolites, the fungus *Dichotomophthora* was studied. It belongs to the family Pleosporaceae. The fungus was isolated from the host plant *Basella alba*, on the basis of morphological characteristics. The crude extract was tested for antibacterial activity against MRSA 43300, MRSA Mu50, and MSSA 25923 bacterial strains using ethanol and ethyl acetate extract. A new macrocyclic trichothecene derivative (bioactive secondary metabolites) of the fungus *Paramyrothecium roridum* was discovered. It inhibits proliferation and induces apoptosis in prostate cancer cells by inhibiting pro-survival Akt/NF- κ B/mTOR signaling and exhibited antimalarial activity. Nematicidal activity was present in Verrucarins A and Roridin A. Antifungal activity was exhibited by Verrucarins B and other metabolites extracted from *Paramyrothecium*. The fungus *Paramyrothecium* spp. is found in soil and decomposing plant tissues all over the world as saprophytic fungi or pathogenic on a variety of hosts and is a member of the Stachybotriaceae family. In the present investigation, fungus was isolated from the host plant *Holorrhena antidysentrica*. Isolation was identified according to morphological characteristics. In Potato Dextrose Agar (PDA) culture, the olive-green conidia were 6-6.5 μ m long $\times$ 2.3 μ m wide, and cylindrical with rounded ends. Conidia formed as white to black masses on sessile sporodochia in concentric zones and was identified using a molecular approach using a polymerase chain reaction assay (PCR) of the DNA to confirm the *Paramyrothecium* species.



Assessment of antimicrobial and anti-cancerous activity of bioactive secondary metabolites of fungi *Paramyrothecium* spp.

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Abstract

In the era of natural drug discovery fungi is becoming one of favorite microorganism. They are considered as a good source of bioactive compounds. Fungus is known to produce many beneficial bioactive secondary metabolites. These secondary metabolites show immense biological activities like antimicrobial, antibiotic, insecticidal, herbicide, antifungal and anticancerous activity. We isolated a fungal strain of *Paramyrothecium* genus belonging to stachybotryaceae family from two different plant hosts *Teliacora* and *Croton* and is known to cause leaf spot and leaf blight. Secondary metabolite that was produced by *Paramyrothecium* sp. Is chemically macrocyclic trichothecene, terpenes, alkaloids and other compounds. These compounds have high cytostatic activity, cytotoxic and antioxidant property. Isolated compounds were identified by different advance techniques like column chromatography, thin layer chromatography (TLC), high performance liquid chromatography (HPLC), gas chromatography, mass spectroscopy (GC-MS), high resolution mass chromatography (HRMS) as well as Nuclear magnetic Resonance (NMR) for structural analysis of compounds. We also analyzed molecular sequencing through ITS, Rpb2 to distinguish and develop perception of this fungi, since these regions are the most prominent nuclear DNA sequences in fungi.



Fabrication, Characterization and Application of Terpineol-Loaded Zein Nanoparticles for Controlling Fungal Diseases in Potato

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Abstract

Nanotechnology is increasingly applied in agriculture and food science to enhance the effectiveness and longevity of bioactive compounds. One such advancement is nano-encapsulation, which improves the solubility, stability, and bioavailability of these compounds, while extending their shelf-life. Zein, a corn-derived protein, offers an ideal matrix for nano-encapsulation due to its biocompatibility and controlled-release properties, making it valuable in both pharmaceutical and agricultural applications. In this study, terpineol, a monoterpenoid with strong antioxidant, antimicrobial, and antifungal activities, was encapsulated using zein nanoparticles (TerZNPs) prepared via an antisolvent precipitation method. Characterization of TerZNPs through UV-Vis spectroscopy, FTIR, TEM, and zeta potential analysis revealed spherical nanoparticles with a hydrodynamic diameter close to 200 nm and a PDI < 0.2. The encapsulation efficiency and loading capacity reached 71.47% and 11.87%, respectively, highlighting the suitability of the zein matrix for terpineol encapsulation. In vitro antifungal assessments demonstrated significant inhibition of *Phytophthora infestans* and *Alternaria solani* pathogens responsible for major crop losses. Additionally, TerZNPs reduced the severity of late blight disease in potato plants, leading to enhanced plant health and tuber yield. To investigate the mechanism behind the antifungal action of the nanoparticles, fluorescent zein nanoparticles were prepared by encapsulating fluorescein diacetate (FDA) to confirm nanoparticle penetration into plant cells. Further, antioxidant assays revealed that TerZNPs significantly increased the activity of defence enzymes (SOD, CAT, POD), mitigating oxidative stress caused by *Phytophthora infestans*. Moreover, Terpineol's direct antifungal activity, combined with its controlled release from the zein matrix and confirmed plant cell penetration, resulted in decreased fungal loads and improved crop health and productivity. These findings suggest that TerZNPs represent a promising biofungicidal strategy, leveraging terpineol's bioactivity to strengthen crop resilience and yield.



Exploring the Antioxidant potential and Pancreatic Lipase-Targeted Therapeutic role of Diosgenin from *Dioscorea bulbifera*

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Abstract

Obesity and oxidative stress are key factors of metabolic syndrome, increasing cardiovascular and diabetes risk. Anti-obesity agents, such as lipase inhibitors reduces fat absorption, while antioxidants mitigate oxidative damage, preventing degenerative disease progression. Therefore, we investigated the therapeutic potential of diosgenin rich extract of *Dioscorea bulbifera*, with a focus on their antioxidant activity and pancreatic lipase (PL) inhibition. The inhibitory activity of pancreatic lipase was assessed using a spectrophotometric assay with p-nitrophenyl palmitate as the substrate, measuring the rate of hydrolysis. The antioxidant activity of extracted diosgenin was also evaluated using the DPPH radical-scavenging assay and the ferric reducing antioxidant power (FRAP) method. The results showed that the extracted diosgenin exhibited a greater inhibitory effect, reducing enzyme activity by 52% compared to the control at a concentration of 60 µg/mL. Additionally, molecular docking analysis revealed that diosgenin interacts with the active site of lipase (PDB ID: 2PPL) with a binding affinity of -7.3 kcal/mol and a RMSD of 2.2 Å. The binding was primarily stabilized by hydrogen bonding and hydrophobic interactions, particularly with key residues such as ARG55, GLU23, and ASP24. Furthermore, Diosgenin showed potent antioxidation activity. It reduces the DPPH radicles up to 78%. Additionally, the ferric reducing power of diosgenin increased in a dose-dependent manner. Notably, diosgenin demonstrated a higher reducing power than ascorbic acid, indicating its potent antioxidant capacity. These findings highlight the dual therapeutic potential of *D. bulbifera*-derived diosgenin as a potent pancreatic lipase inhibitor and antioxidant, suggesting its promising role in managing obesity and oxidative stress-related metabolic disorders.



Fermented Food Nutraceuticals for Health Promotion and Food Security

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Abstract

Growing population of world demands more and accessible food for food security. At the same time, increase in the lifestyle related diseases changes perception of the population towards healthy foods that not only provide nutrition but also have certain physiological impact on the body. Demand for healthy foods results in the emergence of the concept of nutraceuticals i.e. food for health. In this scenario, fermented foods offer novel opportunity for nutraceutical industry as they are rich sources of nutrients and bioactive components that have health benefits also. These fermented foods contain dietary fibres, vitamins, proteins, fatty acids, and other bioactives that support healthy gut microbiome. Fermented foods may contain live microorganisms that can offer probiotic potential which further increase its utility in providing healthy foods to the vulnerable section of the population. Marketing and proper supply of these fermented foods to the remote areas will help in reducing hunger and malnutrition and also support food security programs.



Antibacterial activity of some medicinal plants of North-Eastern Terai Region of Uttar Pradesh

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Abstract

Bacterial infections remain one of the most ubiquitous and daunting question to global public health, assert millions of lives annually and damaging healthcare systems across the world. Once manageable with antibiotics, now pose escalating threats due to the rapid rise of antimicrobial resistance (AMR). Misuse and over use of antibiotics cause antibacterial resistance which is critical global health challenge of present time, and leading to the emergence of multi drug resistance bacterial strains. Mechanisms that cause resistance such as interference in drug targets, antibiotics enzymatic degradation, enhance efflux pump activity, and formation of biofilm contribute bacterial survival in opposition to antimicrobial agents. Approach to counter resistance include isolation of novel antibiotics, antimicrobial management programs, and alternative therapies such as plant-based antimicrobials. Plant-based formulations can be a good option in reducing antibacterial resistance. Phytochemicals that are found in plants such as terpenoids, flavonoids, saponins, and alkaloids have shown antimicrobial activity against drug-resistant bacteria. These phytochemicals can cause bacterial cell membrane disruption, hindrance of bacterial efflux pumps and interruption of biofilm formation. The North-Eastern Terai Region of Uttar Pradesh, renowned for its diverse ecosystems, hosts a rich repository of medicinal flora traditionally utilised to combat bacterial infections. Different extracts of these plants were tested against antibiotic-resistant bacterial strains, including *Escherichia coli*, *Staphylococcus aureus*, and *Pseudomonas aeruginosa* and were found to be effective against these bacterial strains.



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Collection, Preservation and Identification of Family Reduviidae of Hemiptera in Madhya Pradesh

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Abstract

The family *Reduviidae* (Hemiptera) is a diverse group of insects, commonly known as assassin bugs, which play important ecological roles as predators of other insects, including agricultural pests. This study focuses on the collection, preservation, and identification of *Reduviidae* species from Madhya Pradesh, a region rich in biodiversity. The primary aim of the research is to establish a comprehensive database of *Reduviidae* species found in this area, using both morphological and molecular techniques for accurate identification. Specimens were collected from various habitats, including agricultural fields, forests, and urban areas, over a period of one year. Proper collection methods and preservation techniques were employed to ensure the integrity of the specimens for future research. Identification was carried out through detailed morphological examination, including the analysis of body structures such as legs, antennae, and genitalia, in addition to DNA barcoding for precise species-level identification. This study highlights the diversity of the *Reduviidae* family in Madhya Pradesh, contributing to the understanding of the distribution and ecological roles of these insects in the region. The findings serve as a valuable resource for entomologists, ecologists, and pest management professionals, and provide a foundation for further studies on the biodiversity and behavior of *Reduviidae* in India.



Exploring the Phytopharmaceutical Potential of Underutilized Plant *Dioscorea alata* L. from the Forests of North-Eastern Terai Region of Uttar Pradesh

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Abstract

The North-Eastern Terai region of Uttar Pradesh is home to diverse yet underutilized plant species with significant medicinal potential. *Dioscorea alata* L., commonly known as purple yam, is one such plant with promising phytopharmaceutical applications. Traditionally used as a food source, this species also possesses bioactive compounds with anti-inflammatory, antioxidant, antidiabetic, and antimicrobial properties. However, its pharmacological potential remains largely unexplored. This study aims to investigate the phytochemical profile, antioxidant activity, and potential pharmaceutical applications of tubers of *D. alata* from the Terai forests of Uttar Pradesh. Phytochemical analysis of methanolic extracts revealed the presence of phenolics, flavonoids, saponins and alkaloids, which contribute to its medicinal properties. The Total Phenolic Content (TPC) was found to be 8.431 ± 0.007 mg GAE/g extract, while the Total Flavonoid Content (TFC) was 4.107 ± 0.019 mg QE/g extract. The antioxidant potential was assessed using the DPPH radical scavenging assay, where *D. alata* exhibited strong free radical inhibition with an IC₅₀ value of 134.097 ± 0.011 µg/ml. These findings suggest that *D. alata* is a valuable source of natural antioxidants and bioactive compounds, warranting further exploration for potential therapeutic applications in oxidative stress-related diseases, diabetes management, and anti-inflammatory treatments.



MC-LR-induced alterations in the unfolded protein response pathway in mice and the ameliorative effects of coenzyme Q10

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Abstract

Cyanotoxins, harmful substances produced by cyanobacteria in freshwater, pose serious risks to both the environment and human health. Detecting and identifying these toxins quickly and accurately is essential for preventing their negative effects. This review explores three advanced techniques used for this purpose: High-Performance Liquid Chromatography (HPLC), Inductively Coupled Plasma Mass Spectrometry (ICP-MS), and Real-Time Polymerase Chain Reaction (qPCR). HPLC helps separate and measure different cyanotoxins based on their chemical properties, while ICP-MS detects toxic elements linked to cyanotoxins with high precision. qPCR, on the other hand, is a powerful genetic tool that identifies toxin-producing cyanobacteria by detecting specific DNA sequences. We discuss the strengths and limitations of these methods and how they contribute to water quality monitoring and public safety. Additionally, we highlight recent advancements, such as multi-omics approaches and biosensors, which are making detection faster and more accurate. By bringing together the latest research and technological developments, this review aims to help scientists, environmental agencies, and policymakers choose the best tools for monitoring and controlling cyanotoxin contamination in water bodies.



Preparation, expression and construct of a Mycobacterium tuberculosis gene [RV2563] and studying its over expression profile.

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Abstract

In gene expression we study the over expression of a gene in a particular species. In my dissertation I am working Mycobacterium tuberculosis. We know Tuberculosis (TV) is most common disease caused by bacteria Mycobacterium tuberculosis. In this species have a specific gene us RV2563. The work is thus to isolate and study its over expression by using different tools like DNA isolation, select gene if interest, isolate the gene, PCR, Cloning, culture etc. RV2563 gene has 1050 bp length, molecular mass 36025.4 Da and code a protein have 349 amino acids. RV2563 gene is a coding sequence for DNA (CDS)gene. It produces a protein like "Probable glutamine-transport transmembrane protein ABC transporter". Which is involved in active transport of glutamine across the membrane (import). Responsible for the translocation of the substrate across the membrane. After to study gene expression we are able to find how to control this gene expression. What types of protein structure and function synthesized by the gene.



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Sample	CT value
Positive control	15.5
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