Abstracts:

BIOLOGICAL SCIENCES

94th Annual Session of NASI and Symposium

on

"Accelerated R & D towards a *Viksit Bharat*"

at

IISER Bhopal

Abstracts

(Biological Sciences)

94th Annual Session of NASI and Symposium

on

"Accelerated R & D towards a *Viksit Bharat*"

Dedicated to the Past President of the Academy

Bharat Ratna Dr. M.S. Swaminathan

December 01-03, 2024

Hosted by

Indian Institute of Science Education and Research (IISER)

Bhopal - 462066



94th Annual Session of NASI and Symposium on

Accelerated R & D Towards a *Viksit Bharat*

jointly organized by

The National Academy of Sciences, India (NASI)

&

Indian Institute of Science Education & Research Bhopal (IISERB)

dedicated to the Past Presidents of the NASI,

- Bharat Ratna, Prof M. S. Swaminathan
- Padma Bhushan, Dr Manju Sharma

on 1-3 December 2024

at

IISERB, Bhopal Bypass Road, Bhauri, Bhopal, Madhya Pradesh, INDIA

---Tentative Programme ---

Day 1: December 1, 2024 (Sunday)

Children Science Meet (10:30 am – 12:00 pm) Venue: L-5

Local Coordinator: Prof Abhijit Patra, IISER Bhopal

Chairman	**Prof Ajoy K Ghatak** *Past President, NASI; Former Professor of Physics, IIT Delhi*
Co-Chair	**Prof Snigdha Thakur** Dept of Physics, IISER Bhopal

Resource Person

1. **Prof Ajoy K Ghatak,** Formerly Professor of Physics, IIT Delhi (25 + 5 min)
   Title: Einstein, $E = mc^2$ & The Atom Bomb
2. **Padma Shri Prof H.C. Verma**, Formerly Professor of Physics, IIT Kanpur (50 + 10 min)
   Title: Learning Physics from Nature and Scoring in Exams

Lunch (12:45 – 2:00 PM) **Venue**: Dining Hall, VH

REGISTRATION: LHC (11:00 AM – 2:00 PM)

December 1, 2024 (Sunday)

Inaugural Session (2:15 pm - 03:30 pm) **Venue:** L- 5 in LHC

Coordinator: Prof Chandan Sahi, IISER Bhopal

To begin with the lighting of the lamp

Welcome (4 min)	**Prof Vinod K Singh**, IIT Kanpur Convener **Prof Sourav Datta**, IISER Bhopal Local Co-convener
About NASI (5 min)	**Prof Jayesh R. Bellare**, IIT Bombay General Secretary (OS), NASI
About IISER Bhopal (6 min)	**Prof Gobardhan Das** Director, IISER Bhopal
Guest of Honor (6 min)	**Dr Shailesh Nayak** NIAS Bangalore
Guest of Honor (6 min)	**Dr Ajai Chowdhry** Founder, HCL; Chairman, EPIC Foundation
President (10 Min)	**Prof Balram Bhargava** President, NASI
Chief Guest (20 Min)	**Dr Jitendra Singh** Hon'ble Union Minister of State (Independent Charge) for Science & Technology, Govt of India
Felicitation of the Guests (3 min)	
Vote of thanks (4 min)	**Prof Daya Shankar Pandey**, BHU Varanasi General Secretary (HQ), NASI, **Prof Abhijit Patra**, IISER Bhopal Local Co-convenor
National Anthem & Group Photographs	

Tea/Coffee 3:30 PM – 4:00 PM (Foyer of LHC)

Session 1: Quantum Research & Futuristic Applications (4:00 PM - 4:50 PM)

Coordinator: Manmohan Kapur, IISER Bhopal **Venue:** L-5 in LHC

Chair/ Co-Chair	**Anurag Sharma**, IIT Delhi **Akshay Modi**, IISER Bhopal
Talk 1 (20 + 4 min)	**Ankur Raina**, IISER Bhopal *Bits to Qubits: Revolutionizing Computing with Quantum Mechanics*
Talk 2 (20 + 4 min)	**Kasturi Saha**, IIT Bombay *Quantum Sensing with Nitrogen Vacancy Centers in Diamond*

NASI Foundation Day Lecture (4:50 – 5:25 PM) Venue: VH Auditorium

- **Preside over:** **Prof Balram Bhargava**, President, NASI
- **Chairperson:** **Prof Ashok Misra**, Past President, NASI; JNCASR Bangalore
- **Speaker :** **Dr Ajai Chowdhry**, Founder HCL

Session 2: Climate Resilience & Sustainability (5:30 PM – 6:45 PM) Venue: L-5 in LHC

Coordinator: Dhanyalekshmi Pillai, IISER Bhopal

Chair/ Co-Chair	**Amit Roy**, Vice President, NASI **Pankaj Kumar**, IISER Bhopal
Talk 1 (20 + 4 min)	**Shailesh Nayak**, NIAS Bangalore *Climate Implications and Action: A Policy Perspective*
Talk 2 (20 + 4 min)	**Suruchi Bhadwal**, TERI New Delhi *Understanding Climate Change and its Responses*
Talk 3 (20 + 4 min)	**Ramya Sunder Raman**, IISER Bhopal *Atmospheric Aerosol Management to Advance Sustainable Development Goals: Opportunities and Strategies*

Dinner 7.30 PM onwards Venue: VH Lawn

Day 2: December 2, 2024 (Monday) **Venue:** VH Auditorium

Special Lecture (9:00 – 9:20 PM) Venue: VH Auditorium

- **Chairperson:** **Prof Balram Bhargava**, President, NASI
- **Speaker:** **Dr Subhra Chakraborty**, NIPGR
  A Tribute to Madam Manju Sharma - Woman of Wonder

Session 3: Health and Disease: Prevention, Control & Treatment (9:20 AM – 10:10 AM)

Coordinator: Ram Kumar Mishra, IISER Bhopal **Venue**: VH Auditorium

Chair/Co-Chair	**Madhu Dikshit**, CDRI Lucknow **Paramjit Khurana,** *University of Delhi*
Talk 1 (20 + 4 min)	**Amit Prakash Sharma**, ICGEB New Delhi *Malaria: traversing the tracks between structural biology and epidemiology*
Talk 2 (20 + 4 min)	**Sanjay Behari**, SCTIMST Trivandrum *Biomedical device development in contributing to health care in the country: the road map, the successes, and the travails*

Tea Break and Poster Visit (10:15 – 10:45 AM)

Session 4: Artificial Intelligence & Machine Learning (10:45 AM –11:55 AM)

Coordinator: Aasheesh Srivastava, IISER Bhopal **Venue**: VH Auditorium

Chair/Co-Chair	**R.S. Verma, MNNIT Allahabad** **Mitradeep Bhattacharjee**, IISER Bhopal
Talk 1 **(20 + 4 min)**	**Manish Gupta**, Google India Research & IIIT Bangalore *Transformative Power of AI and Open Challenges*
Talk 2 (20 + 4 min)	**Nitin Saxena**, IIT Kanpur *(Artificial) Intelligence in Society*
Talk 3 (20 + 4 min)	**Manik Varma**, Microsoft Research & IIT Delhi *Foundation Retrieval Models: The Next Paradigm Shift in Search, Recommendation & Chat*

Session 5: Cyber Security & Data Sovereignty (12:00 PM – 1:10 AM)

Coordinator: Rahul Garg, IISER Bhopal

Chair/Co-Chair	**J.P. Mittal**, BARC Mumbai **Vishal Rai**, IISER Bhopal
Talk 1 (20 + 4 min)	**Manindra Agrawal**, IIT Kanpur *Securing Critical Infrastructure of India*
Talk 2 (20 + 4 min)	**Jayant Haritsa**, IISc Bangalore *Light on Malicious Database Queries*
Talk 3 (20 + 4 min)	**Shweta Agrawal**, IIT Madras *Post Quantum Cryptography: The Road Ahead*

Lunch Break (1:15 – 2:20 PM)

Session 6 (Sectional Presidents' Session): (2:25 PM – 3:15 PM) **Venue**: VH Auditorium

Coordinator: Surajit Saha, IISER Bhopal

Chair/Co-Chair	**S.M. Yusuf**, BARC Mumbai **Gopal C. Kundu**, KIIT Bhubaneswar
Talk 1 (20 + 4 min)	**S Natarajan**, IISc Bangalore Sectional President, Physical Sciences *Designing new white light emitting materials for low-cost LEDs*
Talk 2 (20 + 4 min)	**Ch Srinivasa Rao,** ICAR-NAARM, Hyderabad Sectional President, Biological Sciences *Net Zero Emission Target by 2070: Agriculture Sector Contributions*

Tea Break and Poster Visit (3:15 PM – 4:00 PM)

Council Meeting (3:15 – 5:00 PM) **Venue**: VH Boardroom 3

- **Fellows Meeting** (Induction of Newly Elected Fellows; 5:00 –6:15 PM)
  Venue: VH Auditorium
- **Annual General Body Meeting** (6:15 – 7:15 PM)
- **Venue**: VH Auditorium

Dinner 7.30 PM onwards Venue: VH Lawn

Day 3: December 3, 2024 (Tuesday)

Session 7a (Parallel Session: Physical Sciences): (9.00 AM - 9.50 AM)

Venue: VH Auditorium

Coordinator: Nitin Patil, IISER Bhopal

Chair/Co-Chair	**S Natarajan**, IISc Bangalore (Sectional President, Physical Sciences) **Sanjit Konar**, IISER Bhopal
Speaker 1 (20 + 4 min)	**Joyanta Chaudhury**, IISER Bhopal *Toward a Carbon-Neutral Energy Economy via Recycling CO_2*
Speaker 2 (20 + 4 min)	**Arindam Ghosh**, IISc Bangalore *Designing emergent physics and technology with interfaces*

Session 7b (Parallel Session: Biological Sciences): (9.00-9.50 AM)

Venue: Seminar Hall 1 in VH

Coordinator: Apurba L. Koner, IISER Bhopal

Chair/Co-Chair	**Ch Srinivasa Rao**, ICAR-NAARM, Hyderabad (Sectional President, Biological Sciences) **Sourav Datta**, IISER Bhopal
Speaker 1 (20 + 4 min)	**C.R. Mehta**, Central Institute of Agricultural Engineering Bhopal *Food Security in India and Farm Mechanization*
Speaker 2 (20 + 4 min)	**M. Sundaram**, ICAR, IIRR Hyderabad *Gene Editing. Research and Development in Rice*

Tea Break (9:50 – 10:25 AM)

Discussion, Recommendations and Valedictory (10:30 – 12:00 PM)

Venue: VH Auditorium

Coordinator: Saptarshi Mukherjee, IISER Bhopal

Chairperson: Dr Subhra Chakraborty, NIPGR

Remarks (5 min)	**Balram Bhargava**, President, NASI
Remarks (3 min each)	Council Members, Sectional Presidents, Chairs, Speakers, etc
Felicitations and 'Outstanding Paper Presenters' receive their certificates. (30 min)	
Vote of Thanks (3 min)	**Santosh Shukla** Acting Exec Secretary, NASI

Lunch & Departure (12.30 - 2.00 PM)

PRESIDENTIAL ADDRESS

Net Zero Emission Target by 2070 and Agriculture Sector Contributions

by

Prof. Ch. Srinivasa Rao
Sectional President (Biological Sciences)
94th Annual Session of NASI at Bhopal
ICAR-National Academy of Agricultural Research Management, Hyderabad, 500030 India

NET ZERO EMISSION TARGETBY 2070 AND AGRICULTURE SECTOR CONTRIBUTIONS

Ch. Srinivasa Rao
ICAR-National Academy of Agricultural Research Management, Hyderabad, 500030 India

Introduction

Climate change and its impacts stands as one of the most urgent challenges confronting our planet today, denoting the prolonged alterations in global or regional climate patterns, chiefly propelled by human actions that discharge greenhouse gases into the atmosphere, ensnaring heat and driving up the Earth's average temperature. The primary cause behind climate change stems from human activities, notably the combustion of fossil fuels, deforestation, and industrial operations. The combustion of coal, oil, and natural gas for electricity generation, transportation, and industrial processes emit substantial quantities of carbon dioxide (CO_2), constituting the foremost greenhouse gas (GHGs), and accounts for approximately 65% of global greenhouse gas emissions. Equally significant are deforestation and land-use alterations, whereby the clearance of forests for agriculture, urban expansion, and other human endeavours liberates stored carbon into the air, contributing to roughly 11% of global greenhouse gas emissions. Agricultural and land use changes, inclusive of rice cultivation, livestock rearing, and fertilizer application, emit methane and nitrous oxide, potent greenhouse gases, accounting for around 24% of global emissions.

IPCC Report on Climate Change

The Inter-Governmental Panel on Climate Change (IPCC) in its 6th Assessment Report, released on August 9, 2021, observed that climate change is widespread, rapid and intensifying. The temperature increase will cross 1.5 ^{o}C threshold by 2040, which was earlier projected to be much later. The UN Secretary-General (November 1, 2021), on the occasion of Conference of Parties (CoP 26) at Glasgow emphatically said that either we stop it (climate change) or it will stop us. It is time to say enough as addiction to fossil fuel is pushing the humanity to the brink. In the CoP 26, India has made 5 commitments 'Panchamrit Commitments'. These include that by 2030, India will reduce emissions intensity by 45%; draw 50% of energy from renewable sources; raise non-fossil fuel-based energy capacity to 500 GW and cut carbon emission by 1 billion ton (Bt); and by 2070, the country will attain net zero emission and C neutrality. The questions are how Indian agriculture can contribute to fulfil these commitments, can Indian agriculture attain net zero emission or C neutrality target, and if yes, what are the technologies and action plan to attain the target?

Greenhouse Gas (GHGs) from Agriculture and Land Use Change

To answer these questions, we need to analyze the current greenhouse gas (GHG) emission scenario of the world and India. In 2020, world emitted about 50 Bt CO_2 eq. Globally, agriculture contributes 10-12% and agriculture, forestry, and other land use (AFOLU) contributes 24-25% of the total emission. India including all the sectors of the economy emitted about 6% of global GHGs. Indian agriculture contributed 0.8% of global and 14% of Indian GHGs emission. Currently, total

GHG emission from all the sectors of Indian economy is 2.82 Bt CO_2 eq. per annum (MoEFCC 2021). The energy sector contributes 75% of this emission followed by agriculture (14%), industry (8%) and waste (3%). India's agriculture emits 408 Mt CO2 eq., 55% of this emission comes from enteric fermentation, 19% from soil (mostly nitrous oxide), 17% from rice fields, 7% from manure management and 2% from residue burning and other sources. In the crop sector, which emit about 40%, of total lowland rice emits the largest amount of GHGs, followed by sugarcane and potato. Conventional lowland rice field emits about 80-100 kg methane and 0.7-0.8 kg nitrous oxide per hectare with a global warming potential (GWP) of 2100-2350 kg ha^{-1}.

Economic Losses of Climate Change

Climate change inflicts significant economic losses, a trend projected to escalate if global warming persists unchecked. Economically, losses in agriculture and food production arise from damages inflicted by droughts, floods, and extreme weather events, disrupting crop yields and income streams for farmers'. Property and infrastructure suffer as sea-level rise and coastal erosion imperils coastal assets and extreme weather events wreak havoc on buildings and transportation networks. Disruptions to supply chains and trade ensue from weather-related delays and alterations in raw material availability and pricing. Health costs mount as climate change exacerbates illnesses and injuries, while increased energy and water costs burden households and businesses. Recognizing the long-term economic impacts underscores the imperative for proactive measures to mitigate emissions and adapt to climate change, safeguarding economies and societies against the adverse effects of a warming planet. Studies indicated in 2020 that estimated world economic losses due to climate change could be between 127 and 616 trillion dollars by 2100 with current commitments, compared to 1.5 °C or well below 2 °C compatible action. Failure to implement current commitments raises economic losses to 150–792 trillion dollars by 2100. India being the most populous country with a larger geography is vulnerable to climate change, the most affected with climate change and its impacts in terms of droughts (early, mid-season and terminal), cyclones and floods, heatwaves and sea water inundation-led coastal salinity. Agriculture sub-sectors, field crops, horticulture, livestock, poultry, fishery are often affected by these extreme climatic events, leading to food losses, lowering the livelihood of small and marginal farmers, thus posing food, nutrition security challenges and overall sustainable development goals.

Net Zero Emission Commitment by Government of India

The commitment to achieving net-zero entails balancing greenhouse gas emissions produced with those removed from the atmosphere. This requires offsetting any remaining emissions through activities like reforestation or carbon capture and storage technologies. Numerous countries, companies, and organizations have established targets to reach net-zero emissions by specific years, with targets often set for 2050 or 2060. Greenhouse gas emissions from fossil fuels are projected to reach a record 36.8 billion metric tons in 2023, an increase of 1.1% from 2022, according to an annual report by the Global Carbon Project. India's Third National Communication to the United Nations Framework Convention on Climate Change was submitted on December 9, 2023. The report contains information on India's greenhouse gas emissions, its vulnerability to climate change, and the measures it is taking to mitigate emissions and adapt to the impacts of climate change. The energy sector contributed the most to the overall anthropogenic emissions

with 75.81%, followed by the agriculture sector with 13.44%, Industrial Process and Product Use (IPPU) with 8.41%, and Waste with 2.34%.

The Green Credit Initiative was launched by Hon'ble Prime Minister on the side-lines of COP 28. It is an initiative within the government's Lifestyle for Environment or LIFE movement. The Green Credit Rules, 2023, were notified on 12th October 2023 under the Environment Protection Act 1986. These rules put in place a mechanism to encourage voluntary environmental positive actions resulting in the issuance of green credits. In its initial phase, voluntary tree plantation is envisaged on degraded land, waste land, watershed areas etc. under the control and management of Forest Departments. In August 2022, India updated its NDC according to which target to reduce emissions intensity of its GDP has been enhanced to 45 percent by 2030 from 2005 level, and the target on cumulative electric power installed capacity from non-fossil fuel-based energy resources has been enhanced to 50% by 2030. India has been spending a significant amount of resources on adaptation-relevant actions, despite the competing demands for limited resources in a developing economy (https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1989495).

Opportunities and Strategies for Agriculture Sector Contributions to Net Zero Emission Targetby 2070

Agriculture contributes 14% of GHGs in India besides significant contributions from land use change. India is moving towards Paris Agreement (PA) commitments, the Net Zero Carbon (NZC) commitment by 2070 is a challenge unless all other sectors like agriculture contribute to the mission NZC. Currently, the agriculture sector's major emphasis is adaptation to climate change and its impacts; co-benefits of adaptation are equally important in the achievement of NZC.Agriculture sector is critical for the Indian economy and livelihoods of a large population; it contributes to food and nutritional security, health, and agri-exports. Food needs of the country along with crucial technological impact targets such as improved N use efficiency, water use efficiency, farm mechanization, and food loss reduction target. This underlines that a strong technically managed farming can have a larger mitigation potential if these technologies are implemented in a synergistic manner. Various agriculture sub-sectors like field crops, horticulture, livestock, fishery, and poultry can be potential avenues if managed with technically sound precision farming practices. Livestock-dairy is the largest contributor, and systems like rice-paddy, fertilizer and manure application, soil tillage mediated carbon loss into the atmosphere, besides improper management of farm and agri-industry waste, coal-based energy for lifting irrigation water etc., emit a considerable amount of GHGs. Indirectly, agro-industries related to fertilizer and pesticide manufacturing companies, their transportation, farm machinery used energy, transportation of agri inputs and outputs in terms of agri-value chains and cold storage infrastructure also contribute, but these emissions are accounted for in the Industry and transport sectors.

Indian agriculture has the potential to attain net zero emissions or carbon neutrality, at least in the crop sector. The current emission from the crop sector is about 150 Mt CO2 eq. yr-1. Our experiences show that alternate wetting and drying in rice with short-duration variety, neem-coated urea with soil health card and leaf colour chart reduces GHG emissions from rice by 40-50%. If we go for dry direct-seeded rice (DSR) without continuous submergence, the emission is reduced by about 70%. The global warming potential (GWP) is reduced by 70-80% with crop diversification from rice-wheat to maize-wheat. Conservation agriculture, including minimum

tillage, residue retention, and direct seeding of rice, can reduce the emissions by 30-40%. If we combine drip or sprinkler irrigation, run with solar or any form of renewable energy, the emission is almost zero. Studies showed that with the current adoption of conservation agriculture and DSR, mitigation of about 14% of total emissions from the crop sector has been achieved. A preliminary estimation shows that upscaling of conservation agriculture to 25% of the net cultivated area (140 Mha), rehabilitation of 25% of the degraded land (26 Mha), precision agriculture in 30% of the net cultivated area (140 Mha), diversification of rice-wheat system to upland cropping system in 10 Mha, adopting paramparagatKrishiVikashYajana (PMVY) and organic farming in 30% of the net cultivated area and using renewable energy in 50% of the net cultivated area will have net mitigation of about 160 Mt CO2 eq. yr-1.

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Contents

1. UNRAVELLING THE POSSIBLE POTENTIAL OF SYNBIOTIES IN MODULATING BRAIN PHYSIOLOGY: AN IN-VIVO APPROACH

Aamir Khan, Malabika Sikdar and Rashmi Srivastava
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Abstract
The brain-gut-axis represents a bidirectional communication pathway between the gut microbiome and the central nervous system. Increasing interest in gut microbiome and the mechanisms underlying its interaction with the brain has led to significant attention toward the potential applications of probiotics and prebiotics. This study evaluated the effects of dietary supplementation with Lactobacillus rhamnosus (L), Bifidobacterium longunm (B) and mannan oligosaccharides (MOS) - individually and in combination (LB and LBM) -on immature male Japanese quail. Markers related to oxidative stress, inflammation (L-1B, IL-10& NFkB), apoptosis (Caspase-3, Caspase-7)and fertility-related molecular targets (ER-a, ER-B&& GnRH) were investigated in the brain to attenuate male fertility. Oral supplementation of 1% L. rhamnosus, B. longum and MOS significantly enhances neural growth and antioxidants like SOD & catalase thereby decreasing apoptotic factors Caspase-3 and Caspase-7. Furthermore, immune system strengthening was evident due to reduction in immunofluorescentexpression of proinflammatory IL-1ß and NFkB and an increase in anti-inflammatory IL-10 expresion in all supplemented groups. These changes were also associated with elevated levels of ER-a and ER B, regulating the neuroendocrine mechanisms as evidenced by increased expression of GnRH, ultimately leading to improved male fertility.In summary, the combinations of L. rhamnosus, B. longum and MOS in dietary supplementation improved male fertility in immature Coturnix coturnix japonica by upregulating ERs expression through modulation of the gut microbiome. These finding highlights the potential therapeutic use of nutritional factors in avian species and suggests their utility in addressing low fertility issues in quail, benefiting the poultry industry.

2. LACTOBACILLUS RHAMNOSUS AS A NEUROPROTECTIVE AGENT AGAINST ARSENIC-INDUCED HPI AXIS DISRUPTION AND OXIDATIVE STRESS IN ZEBRAFISH (DANIO RERIO)

Abhishek Jain, Roshni Jain and Subodh Kumar Jain
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Abstract
Arsenic, a toxic metalloid commonly found in contaminated water, has been linked to various adverse health effects, including neurotoxicity. The hypothalamus-pituitary-interrenal (HPI) axis,

a critical stress-responsive neuroendocrine pathway, plays a key role in maintaining physiological homeostasis and reacting to stressors. Disruption of the HPI axis and increased oxidative stress are both associated with neurodegenerative disorders. In this study, zebrafish exposed to different concentrations of arsenic trioxide for acute and chronic durations. The neuroprotective potential of *Lactobacillus rhamnosus*, a well-known probiotic, was assessed for its ability to mitigate arsenic-induced damage. Key parameters such as HPI axis gene expression, oxidative stress markers, neurotrophin gene expression, and DNA damage were evaluated. The results revealed that arsenic trioxide exposure caused significant dysregulation of the HPI axis, with altered expression of C-Fos, and CRH genes. Additionally, increased oxidative stress and DNA damage, indicated by the expression of GPx, GR, MnSOD, and Cu/ZnSOD, also observed. However, co-exposure of *Lactobacillus rhamnosus* significantly attenuated arsenic induced effects, restoring HPI axis homeostasis and reducing oxidative stress. The probiotic treatment helped normalize C-Fos, and CRH gene expression, suggesting that *Lactobacillus rhamnosus* may be a promising alternative to antioxidant therapy, capable of counteracting arsenic-induced neurotoxicity by suppressing oxidative damage.

3. ALTERATION OF MEMBRANE PROTEINS AND HIPPOCAMPAL INTEGRITY IN RAT BRAIN DUE TO CO-TOXICITY OF CADMIUM AND LEAD

Abhishek Kumar
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Abstract

The hippocampus plays a critical role in learning, memory, and emotional regulation, making it highly susceptible to neurotoxic insults. This study investigates the combined toxic effects of cadmium (Cd) and lead (Pb) on hippocampal integrity and membrane protein alterations in the rat brain. Adult male rats were exposed to Cd and Pb co-treatment for 21 days. Post-exposure, hippocampal tissue was analyzed for oxidative stress markers, antioxidant parameters, acetylcholinesterase (AChE) activity, mitochondrial function, serotonin levels, and histopathological changes. Biochemical analysis revealed a significant elevation in oxidative stress, as evidenced by increased levels of malondialdehyde (MDA) and decreased activities of key antioxidant enzymes, including superoxide dismutase (SOD) and catalase (CAT). AChE activity, a critical enzyme for cholinergic function, was markedly reduced in the hippocampal region. Furthermore, mitochondrial respiratory complexes I and IV showed a significant reduction, indicating impaired energy metabolism. Neurotransmitter analysis revealed a substantial decrease in hippocampal serotonin levels, suggesting a potential link to mood and cognitive deficits. Histological examination of hippocampal sections demonstrated pronounced structural damage, including neuronal loss and disrupted architecture, particularly in the CA1 and CA3 regions. These findings highlight the synergistic neurotoxicity of Cd and Pb, which not only disrupt hippocampal membrane proteins but also compromise the overall structural and functional integrity of the hippocampus. The alterations in oxidative stress, mitochondrial function, and neurotransmitter levels suggest a multifaceted mechanism of neurotoxicity, emphasizing the need for further investigation into potential protective strategies.

4. COMPREHENSIVE COMPUTATIONAL ANALYSIS OF DUAL COX AND LOX INHIBITION BY DIETARY PHENOLIC COMPOUND CHLOROGENIC ACID

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Abstract

Cyclooxygenase (COX) and Lipoxygenase (LOX) play crucial roles in the conversion of arachidonic acid (AA) to eicosanoids, which are vital for triggering immune responses, inflammation, and the resolution of inflammation. Inhibitors targeting both COX and 5-LOX are emerging as promising anti-inflammatory agents, as they block the production of prostaglandins (PGs) and leukotrienes (LTs) without affecting lipoxin formation. This dual inhibition approach offers advantages over selective COX-2 inhibitors, particularly in reducing gastrointestinal side effects. Dietary phenolic acids, known for their anti-inflammatory properties, present a valuable opportunity for drug discovery. Notably, molecules with dual inhibition mechanisms demonstrate enhanced potential as lead candidates. In this study, we investigated the dual COX/5-LOX inhibitory capacity of chlorogenic acid (CGA), a phenolic compound found in apples, coffee beans, and artichokes, using in silico (Molecular docking and Molecular dynamics simulation) tools. Our findings revealed that CGA possesses inhibitory effects on both COX-2 and 5 LOX enzymes. Molecular docking, dynamics simulations, energy calculations, and target similarity analyses support these results. These results suggest that chlorogenic acid forms more stable interactions with both 5-LOX and COX-2 proteins, indicating its potential as a more effective anti-inflammatory agent than conventional inhibitors. Further experimental validation is warranted to confirm these computational predictions.

5. ADAPTIVE RESPONSES OF WITHANIA SOMNIFERA AND WITHANIA COAGULANS TO UV-B RADIATION: INSIGHTS INTO RESILIENCE MECHANISMS

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Abstract

This abstract scrutinizes the effects of UV-B radiation on Withania somnifera and Withania coagulans, focusing on their adaptive responses. Exposure to UV-B radiation prompts the activation of various defensive mechanisms, notably the synthesis of secondary metabolites such as flavonoids, which play a crucial role in plant cellular defense. Our findings reveal distinct physiological and biochemical responses between the two species when subjected to UV-B stress. We assessed several parameters, including the activity of antioxidative enzymes such as Superoxide dismutase (SOD), Ascorbate peroxidase (APX), Catalase (CAT), and Glutathione reductase (GR) and the accumulation of secondary metabolites, particularly in glandular trichomes. Secondary metabolites from these plants are Withanolides - withaferin A exhibiting various medicinal properties, including anti-inflammatory, antioxidant, and neuroprotective

effects. Notable differences were observed in the expression and storage of these compounds between UV-B treated W. somnifera and W. coagulans, indicating divergent survival strategies under UV-B stress. The results suggest that W. somnifera exhibits a more robust capacity to cope with UV-B exposure, as evidenced by enhanced production of protective metabolites and efficient antioxidative mechanisms. Conversely, the limited adaptive response of W. coagulans may contribute to its status as an endangered species. This research underscores the ecological implications of UV-B radiation on these species, offering insights into the resilience mechanisms that allow W. somnifera to thrive in similar environments where W. coagulans is struggling to survive. Understanding these adaptive strategies may inform conservation efforts and provide a basis for further studies on the ecological dynamics of these important medicinal plants. Key word- Withania somnifera , Withania coagulans, UV-B radiation, SOD, APX, CAT, GR, Withanolides, withferin A.

6. DOSE-DEPENDENT ASSESSMENT OF NEUROBEHAVIORAL IMPAIRMENT IN ADULT ZEBRAFISH EXPOSED TO TBBPA

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Abstract

Environmental toxicants are one of the main causes of neurodegenerative disorders. Among these classes, TBBPA is the most popular and largest brominated flame-retardant chemical, used in the prevention of electrical appliances, furniture, textiles, and plastics. There exist several derivatives of TBBPA, among which TBBPA-DHEE (Tetrabromobisphenol A-bis (2-hydroxyethyl) ether) is comparatively more toxic and health hazards associated with it draw more attention. However, there is insufficient toxicological data to prove the toxic effects of its exposure. The study aims to evaluate the dose-dependent effect of TBPPA-DHEE in adult zebrafish. Biometric and Behavioral analyses of adult zebrafish exposed to it were done. Day-wise behavioral alterations were also observed and recorded till the final day of exposure. Behavioral evaluations include locomotor activity, anxiety-like behavior, and social interaction. Its higher concentration was associated with severe impairments in locomotion, an increase in anxiety-like behavior characterized by increased latency to explore the lower regions of the novel tank, and disruptions in social interaction. The results showed a significant dose-dependent increase in neurobehavioral dysfunction and these findings suggest that TBBPA may impair motor function, potentially through disruption of neurotransmitter systems or damage to motor neurons. Social Interaction study also revealed impairments in social behavior, with zebrafish displaying reduced interaction time and increased social avoidance at higher doses. Overall, the study provides robust evidence that TBBPA induces significant neurobehavioral dysfunctions in zebrafish in a dose-dependent manner and thus raises important concerns about the potential implications for human health.

7. ASSESSMENT OF EMERGING AGRO-PRACTICES FOR THE SUSTAINABILITY OF LAND RESOURCES AND FOOD SECURITY IN SELECTED DISTRICTS OF UTTAR PRADESH

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Abstract

Climate change has become a major worldwide concern that affects agricultural productivity, food security, livelihood and overall population health. In recent time, there has been a growing recognition for the need to establish resilience, adaptability and sustainability in order to secure food security and promote sustainable development. Here, we report the appropriate agro-practices adaptation can greatly reduce the impact of climate change. By identifying emerging agricultural practices for various cropping system on seasonal and annual changes and effect of various amendments (e.g.: biochar & industrial residues) on microbial functional diversity and soil carbon stock. Longitudinal/Panel study for analyzing seasonal and annual variation of soil carbon will be observe among various cropping pattern, therefore soil samples will be collected periodically and will be analyzed for Physicochemical properties, Soil enzymes, Glomalin contents and Soil aggregate. Results are accompanied with recommendation and interpretation aids supporting the correct use for practical applications. A more comprehensive understanding of the effects of climate change threats and the identification of coping strategies would advance knowledge of sustainable management.

8. UNDERSTANDING SUSPENDED SEDIMENT DYNAMICS AND HYDROLOGICAL MODIFICATIONS IN THE LARGEST PENINSULAR BASIN OF INDIA

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Abstract

The Godavari River Basin (GRB), the largest basin in Peninsular India, has experienced a significant decrease in streamflow and sediment discharge since 1970s, with a particularly noticeable loss after 1990. Previous studies rank the GRB third highest in terms of decline in suspended sediment load among major global rivers exhibiting an overall decline of approximately 123 Mt/year. However, there is a lack of understanding regarding the impact of reservoir activities, flow changes, and sediment dynamics. A dataset from the Central Water Commission (CWC) of India was utilized to analyze changes in suspended sediment load and discharge across the GRB. The

research examines how suspended sediment load varies in response to the construction of dams and flow modifications. The hydrological modifications like alterations in the volume, frequency, and duration of the natural river flow are witnessed. The research findings indicate that many gauging stations experienced a greater than 50% decrease in suspended sediment load after 1990. Further analysis reveals a significant drop in suspended sediment load after 1990, owing to the entrapment of suspended sediment load caused by the construction of large-scale dams. However, during high-flow conditions, smaller unrestricted tributaries significantly reduce the negative effects of dams and reservoirs on the movement of suspended material to downstream regions The findings have crucial implications for understanding the intricate interactions between land use, land cover, suspended sediment loads, soil erosion, and reservoir management in the GRB and can help policymakers improve reservoir management, soil erosion control, and water conservation measures in the GRB.

9. SYNERGISTIC APPROACH OF ESSENTIAL OILS WITH NANO-PARTICLES: AN EMERGING POSSIBILITY FOR FOOD PRESERVATION

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Abstract
Various microbes such as bacteria, fungi, viruses, parasites etc are significant threat for food industries due to infection of food products. During pre-and post-harvest processing, microbes' degenerate food items due to production of different toxins, viz., mycotoxins. Mycotoxins are hugely vigorous and toxic food spoiling agents that cause health issues to human beings. Some herbal derivatives obtained from medicinal plants are being emphasized as an alternative of these chemicals such as essential oils (EOs). Eos are conventionally used in some eatables, perfume, and cosmetic industries. They are well known antimicrobial agents and food preservative used for cereals, grains, pulses, fruits, and vegetables. Their efficacy is due to various active constituents such as, terpenes, terpenoids, carotenoids, coumarins, curcumins. Thus, the diverse properties of EOs offer huge opportunity of being used in various industries as they are natural, safe, eco-friendly, cost-effective, renewable, and readily biodegradable antimicrobials. But shelf life and their volatile properties are few barriers in the field concern. To overcome this challenge a novel technique i.e., nanotechnology could be utilised. Nano-bullets are being synthesized by using various parts of herbals and also increase their shelf life. Hence, synergistic use of essential oils and nano-bullets can be the future boom for aforesaid industry.

10. NETWORK PHARMACOLOGY AND GENOMIC INSIGHTS INTO THE ANTIFUNGAL POSSIBILITIES OF *PSIDIUM GUJAWA* L. LEAF ACTIVE CONSTITUENTS AGAINST *TRICHOPHYTON RUBRUM*

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Abstract

Trichophyton rubrum is a prevalent pathogenic fungus responsible for various dermatophytosis, necessitating the exploration of novel therapeutic strategies. Several chemotherapeutic agents like azole compounds are systematically used for the treatment of the disease. However, the use of synthetic compound does not result into complete eradication of the disease pathophysiology. Moreover, generation of resistant species and subsequently the resurgence are also reported. Hence, there is a need of some herbal active constituents which could act as novel therapies and also reduce cosmetic embarrassment. The current study, therefore, investigates the bioactive constituents of guava leaves (*Psidium guajava* L.) through integrated approach combining network pharmacology. In the current work, we identified key phytochemicals in guava leaves through GC/MS and further information of their potential targets were obtained via PharmMapper, and SwissTargetPrediction.We, then, systematically collected *T. rubrum* related targets from NCBI-GEO databases. GEO2R analysis was employed to explore differential gene expression profiles between healthy and infected skin samples. We identified several key genes upregulated and downregulated during disease pathogenesis. Marker genes were also identified at the interface of disease etiology and as drug targets. These genes were further integrated into the network pharmacology model,Cytoscape 3.10.2, STRING databases to contract PPI network map of the cross targets and the pathways involved. The study shall decipher new markers genes associated with the dermatological infections and open new avenues for the therapeutic interventions in the arena of complementary and alternative medicines.

11. A COMPARATIVE STUDY ON THE HISTOCHEMICAL LOCALIZATION OF ACETYLCHOLINESTERASE IN THE TELENCEPHALIC NUCLEI OF *HEMIDACTYLUS FLAVIVIRIDIS AND CHANNA PUNCTATUS*

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Abstract

Acetylcholinesterase (E.C.3.1.1.7) which is a significant neuro-enzyme belonging to hydrolase group, splits the neurotransmitter acetylcholine in to choline and acetate, thus it is an effective marker of cholinergic and cholinoceptive neurons, giving a vivid demarcation of brain areas and nuclei on the basis of intensity of reaction. In the present study, distribution pattern of acetylcholinesterase has been studied in the telencephalic area of wall lizard *Hemidactylus* and a non cat fish *Channa punctatus* by employing a modified histochemical technique to visualize acetylcholine containing neurons described by Hedreen, J.C. (1985).

In the present study large number of striatal nuclei in the brain of wall lizard *viz.* Tuberculum olfacorium, Nucleus parolfactorious medialis and lateralis, Nucleus accumbense showed very high intensity while septal nuclei and cortical centres except few, showed moderate reaction. In *Channa*, among the pallial nuclei, medial and dorsomedial nuclei showed intense activity and most of the subpallial nuclei showed very high intensity. However, in the light of present comparative study between a fish and a reptile, many nuclei are presumed to be homologous from the evolutionary point of view and it has been discussed.

12. EFFECT OF *ALLIUM SATIVUM* ON LIVER BIOMARKERS STUDIES AND LIPID PROFILE IN ALLOXAN INDUCED DIABETIC RATS

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Abstract

Background: Diabetes is a group of metabolic disease and associated with impaired glucose metabolism, resulting from defect in insulin secretion, action and both. The present study was undertaken to evaluate the insulin secretion and anti-oxidative potential of *Allium sativum* extract in diabetic rats.

Method: Blood was collected at after 14 days from eye orbital of rats with the help of capillary glass tube and centrifuged 1000 rpm for 10 min. at 4^0C and serum sample collected. Serum sample all groups were analyzed for various biochemical parameters at same time after 14 days of feeding rats. The biochemical parameters evaluated were serum lipid profiles and liver biomarkers using diagnostics kits.

Result: Diabetes increase blood glucose level and oral administration of *Allium sativum* extracts daily for 14 days, to the diabetic rats caused 31.7% decrease on 7^{th} day and 55% decrease in the blood glucose level on 14 days of the start of treatmet. In the present study indicates the increase in the levels of SGOT, SGPT, ALP, bilirubin, total Cholesterol, triglyceride and creatinine in serum when compared with control rat serum. The levels of SGOT, SGPT, ALP and bilirubin were increase 145%, 211%, 498%, 189.1%, 77.5%, 134.3% and 185% increase in alloxan induced diabetic rat serum as compared with control rats. Oral administration of *Allium sativum* extracts for 14 days showed antidiabetic potential against alloxan diabetes induced alterations in the level of SGOT, SGPT, ALP and bilirubin. The levels of SGOT, SGPT, ALP and bilirubin were decreased by 37.6%, 41%, 77%, 45%, 34.3%, 43.4% and 50% in diabetic rats given *Allium sativum* extracts treatment for 14 days when compared with diabetic control rats.

Conclusion: Oral administration of *Allium sativum* extracts increase insulin activity and reduced oxidative stress complication in diabetic rats.

13. HEPATOPROTECTIVE PROPERTY OF *MOMORDICA CHARANTIA* IN THE MITIGATION OF LIVER FUNCTION IN THE LETROZOLE-INDUCED PCOS LIKE CONDITIONS IN MICE

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Abstract

Polycystic ovary syndrome (PCOS) is a hormonal disorder that affects approximately 6-12% of women of reproductive age. It is often accompanied by a spectrum of metabolic disturbances, including insulin resistance, obesity, dyslipidemia, cardiovascular problems, and type 2 diabetes mellitus. Due to hormonal disturbances it leads to infertility in reproductive aged women. These metabolic derangements contribute significantly to an increased risk of cardiovascular diseases and

non-alcoholic fatty liver disease (NAFLD). The liver, as a central organ in metabolic regulation, is profoundly affected by these metabolic abnormalities, highlighting the importance of liver health in the management of PCOS. In recent years, healthcare systems have increasingly acknowledged the value of food-based, alternative, and complementary medicines. This trend may stem from a better understanding of the potential toxicity associated with conventional allopathic treatments or their higher costs. Phytochemicals found in herbal remedies and medicinal plants offer therapeutic benefits for conditions like PCOS. *M. charantia*, commonly known as bitter melon or bitter gourd, has been traditionally used in various cultures for its medicinal properties, particularly its anti-diabetic and hepatoprotective effects. The bioactive compounds in *M. charantia*, such as charantin, quercetin, polypeptide-p, and vicine, have been shown to exhibit insulin-mimetic and lipid-lowering effects, which could be beneficial in managing PCOS-related metabolic complications. Based on this, we sought to study the hepatoprotective effect of *M. charantia* in the mitigation of liver function in the PCOS mice. The aqueous methanolic extract of *M. charantia* on biochemical, lipid profile, and histopathological study elucidated its potential hepatoprotective and metabolic regulatory roles in PCOS mice. The *M. charantia* treatment causes improvement in lipid profile, along with normalization of hormonal enzymes. Therefore, understanding these effects could provide insights into novel therapeutic strategies for managing liver health in PCOS patients, potentially improving their overall metabolic profile and quality of life.

14. ULTRASTRUCTURAL STUDY OF EGG CHORION OF AN INSECT PEST *HELICOVEPA ARMIGERA* (HUBNER) (LEPIDOPTERA:NOCTUIDAE)

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Abstract

The cotton bollworm, *Helicoverpa armigera* (Hubner), a serious polyphagous pest whose eggs were examined for its chorionic ultrastructural details (regional and radial) through scanning and transmission electron microscopy as it provides right approach for correct identification of pest species required for fundamental studies of biology and developing appropriate plan of action for effective pest control. The eggs of cotton bollworm are spherical measuring 430 to 600 μm in length and 410 to 580 μm in diameter. The apical area of the egg bears a nipple like projection referred as micropylar cone having micropylar apparatus consists of micropylar rosette surrounded by 11 to 12 petal shaped primary cells. Micropylar rosette surrounds a centrally located depression called micropylar pit having 4 micropylar openings for sperm entry. The egg surface is covered by 24 to 26 prominent longitudinal ridges and cross ridges which run between longitudinal ridges. Below the micropylar cone, perforations referred as aeropyles are present at the junction of longitudinal and cross ridges. These aeropyles communicate with the trabecular layer through which fresh air diffuses to the developing embryo. The cross section of chorion exhibits thickness having 4 distinct layers as displayed by many lepidopterans. The innermost layer (IL) C_1 forms the external boundary of vitelline membrane and inner border of wide cavity layer referred as trabecular layer (TL) C_2 supported by number of trabecles in which air is held which in turn

forms intrachorionic respiratory meshwork of the egg. Next to trabecular layer a thick lamellar layer called principal layer (PL) C_3 is present which exhibits a characteristic pattern of dark bands of high electron density alternating with light bands of moderate electron density. The outermost layer of chorion (EL) C_4 is thin, exhibiting pit-like depressions at various places.

15. SEASONAL CHANGES IN NEURONAL SPACING OF PREOPTIC AREA OF *HETEROPNEUSTES FOSSILIS*

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Abstract
Fish brain differs among species with respect to anatomical and histological observations but they show resemblances in the number of brain compartments. Preoptic area (POA), a part of teleostean brain has been suggested to play an important role in cognition and learning. It has been reported that POA is involved in spawning behavior. Neurons/nerve cells are the structural and functional unit of the nervous system and are responsible to transmit information in the form of electrical impulses and chemical signals. The earlier studies on fishes have reported that the fluctuation in season leads to changes in terms of brain size whereas the present investigation indicates spaces between neurons i.e, neuronal spacing in POA of teleost fish along with seasonal variations. In this study brain of *Heteropneustes fossilis* during the non-spawning and spawning phase was perfused with 10% formalin solution and stained with Cresyl-violet staining (basic dye) for the cytoarchitectonic study. It was observed that neuronal spacing in POA region of female*H. fossilis* significantly accredited during spawning phase of fish. Neuronal plasticity in POA region is accompanied by seasonal changes. The result suggest better functioning and networking of the region concerned during spawning phase of fish as POA is responsible to control both social and sexual behavior in teleost.

16.ADVANCINGARTIFICIALINTELLIGENCEANDHEALTHTECHNOLOGY ASSESSMENT: A PROMISING FUTURE WITH CHALLENGES

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Abstract
Artificial intelligence (AI) is a novel technology, bringing unprecedented tools for diagnosis, treatment and patient care. The technology offers significant advantages for patients, providers, and the overall healthcare system. Benefits include enhanced primary care, reduced costs, and improved efficiency of medical processes. AI adaptation in healthcare is still in its early stages; but it is leading us toward a promising future, AI will improve the quality of healthcare facilities, balancing innovation and human expertise, say experts, however, security questions remain unanswered. Before its wider implementation, it is important to highlight the aspects of AI that

challenge traditional health technology assessment methods. In recent years, the use of artificial intelligence (AI) in medicine and healthcare has been praised for the great promise it offers, but there are substantial barriers that challenge health technology assessment (HTA) professionals to use AI-generated evidence for decision makers to address these issues in a systemic and holistic manner in integrating AI into the HTA processes. This study offers an overview of how AI can benefit future healthcare using health technology assessment (HTA), in particular increasing the efficiency of clinicians, improving medical diagnosis and treatment, and optimising the allocation of human and technical resources.

17. ESTIMATION OF STATURE BASED ON TIBIAL LENGTH OF NORTH INDIAN MALES

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Abstract
Although it can be challenging to estimate stature from severed body parts, doing so is essential for creating a biological profile in forensic medicine. This study aims to determine the population's stature in Central India by measuring leg length. In the present study, 563 males between the ages of 20 and 40 who were in good health were the subjects. A new equation was constructed by measuring the subjects' actual heights and the length of their left and right legs. A positive and statistically significant correlation was observed between stature and both leg length measurements. Three subgroups were formed based on height classification, namely short, medium, or tall. Height estimation in each group was calculated using both unilinear and multilinear regression formulas. The leg length correlation coefficients for the left (0.712) and right (0.708) were both highly significant. According to this study, leg length gives a new forensic standard for stature estimate that can be used in the forensic context of the population of North India.

18. MOLECULAR DOCKING AND SCREENING OF NATURAL TERPENOIDS AGAINST BETA-GLUCOSIDASE OF *RHIZOCTONIA SOLANI* IN RICE SHEATH BLIGHT

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Abstract
Natural terpene compounds possess antifungal capabilities that match or surpass the potency of conventionally used synthetic fungicidal agents when combating a diverse array of fungal pathogens and oomycete species. The world's rice agro ecosystem is vulnerable to myriad of pest attacks and diseases threatening the frangible food fabric of India. Sheath blight of Rice is one of the most devastating diseases that significantly impede its yield potential. For this

study, a nature-first approach was implemented to abate *Rhizoctonia solani*, a saprophytic and facultative plant parasite by using natural terpenoids. One of the cell-wall degrading enzymes, beta-glucosidase with the Uniprot ID: A0A8H7H8J1 was modelled using SWISS-MODEL, MODELLER, MultiFOLD and AlphaFold2 as its 3D structure was not available. The fidelity of the protein structures generated was assessed through SAVESv6.0 server and the structure generated by MODELLER was selected as the best. A total of 15 natural terpenoids that are the major components of essential oils were selected and docked with the protein. Beta-sitosterol, abietic acid and palustric acid turned out to be the best-performers with least binding affinity. ADME screening of the top ligands proved that palustric acid, a diterpene has the least partition coefficients and hence more stable pharmacokinetically. ADMET evaluation presented that it can damage the liver in large quantities but remains largely safe to humans and environment. Apart from fungicides, palustric acid coupled with biocontrol agents and better management practises are a way forward to combat the disease spread.

19. RELOOKING INTO THE DECCAN TRAP, INDIA, AS A POTENTIAL CO_2 SINK

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Abstract

This study evaluates the feasibility of utilizing India's Deccan Traps among the largest continental flood basalts globally as a potential CO_2 storage solution in response to increasing global concerns regarding climate change driven by elevated carbon emissions. The implementation of Carbon Capture and Storage (CCS) technologies could serve as a vital mechanism for India to attain 'NET-ZERO' emissions by 2070, complementing the nation's initiatives in renewable energy development. Continental flood basalts offer promising CO_2 storage capabilities due to their extensive area coverage, large volume, and minimal leakage risk. The study focuses on the Deccan Traps, covering 500,000 square kilometres, and explores the diverse lava flow morphologies and volcanic facies which could be of particular interest for CO_2 storage. Fieldwork conducted in the Pune-Nashik region evaluates the internal structure of lava flows and studies the distribution and abundance of vesicles, fractures, flow top-breccias as they will be crucial in determining the fluid flow path in Basalt. For example, in a typical compound Pahoehoe lava flow, the uppermost and the lowermost section, rich in vesicles, may provide ample porosity, while fractures in the core zone could enhance permeability and hydrologically connect the aforementioned zones. Whereas, the thick, massive core zone may act as a natural seal for CO_2 storage. In addition to the basalt flows, numerous dykes present in the Deccan may act as highly permeable fracture corridors, providing pathways for fluid flow or potential leakage routes. A systematic field mapping of dykes in the Pune and Nashik regions of Deccan Maharashtra has been conducted. From this mapping, a 3D Discrete Fracture Network model was developed to assess permeability, providing a flow module for the fractures within the dyke. Additionally, this model was employed to create a reservoir model to evaluate CO_2 storage capacity.

20. THE PROTECTIVE ROLE OF NEUROTENSIN RECEPTOR-1 ANTAGONIST SR48692 IN HFD-INDUCED BEHAVIOURAL DEFICIT IN MICE.

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Abstract

The prevalence of high-fat diet (HFD)-induced metabolic dysregulation is closely linked tocognitive and behavioural impairments, with evidence pointing towards the involvement ofneuropeptide signalling pathways in mediating these effects. Neurotensin (NTS), aneuropeptide, has been known to be associated with modulating behaviours such as learning, memory and mood disorder. This study investigates the protective role of the neurotensinreceptor-1 (NTSR1) antagonist, SR48692, in mitigating behavioural deficits induced by HFDconsumption in mice. Swiss albino mice (male, 8 weeks) were maintained in two batches, fedstandard diet (SD) and HFD for four weeks. Each was further treated with intraperitoneallysaline and SR48692 (100 μg/kg bw) for four weeks; Group:I/SD and Group:II/HFD,Group:III/HFD+SR48692, and Group:IV/SD+SR48692. Obtained results showed that theHFD regimen mice exhibited significant imbalanced lipid-profiles, behavioural impairments; like anxiety-like behaviour reflected in the open field test (OFT), elevated plus maze (EPM), and depressive-like behaviour in the forced swim test (FST). These behavioural alterations were accompanied by neuroinflammatory responses, oxidative stress (OS) and synaptic dysfunction in the hippocampus. The co-treatment of SR48692 treatment counteracted the HFD-induced, impaired lipid-profiles (triglyceride and cholesterol) and inflammatory signals, including decreased plasma leptin and increased IL-10 cytokine, along with decreased OS in the brain, as revealed in increased neuronal cell density and cell layer thickness in the CA1, CA3, and DG regions of the hippocampus. The co-treatment SR48692 modulated behavioural alterations observed in OFT, EPM, and FST in the mice. Conclusively, the SR48692 could be considered as therapeutic agent in ameliorating HFD-induced behavioural deficit.

21. EFFECT OF HEAVY METAL STRESS ($CR_2(SO_4)_3$) ON SORGHUM MILLET

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Abstract

Heavy metal contamination, particularly chromium (Cr), constitutes a profound menace to global agro-ecosystems, compromising crop vitality, productivity, and integrity. This study aims to investigate the effects of chromium-induced heavy metal stress on *Sorghum bicolor*, focusing on physiological, biochemical, and morphological responses. Sorghum millet was exposed to varying concentrations of $Cr_2(SO_4)_3$ in controlled conditions. Key growth parameters, including germination rate, root and shoot length, chlorophyll, Protein, Carbohydrate and Proline content etc., were measured to assess the impact. The plant's responses were monitored over a designated period. The results demonstrate that chromium accumulation within plant tissues precipitates a

spectrum of deleterious effects, including marked suppression of seed germination, stunted root and shoot growth, and a pronounced decline in chlorophyll content, indicative of severe stress-induced photosynthetic dysfunction. At the biochemical level, chromium alters the composition of metabolites in *Sorghum bicolor*, including amino acids, sugars and organic acids, reflecting metabolic reprogramming in response to stress. This study provides insights into the physiological and biochemical responses of *Sorghum bicolor* to chromium-induced heavy metal stress. Also highlights the critical role of sorghum millet's antioxidant defense mechanisms in mitigating the toxic effects of chromium sulfate, but it also reveals the vulnerability of this crop to high levels of metal contamination. The findings emphatically highlight the critical necessity of mitigating heavy metal contamination in agricultural soils, particularly in millet-dependent regions, to safeguard food security and ecological balance. Advanced genetic and agronomic innovations are imperative for fortifying sorghum's resilience against heavy metal-induced stress.

22. GIS BASED SUBSURFACE WATER QUALITY ASSESSMENT FOR INDUSTRIAL AND AGRICULTURAL ACTIVITIES: A CASE STUDY OF SHAHADA TEHSIL, MAHARASHTRA, INDIA

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Abstract

The study of subsurface water quality to evaluate its aptness for agricultural, industrial practice has become essential due to the variability in rainfall intensity and uncertainty in its distribution. In view of this, the geochemical properties of 45 groundwater samples, including electrical conductivity (EC), pH, total dissolved solids, major cations, and anions, are measured and evaluated suitability. The suitability for irrigation purpose advised by appraisal of various cultivation water quality parameters such as sodium percentage (Na%), sodium adsorption ratio (SAR), Kelly's ratio (KR), residual sodium carbonate (RSC), magnesium adsorption ratio (MAR), and permeability index (PI). The industrial applicability was analysed using the Langelier saturation index (LSI), Ryznar stability index (RSI) and Larson–Skold index (LSkI). Geographic information systems (GIS) used the analytical results to produce the numerical spatial dispersion of the indexes. The comprehensive technique of suitability evaluation indicates that subsurface water in the research region is ideal for cultivation. Also, the spatial variation maps of LSI, RSI and LSkI illustrations that most pre-monsoon period samples were largely unaffected by minor scaling and corrosive potentials. Hence study indicates that, continuous monitoring of quality groundwater resources can play major role for achieving the goal of sustainable development of the region.

23. WATER FOOTPRINT ASSESSMENT AND AQUIFER PROFILE TOWARDS DEVELOPED HYDROLOGICAL APPROACH IN INDIA

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Abstract

Water footprint (WF) is a tool to estimate water consumption by humans and the available fresh water. WF focused on how anthropogenic activity impacted in the quantity and quality of sediments deposition and pattern in water channel and geochemical environment. The physical and chemical characteristics of surface/ spring and well water samples were examined for two years fluctuation in 2022–2024 in the down stream river way of Ganga at south eastern Prayagraj city. The ionic speciation and minerals dissolution/ precipitation were calculated. Water wells, characterizing ground water circulation at shallow depths are moderate to high mineralized waters of Na-HCH_3. In contrast to the shallow environment, the CO_2-rich, deeper water of the Ca-HCO_3-SO_4 type and undergoes significant changes in the baseline chemistry along flow lines with increasing residence time. The heavy metal concentration ranged between 18.61-29.14, 03.14 -09.91, 51.25 -78.08, 34.29 -23.49, 0.18- 0.72, 21.26- 22.60 and 10.72- 13.44 mg/kg for Co, Cu, Cr, Cd, Ni, Zn and Pb, respectively. Geo-accumulation index was noted between (0 and 2, class 2) which showed that sediment was contaminated to moderately contaminated and may have adverse affects on freshwater ecology of the river specially post flow. There were analyzed green-to-blue water footprint ratio i.e. 0.7-010. Mathematical equation were also derived the hydro geological variables for better understanding of the study area, hence proper management strategies are required to control the direct discharging of wastewater in the river flow in way of zero-discharge and ecological integration towards developed hydrological approach in India.

24. EVOLUTIONARY DIVERSITY OF CXCL16CXCR6: CONVERGENT SUBSTITUTIONS AND RECURRENT GENE LOSS IN SAUROPSIDS

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Abstract

The CXCL16-CXCR6 axis is crucial for regulating the persistence of CD8 tissue-resident memory T cells (TRM). CXCR6 deficiency lowers TRM cell numbers in the lungs and depletes ILC3s in the lamina propria, impairing mucosal defence. This axis is linked to diseases like HIV/SIV, cancer, and COVID-19. Together, these highlight that the CXCL16-CXCR6 axis is pivotal in host immunity. Previous studies of the CXCL16-CXCR6 axis found genetic variation among species but were limited to primates and rodents. To understand the evolution and diversity of CXCL16-CXCR6 across vertebrates, we compared approximately 400 1-to-1 CXCR6 orthologs spanning diverse vertebrates. The unique DRF motif of CXCR6 facilitates leukocyte adhesion by interacting with cell surface-expressed CXCL16 and plays a key role in G-protein selectivity during receptor

signalling; however, our findings show that this motif is not universal. The DRF motif is restricted to mammals, turtles, and frogs, while the DRY motif, typical in other CKRs, is found in snakes and lizards. Most birds exhibit the DRL motif. These substitutions at the DRF motif affect the receptor—Gi/o protein interaction. We establish recurrent CXCR6 gene loss in 10 out of 36 bird orders, including Galliformes and Passeriformes, Crocodilia, and Elapidae, attributed to segmental deletions and/or frame-disrupting changes. Notably, single-cell RNA sequencing of the lung shows a drop in TRM cells in species with CXCR6 loss, suggesting a possible link. The concurrent loss of ITGAE, CXCL16, and CXCR6 in chickens may have altered CD8 TRM cell abundance, with implications for immunity against viral diseases and vaccines inducing CD8 TRM cells.

25. EFFECT OF LEAF COLOUR MUTATIONS ON BOLTING AND YIELD IN SAFFLOWER (*CARTHAMUS TINCTORIUS* L.): A MORPHOLOGICAL ACCOUNT

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Abstract
Leaf colour mutants, although, are commercially undesirable but provide a good opportunity to understand the role of pigment metabolism in plants. Thus, two EMS-induced true breeding chlorophyll mutants (dark green and light green) of safflower were investigated in this study. The purpose of this investigation was to analyse the effect of contrasting levels of chlorophylls on overall growth and development in plants. Few morphological parameters related to leaf, stem, head (inflorescence) and seed were studied in both the mutants along with their parent variety. Both the mutants displayed an obvious altered phenotype with delay in bolting and reduction in seed size being most prominent. Further analysis will give a better insight into the relationship between pigment metabolism, stress adaptation and phytohormonal regulations in plants.

26. DETERMINATION OF INORGANIC ELEMENTAL PROFILE OF THE SOYBEAN BY DIRECT CURRENT ARC OPTICAL EMISSION SPECTROSCOPY

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Abstract
The soybean (Glycine max) is a high-value nutritive crop that is an inexpensive source of vegetable protein and edible oils. It is abundantly available, actively traded, incredibly pleasant tasting, and loaded with plenty of amino acids and contains a rich source of fibre, minerals which

are essentially important for the growth and maintenance of human body tissues and lower the chances of illness. For the analysis of nutrient profiling, it is necessary to employ a technique that could able to quickly assess phytoelements using simple procedural approaches without the need for skilled operators. Direct current arc optical emission spectroscopy is a simultaneous multi-element analytical method with higher sensitivity and precision benefits and quick, dependable, affordable, user-friendly, eco-friendly, free from spectral interference, and the need for sample digestion and dilution, which greatly increases sample productivity and results in better detection limits as compared to other conventional analytical techniques. Therefore, the present study deals with the demonstration of the capability of the direct current arc optical emission spectroscopy technique for the assessment of the elemental constituents of soybean. The emission spectrum of the soybean has been recorded in the spectral region 350–900 nm by exciting the sample with the help of a direct current source. The analysis of the acquired spectrum shows persistent lines of calcium, potassium, magnesium, manganese, iron, sodium and chromium that confirm the occurrence of these elements in the soya bean sample.

27. MITIGATING RENAL DYSFUNCTION IN LIVER CIRRHOSIS: THERAPEUTIC ROLE OF FERROUS SULPHATE, FOLIC ACID AND ITS CO-ADMINISTRATION

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Abstract

The liver and kidneys are vital organ for detoxification and metabolic regulation. Regular consumption of alcohol and acetaminophen can cause liver cirrhosis. Cirrhosis increases oxidative stress in kidneys by disrupting the balance between reactive oxygen species (ROS) and antioxidants, leading to cell damage. Folic acid and ferrous sulfate are two anti-anemic drugs treats various disease, has high reactive oxygen radicals quenching ability, resulting in protection against oxidative damage in aerobic cell. The aim of this study was to investigate mitigating renal dysfunction in liver cirrhosis and therapeutic potential effect of ferrous sulfate, folic acid and its co-administration caused by alcohol-acetaminophen induced liver cirrhosis. Animals were divided into six groups. Rats of normal control group received water and normal diet ad libitum; AC and LC group received 4.5% alcohol and a combination of 4.5% alcohol and acetaminophen (300 mg/kg bw) via drinking water respectively for seven days. After seven days, rats of LC+FS, LC+FA and LC+FS+FA received FS (5mg/kg bw), FA (5mg/kg bw) and FS+FA (5mg/kg bw) respectively via drinking water for four weeks. Enzyme activity and protein expression were measured by semi-quantitative RT PCR and western blots respectively. Results revealed that FS and FA treatment individually and together restored the antioxidant enzyme activity and the levels of glycolytic pathway towards normal which were affected due to liver cirrhosis. FS and FA are well known antianemic drugs and proved to be efficient agents for antioxidant and glycolytic enzymes alteration in liver cirrhosis. This novel approach could lead to new treatments.

28. CHALLENGES AND PRIORITIES OF RESEARCH, EDUCATION AND EXTENSION IN FISHERIES SCIENCE FOR *VIKSIT BHARAT*

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Abstract

Fisheries sector guarantees food, nutrition, income and livelihood securities to millions of people across the globe. The world fisheries and aquaculture production reached an all-time high of 223.2 million tonnes (mt) (with 185.4 mt aquatic animals and 37.8 mt algae) worth US$ 472 billion, directly employing 61.8 million people in the year 2022. India stood first in inland capture fisheries production (1.9 mt), second in total as well as aquaculture production (16.25 and 10.34 mt, respectively) and third in total (inland + marine) capture fisheries production (5.91 mt) in 2021-22. The sector contributed 1.1% to Indian gross domestic product (GDP) and 6.72% to agricultural GDP and provided livelihoods to over 28 million people. Besides meeting the domestic demand, the country exported a whopping 17.35 lakh tonnes marine products worth ₹ 63,969.14 crore (US$ 8.09 billion) during 2022-23, out of which frozen shrimp alone constituted 7.11 lakh tonnes worth ₹ 43,135.58 crore (US$ 5.48 billion). Indian fisheries witnessed an unprecedented growth after achieving first successful induced breeding of *Cirrhinus reba* on 10th July, 1957. From a mere fish production of 0.75 mt in 1950-51 reaching to 17.4 mt in 2023-24 was possible through pragmatic research, education and extension activities in fisheries and aquaculture. However, the sector is facing several challenges of (i) rising demands to feed the steeply rising population with quality fish proteins and fats, (ii) indiscriminatefishing in coastal and inland waters leading to declining fish stocks, (iii) pollution and habitat degradation, (iv) rising incidence and number of disease-causing organisms, (v) indiscriminate use of veterinary drugs and medicines for controlling such diseases, (vi) minimizing the harvest and post-harvest losses, (vii) stringent international food safety regulations for market access, (viii) vulnerability of small-scale fishers and farmers, (ix) using emerging technologies for improving productivity and efficiency, and (x) creating quality human resource to face future challenges in fisheries sector. The paper discusses challenges and priorities of research, education and extension in fisheries and aquaculture for its sustainable growth and resilience in the face of climate change, environmental degradation, market demands and for *Viksit Bharat.*

29. ADDITIONAL FEEDFORWARD MECHANISM OF PARKIN ACTIVATION VIA BINDING OF PHOSPHO-UBL AND RING0 IN *TRANS*

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Abstract
Loss of function Parkin mutations lead to early-onset of Parkinson's disease. Parkin is an auto-inhibited ubiquitin E3 ligase activated by dual phosphorylation of its ubiquitin-like (Ubl) domain and ubiquitin by the PINK1 kinase. Herein, we demonstrate a competitive binding of the phospho-Ubl and RING2 domains towards the RING0 domain, which regulates Parkin activity. We show that phosphorylated Parkin can complex with native Parkin, leading to the activation of autoinhibited native Parkin in *trans*. Furthermore, we show that the activator element (ACT) of Parkin is required to maintain the enzyme kinetics, and the removal of ACT slows the enzyme catalysis. We also demonstrate that ACT can activate Parkin in *trans* but less efficiently than when present in the *cis* molecule. Furthermore, the crystal structure reveals a donor ubiquitin binding pocket in the linker connecting REP and RING2, which plays a crucial role in Parkin activity.

30. MITIGATION STRATEGY OF RUTIN ON ACRYLAMIDE INDUCED REPRODUCTIVE DAMAGE IN RATS

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Abstract
Acrylamide (AA) is a harmful substance that forms when carbohydrate-rich foods are heated. Its exposure has negative effects on reproductive health, causing issues such as testicular tissue degeneration, reduced ovary weight and follicle numbers, increase sperm abnormalities. This underscores the importance of finding effective ways to prevent reproductive damage AA exposure. Rutin (RU), a natural flavonoid, possess antioxidant and anti-inflammatory properties. Male and female albino rats were given AA orally (40 mg/kg for 10 days) and then treated with different doses of RU (10, 20, 30, and 40 mg/kg) for 3 consecutive days to assess RU's protective effects against AA.

Exposure to AA led to a significant increase in levels of lipid peroxidation and a decrease in the activity of glutathione (GSH), superoxide dismutase (SOD), catalase (CAT), and ATPase in the ovary and testis. Additionally, there was a reduction in the organ weight index and alterations in levels of triglycerides, cholesterol, glycogen, and fructose. Sperm analysis indicated a notable decrease in the number of epididymal sperm, as well as reduced mobility and survival, coupled with an increase in abnormal sperm. Furthermore, there were changes in testosterone, follicle-stimulating hormone (FSH), luteinizing hormone (LH), progesterone, estradiol levels, and increased DNA damage. However, the use of RU therapy restored tissue and serological indexes to normal levels, counteracting DNA damage and bringing sperm parameters back to normal. In summary, the results of this study indicate that Rutin has protective effects against the reproductive toxicity induced by acrylamide in rats.

31. DIVERSITY AND DISTRIBUTION OF ENDOPHYTIC FUNGI FROM SELECTED PLANTS OF APOCYNACEAE

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Abstract

In the present study twenty plants belonging to Apocynaceae (*Adenium obesum* (Forssk.) Roem.&Schult., *Allamanda blanchetii* A.DC., *Allamanda cathartica* L., *Catharanthus pusillus* (Murray) G.Don., *Catharanthus roseus* (L.) G. Don. (pink flower), *Catharanthus roseus* (L.) G. Don. (white flower), *Carissa carandas* L., *Holarrhena antidysenterica* (Roxb. ex Fleming) Wall., *Nerium oleander* L.(pink flower), *Nerium oleander* L. (white flower), *Pergularia daemia* (Forsk.) Chiov.), *Plumeria alba* L., *Plumeria pudica* Jacq.,*Plumeria rubra* L., *Tabernaemontana divaricata* R.Br. ex Roem. &Schult.,*Tabernaemontana divaricata* R.Br. ex Roem. & Schult.(variegated leaf), *Thevetia peruviana* L., *Rauvolfia tetraphylla* L., *Vallaris solanacea* (Roth) Kuntze, and *Wrightia tinctoria* R. Br.)were collected from the campus of Telangana University, Dichpally, Nizamabad to isolate, characterize and document the endophytic fungi.

Two hundred and sixteen leaf and stem tissue fragments from test plants were screened for the presence of endophytic fungi. 70 fungal isolates were obtained from the plant tissues. The colonization frequency forleaf (16%) and stem (16%) tissue fragments of *A. blanchetii*, *C. roseus* (white flower) forleaf (33%) and stem (16%), *H. antidysenterica* forleaf (25%) and stem (25%), *N. oleander* (pink flower) forleaf (25%) and stem (25%), *P. alba* forleaf (16%) and stem (58%), *P. pudica* forleaf (41%) and stem (58%), *P. rubra* forleaf (50%) and stem (50%), *T. peruviana* forleaf (33%) and stem (50%),and *V. solanacea* forleaf (33%) and stem (25%).

32. LIPIDOMIC ANALYSIS OF POLAR TO NEUTRAL LIPID CONVERSION UNDER NUTRIENT STARVATION: A STUDY UTILIZING FLUORESCENCE SPECTROSCOPY AND GC-MS FOR BIOFUEL PRODUCTION.

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Abstract

Microalgae are highly promising for biofuel production from an ecological and environmental perspective, as they absorb carbon dioxide and can thrive on marginal lands using waste or saline water. Certain microalgal strains, such as Chlorella spp., are capable of accumulating significantly higher lipid levels under nutrient-deprived conditions, positioning them as a leading sustainable source of biofuels. The efficient production of high-grade biofuels from microalgal biomass depends on understanding the lipid content dynamics under various nutrient stresses. This study focuses on a detailed analysis of lipid composition alterations in Chlorella spp. under nitrogen and iron deprivation to provide novel insights into lipidomic changes during nutrient stress. The growth rate and lipid content of Chlorella spp.were assessed, with fluorescence microscopy following Nile red staining used to measure lipid accumulation. Lipid profiling was conducted using GC-MS, revealing a significant increase in triacylglycerol (TAG) production under nitrogen

and iron-starved conditions. The observed changes in the fatty acid profile were attributed primarily to a reduction in polar lipids relative to TAGs. This research provides a comprehensive lipidomic analysis of Chlorella strains, demonstrating their potential for biodiesel production.

33. SUSTAINABILITY AND AGRICULTURAL DEVELOPMENT: INSIGHTS FROM THE FARMER FIRST PROGRAMME

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Abstract

Agricultural development and farmers' welfare are central to India's developmental agenda. Over the years, various strategies have been implemented to shift the focus from mere food sufficiency to sustainable income growth and inclusive development. The Farmer FIRST Programme (FFP), launched in 2016 by the Indian Council of Agricultural Research (ICAR), represents an innovative, multi-stakeholder extension initiative aimed at improving the reach and impact of agricultural research. This paper assesses the outcomes of the FFP, implemented across ICAR institutions, with a focus on scaling up promising technologies that have demonstrated a tangible impact on farming communities. Key performance indicators include farm income, cropping intensity, the use of chemical fertilizers and pesticides, organic manure application, and nutritional security. Data from 50 FFP-implementing institutions, collected between 2016 and 2021, were analysed across six distinct zones. The findings show a significant increase in farm income, cropping intensity, and nutritional security, along with a reduction in pesticide use. Nutritional security, measured in cereal equivalent quantity (CEQ), saw marked improvements across all zones. Overall, FFP interventions led to higher incomes and better nutritional security for farm households compared to control groups. These positive results suggest the potential for scaling and institutionalizing the FFP model nationwide. The study recommends adopting a participatory, interdisciplinary approach to effectively expand the FFP across India agricultural research and development sectors.

34. INTERACTIONS OF PRIMARY ATTRACTANT WITH BIOTIC ENVIRONMENT: SPECIAL REFERENCE TO SIDA PLANT OF WESTERN UTTAR PRADESH

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Abstract

Pollination is a key of ecosystem that is essential for the conservation of wildlife, ecosystem functioning and agricultural production. The relationship between flowers and pollinators is the essential feature of sexual reproduction in flowering plants. Pollen vector as pollen, nectars, oil, resin or floral reward known as primary attractant. Sida acuta, Sida cordata, Sida rhombifolia and Sida cordifolia from Malvaceae family are herbs plant used in many many powerful drugs, growing at different place of Agra city of Uttar Pradesh. 25 five flowers/plants were sampled to observed the primary attractant and pollination mechanism. Flowers of S. acuta were visited honey bee and butterfly spent 10-15 and 10-18 seconds on a single flower, S. cordifolia flowers visited butterflies, honey bees, red cotton bug and grasshoper between 11:30-14:00. Visit duration was noted highest by beetles and grasshoper in all Sida plant. Flowers of S. cordata visited by butterflies, Bug and beetle between 11:00-14:00 h after anthesis. Honeybees and Butterflies are the principal most efficient pollinators of S. acuta, S. cordifolia and S. rhombifolia, while only butterflies was most efficient pollinators of S. cordata. Pollination in Sida species is commonly a mutualistic biotic interaction. Primary attractants of Sida plant provide the main food source of visiting insects. Floral Oils and Resins can also attracting the pollinators. In the present study, the interactions with primary attractant (biotic environment) were carried out in selected Sida species for its conservation and reproductive success of plant species.

35. IDENTIFYING MICROBES USING METAGENOMICS INVOLVED IN BIOREMEDIATION OF MICROPLASTICS IN SOIL

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Abstract

Although most research has predominantly focused on marine pollution, microplastics represent a serious environmental challenge for marine and terrestrial ecosystems. These small, varied, and widespread contaminants, measuring less than 0.5 mm, require urgent attention to protect our ecosystems. Effective management and reduction of soil microplastics are essential, as their presence can alter soil characteristics such as porosity, enzyme activity, and microbial communities, which in turn can affect plant growth and agricultural productivity. Microplastics also pose risks to soil fauna by interfering with feeding habits, reproduction, and metabolic processes. They can transport other pollutants and disrupt ecological balance. The presence of microplastics in soil threatens ecosystems and may have implication for human health as well. While research has identified the problem, it has not sufficiently addressed potential solutions. Degrading microplastics is particularly challenging due to their durability. Conventional methods, including physical and chemical degradation, often fall short. In contrast, bioremediation emerges as a promising and cost-effective alternative. This method leverages microbes to enzymatically decompose microplastics into benign byproducts like carbon dioxide and water. Researchers are employing advanced omics technologies- such as genomics, proteomics, transcriptomics,

and metabolomics to gain insights into how microbes can effectively break down and detoxify microplastics. This study provides a thorough examination of what we know about the sources of microplastics, their global distribution, ecological impacts on soil, bioremediation using metagenomics. Recognizing the uncertainties in this field, it underscores the necessity of developing effective strategies and actions.

36. TOXIC EFFECT OF PB ON GROWTH PARAMETERS AND PHOTOSYNTHESIS PROCESSES OF TOMATO PLANTS

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Abstract

The phytoremediation procedure is a novel and economical way to deal with environmental pollutants that are tough to removal. For soil that has been polluted by metal, it is an effective heavy metal removal technique. Lead (Pb) is a potentially harmful heavy metal that is readily absorbed and accumulates in various plant sections despite neither being a vital element nor having an effect on cell metabolism. It is a widely dispersed, significant and hazardous environmental chemical on a worldwide basis. High concentrations of heavy metals, such as lead, in *lycopercicum esculentum* can induce a variety of toxic symptoms in plants, including blackening of the roots, chlorosis, decrease photosynthesis, and growth retardation. Toxic Pb inhibits plant development, root, shoot length, seed germination, and crop output in the end. Pb causes changes in respiration and transpiration activities, disrupts ultrastructure of the chloroplast, alters the permeability of the plasma membrane, disturbed the uptake of nutrients through the roots, produces reactive oxygen species (ROS), and activates some enzymatic and non enzymatic antioxidant. In addition, Pb disrupts photosynthesis, throws off the balance of water and minerals, affects hormonal balance, and affects the permeability and structure of membranes. This review explains the many biological, physiological and morphological consequences resulting from lead poisoning on *lycopercicum esculentum* plants.

37. PREVALENCE OF CERTAIN HUMAN INTESTINAL PARASITIC INFECTIONS AND ASSOCIATED RISK FACTORS IN DISTRICT BULANDSHAHR

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Abstract

Introduction: Intestinal parasitic diseases constitute a global health burden causing clinical morbidity in millions of people. The aim of the present study was to determine the prevalence and

risk factors of intestinal parasitic infections in rural and urban population of district Bulandshaher. Material and Methods: The study population consists of rural and urban population of all age groups and both sexes. Chi square test was applied to study the association between prevalence of intestinal parasites and the demographic factors. Odds ratio (OR) and 95% confidence interval (95%CI) of values were also used. P value < 0.05 was considered as significant.

Results: The prevalence of intestinal parasites was significantly higher in rural population (χ^2=9.8603, *d.f.*=1, *p*=0.0017), illiterate persons (χ^2=8.8169, *d.f.*=2, *p*=0.01217), children (χ^2=10.8982, *d.f.*=2, *p*=0.0043) and persons walking bare foot (χ^2=14.2688, *d.f.*=1, *p*=0.0002) as compared to urban population, graduated persons, adults and population using shoes and slippers during walking respectively.

Conclusions: This study shows that intestinal parasitic infections are prevalent in the study area and require immediate control and preventive measures. Educating the population about the spread of intestinal parasitic infections and promoting good hygiene practices, wearing slippers or shoes while walking along with deworming services will have a substantial impact in the prevention of intestinal parasitic infections.

38. DEVELOPMENT OF PERSONALIZED DRUG FORMULATIONS FOR ENHANCED THERAPEUTIC PERFORMANCE

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Abstract

Several anti-cancer drugs, despite being first-line treatment option for most patients, possess the tendency to undergo first-pass metabolism and induce side effects when used for a prolonged duration, leading to patient noncompliance. This urges an immediate need to develop formulations with better therapeutic efficacy and patient compliance. Therefore, the aim of the work is to develop patient-centric transdermal drug formulations that could effectively circumvent the drawbacks associated with oral chemotherapy. We report the preparation and characterization of customized transdermal-based composite biodegradable hydrogel formulations loaded with an anti-cancer drug for the treatment of melanoma. The so formed composite patches were characterized by Field Emission – Scanning Electron Microscopy (FESEM), Fourier Transform – Infra Red (FT-IR) spectroscopic, Powder X-Ray Diffraction (PXRD), Differential Scanning Calorimetric (DSC) and Thermogravimetric (TGA) analysis. Swelling studies were conducted to understand the swelling and moisture retaining properties of the polymers. The drug loading ability and the drug release profile of the composite patches were determined by UV-Vis spectrophotometric analysis. The studies illustrate that the developed transdermal patches exhibited controlled drug release pattern according to the patient needs than that of the commercial drug. Further, this investigation might be used as a rationale for the required analytical and regulatory studies.

39. THE OVERVIEW AND PERSPECTIVES OF NANO-TECHNOLOGY TO UPLIFT THE LIVELIHOOD OF FARMERS

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Abstract

Chemicals in the form of fertilizer, insecticide, adsorbents etc. have been the central sage of the agrarian as input to optimize the yield and its attributing characters. Fertilizer among all perceived a necklace position during green revolution which provides nutrition to the plants and acts as the source of energy for soil microbes. Increasing global population exerts pressure towards bulk input feed and results high jump in fertilizer consumption of Indian farmers results 10:7:1 (NPK) instead of ideal 4:2:1. Higher application input of fertilizer utilizes only 30-50% while rest pollutes the environment. Therefore, a cocktail of scientific community suggested by extracting active ingredients and exposing it to high surface area, in other words, the matter is transformed to nano-ranged order. This later evolved the ground- base for nano-technology thereby acts as present inventive frontier and received much attention in last few decades due to its eco-friendly nature and is more congenial as an alternative practice in modern agricultural technology. Its application reduces the adverse effect of abiotic stress, toxic heavy metal accumulation, increase the nutrient use efficiency. The community relies that the plants nourish itself mainly as foliar in nano-fertilizer application. Due to which loss of soil biodiversity (biological properties), which is an important contributor of soil health. Moreover, the rapid application of nano-fertilizer raised a serious concern about improper distribution of nutrients and causes thread in human health via food chain. Therefore, the review has been presented to overview the application of nano-fertilizers, its synthesis, characteristics, behaviour, fate and application in soil-plant consortium along with the challenges and concludes that the nano-fertilizer reduces the pressure of integrated nutrient management whenever applied in judicious manner but is not the substitute of manures and fertilizer.

40. EXPLORING ANTIBACTERIAL POTENTIAL OF MEDICINAL PLANTS AGAINST RESISTANT BACTERIA

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Abstract
In recent years, antibiotics drug resistance in pathogenic bacteria poses a significant global health challenge. There is an urgent need to discover novel, effective therapeutic solutions. Medicinal plants are rich sources of phytochemicals that serve as potential antibacterial agents. Our research methodology aimed on investigation of the plant extracts to contribute to the growing literature in the management of treatment of bacterial diseases. The study was conducted toanalyzeinvitro antibacterial activities of plant extracts against resistant bacteria, delved intochromatography to unveil and identify chemical compounds present in the active plant extracts. Evaluation of invitro antibacterial screening revealed ethanol extractsare active than chloroform extracts. Column chromatography of ethanol and chloroform plant extracts was carried out. Gas chromatography – mass spectrophotometry (GC - MS) profiling was done and numbers of bioactive phytochemical constituents were determined in the bio active fractions. Insilico docking studies was also carried out. Discoveries validate the antibacterial potential. We present a comprehensive overview of therapeutic potential of the medicinal plants as alternate therapeutic agents for a promising future in health care sector for the benefit of mankind.

41. THERAPEUTIC EFFICACY OF EUGENOL-LOADED CHITOSAN NANOPARTICLES AMELIORATES ALLERGIC AIRWAY INFLAMMATION VIA NF-KB, HDAC SIGNALING PATHWAY IN ASTHMA: *IN SILICO* AND *IN VIVO* INVESTIGATION

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Abstract
Ethnomedicinal plants have been integral in treating respiratory disorders. Eugenol, a key phytoconstituent of *Syzygium aromaticum* L., exhibits strong anti-inflammatory effects, inhibits inflammation linked to asthma supported by numerous pharmacological trials. The study is focused on enhancing the thermal stability of eugenol by encapsulating it in chitosan nanoparticles via ionic gelation, improving its anti-inflammatory and immunomodulatory potential. Formulation development and optimization of chitosan nanoparticles by Design of

Experiment (DoE) was performed. Eugenol-loaded chitosan nanoparticles (EUGCNP) particles, sized 50–200 nm, demonstrated improved dispersibility from electrostatic hydrogen bonding, as observed through SEM and TEM. We examined the potential of EUGCNP to mitigate asthma pathogenesis by suppressing NF-κBp65 and modulating HDAC1. EUGCNP (10 mg/kg) was administered to Balb/c mice following OVA exposure to establish an allergic asthma model. The impact of EUGCNP on NF-κBp65 and HDAC1 signaling pathways were assessed by examining various inflammatory parameters through immunofluorescent localization, also H&E and Masson's trichrome staining were performed. Metabolomic analysis of BALF and lung tissues identified unique metabolic signatures, while ELISA quantified pro-inflammatory cytokines such as IL-13, IL-4, IL-5 and TNF-α. Serum levels of IgE, NO, ALT, AST, and creatinine, along with MDA, GSH, SOD, and CAT were quantified in lung tissue. Molecular Dynamic Simulation and Molecular docking analysis was also performed. Augmented expressions of HDAC1, and NF-κBp65 were observed in asthmatic group which were suppressed in the treatment group. The findings suggest that EUGCNP attenuate asthma severity and airway inflammation via down regulation of HDAC1, and NF-κBp65 in an ovalbumin-induced asthmatic mouse model.

42. COMPARATIVE ANALYSIS OF CHLOROPHYLL CONTENT ACROSS FORESTRY TREE SPECIES OF CENTRAL INDIA AT NURSERY CONDITION.

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Abstract

Plants act as transducers of the solar light in the chemical energy because they contain chlorophyll molecules and are of utmost importance because of their light absorbing property. These pigment molecules are helpful in the measuring plant productivity, maintaining photostasis, protecting from excess sunlight and are also indicators of phototoxicity, pollution and environmental stress. In the present study, 34 important forestry tree species of central India were evaluated for their chlorophyll content at nursery condition. *Chl-a* concentration was found maximum in *Tectona grandis* (4.31±0.01mg *Chl* a/g FW) followed by *Sterculia urence, Mallotus philippensis, Terminalia chebula, Azadirachta indica,* whereas minimum were reported in *Adina cordifoloa* (0.057±0.01^{s} mg *Chl* a/g FW) followed by *Gmelina arborea.Chl-b* concentration was found maximum in *Sterculia urens* (2.38± 0.05 mg *Chl* b/g FW) followed by *Tectona grandis,* whereas minimum were reported in *Feronia limonia* (0.097±0.01^{q} mg *Chl* b/g FW) followed by *Terminalia arjuna.* Total chlorophyll pigment (a+b) was found to be maximum in *Tectona grandis* (6.65±0.15 mg *Chl a*b/g FW) followed by *Sterculia urence* minimum in *Terminalia arjuna*(0.25±0.01^{r} mg *Chl a*b/g FW). The variable of *Chl-a* has the highest positive correlation (0.981) with *Chl_a+b* and having a significant correlation with variable(s) *Chl_a+b*, *Chl_b* and *a/b*. On the basis of the observation of all the results it was evident that the *Tectona grandis* is most suitable sapling at the nursery condition and diseased free. Objective of this experiment to screened optimum photosynthetic concentration with respect to species at nursery condition.

43. ASSESSMENT OF MICROBIAL BIO-FORMULATION AND VARIETY ON MUSTARD CROP PRODUCTIVITY UNDER PROBLEMATIC SOIL IN SULTANPUR DISTRICT, U.P.

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Abstract

The Impact of microbial bio-formulation on mustard crop productivity during *Rabi*, 2020-21 to 2022-23 under demonstration in saline-sodic soils of Sultanpur was assessed. A total of 275 clients on Integrated Crop Management (ICM) in mustard with salt tolerant variety CS 58 and the use of bio-formulation (PSB) were undertaken in 50.0 ha area at 45 villages of Motigarpur, Jaisinghpur and Kadipur Blocks of district. Salt tolerant variety CS-58 is recommended for saline soil up to soil salinity level (EC) 12.0 dSm-1 and in alkali soils up to pH 9.5. as it is highly suitable for saline and sodic soil conditions. Based on three years data, it may be concluded that the improved practice (IP) had an average seed yield of 21.18q. Ha-1, which enhance yield up to 20.37% from the farmer's practice about 17.64 q. Ha^{-1}. The average extension gap, technology gap and technology index were 253.33 kg ha^{-1}, 382.33 kg ha^{-1}, and 15.72%, respectively. The economic analysis of demonstrations revealed the viability of enhanced technology, with a net return of 88575.67 Rs. ha^{-1} and benefit-cost ratio (BCR) of 5.82, compared to 72327.33 Rs. ha^{-1} and 5.37 (BCR) farmers practice.

44. MICROALGAL CARBON CAPTURE: PIONEERING A SUSTAINABLE BIOREFINERY FOR CLIMATE RESILIENCE

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Abstract

The increasing global population, coupled with rapid industrialization and economic growth, has led to a surge in energy demand. Fossil fuel combustion, responsible for over 80% of energy production, releases significant amounts of CO_2, contributing to climate change. These emissions have profound socio-economic, biological, and environmental impacts. Addressing this issue requires the adoption of two major green strategies: transitioning to low-carbon alternatives and reducing CO_2 emissions. Microalgae offer great potential for environmental remediation by capturing pollutants such as CO_2, heavy metals and microplastics while producing valuable metabolites like fatty acids, biofertilizers, and bioplastics. This study focuses on overcoming key technological challenges in microalgal biorefineries, aiming to enhance biomass productivity, CO_2 sequestration, and the production of essential bioproducts in High-Rate Algal Ponds (HRAP) and controlled conditions. The metabolic profile outlines a photosynthetic biorefinery model that

converts CO_2 and wastewater nutrients into valuable bio-products, contributing to a circular bioeconomy and carbon reduction.

45. ASSESSING THE IMPACT OF POLYVINYLCHLORIDE (PVC) CONTAMINATION ON PADDY CROP GROWTH AND ITS IMPLICATIONS FOR ACHIEVING SDG 2: ZERO HUNGER IN EASTERN UTTAR PRADESH, INDIA

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Abstract

Polyvinylchloride (PVC) pollution in agricultural soils has emerged as a critical environmental issue, particularly in regions of Eastern Uttar Pradesh, Northern India, where nearly 60% of the population depends on cereal crops production; in this study we examines the effects of 4% PVC microplastic incorporation in soil on their growth responses of paddy (*Oryza sativa*) crops, which is one of the vital food sources for Eastern Uttar Pradesh, and it also hampered the food security and sustainability Challenges. In my experiment the spiking of 4% PVC microplastics led to a 25% reduction in root elongation, a 30% decrease in shoot biomass, and a 20% drop in grain yield. Moreover, soil nutrient cycling was disrupted by 35%, microbial activity declined by 28%, and water retention capacity was severely obstructed, further hampering crop productivity. These adverse effects pose a direct threat to Sustainable Development Goal (SDG) 2: Zero Hunger, as they significantly reduce crop yields and threaten food security for vulnerable populations. Our result finding focusing the urgent need for better waste management practices, sustainable agricultural methods, and policy reforms to mitigate soil contamination. By aligning with global sustainability goals, this study emphasizes the importance of improving soil health and managing plastic pollution to ensure resilient agricultural systems, especially in developing regions of Eastern Uttar Pradesh, where food security is most challenging task.

46. METAGENOMICS AND CARBON POOLS OF NILGIRI HILL REGION IN WESTERN GHATS GLOBAL BIODIVERSITY HOTSPOT OF INDIA

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Abstract

Land use change (LUC) and deforestation have had profound effects on vital ecosystem services, leading to widespread environmental degradation. This has been particularly evident in the Nilgiri Hill Region (NHR), a UNESCO World Heritage site and recognized biodiversity hotspot. Henceforth, this investigation was carried out in the six major ecosystems of the NHR (cropland (CL), deciduous forest (DF), evergreen forest (EF), forest plantation (FP), scrubland (SL), and tea plantation (TP)) to assess the impact of LUC on soil quality. The carbon stocks and its pools

in varying lability were highest in EF and DF when compared to other ecosystems studied. It was evident that the LUC has altered the proportion of soil carbon pools, and the efficiency of soil microbiome and has resulted in higher carbon dioxide emissions in TP and CL. However, recalcitrance nature of soils in EF and DF prevents such carbon degradation and thereby hinder the soil carbon emissions. Thus, the result of changing land use has a substantial impact on the carbon cycle CL and TP. Henceforth; to maintain carbon footprints and attain carbon net neutrality under the changing climate scenario, suitable carbon management measures must be implemented in carbon-degraded ecosystems (CL and TP) of the NHR.

47. GENOMIC INSIGHTS AND FUNCTIONAL CHARACTERIZATION OF CERTAIN ODORANT-BINDING PROTEINS IN WHITEFLY *BEMISIA TABACI* ASIA II-1

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Abstract
This study provides genomic insights and functional analysis of odorant-binding proteins (OBPs) in whitefly, *Bemisia tabaci* Asia II-1. The variations in OBP diversity between the genetic groups of whiteflies like Asia II-1, MEAM1, and MED facilitated the reclassification of OBP gene families in *B. tabaci*. Motif pattern analysis of 142 OBPs from Hemipteran insects identified six characteristic motifs. The OBPs 3 &10 showed high binding affinities for β-caryophyllene (binding energy: -7.7 kcal/mol for OBP3, -7.2 kcal/mol for OBP10) and β-ionone (binding energy: -6.7 kcal/mol for both OBP3 and OBP10). The molecular docking analysis identified key amino acid residues in the central hydrophobic pocket that are crucial for ligand binding. Competitive fluorescence binding assays confirmed that β-caryophyllene and β-ionone have strong affinities for binding with OBP 3/10. Bioassays using olfactometry demonstrated that OBP3 and OBP10 are involved in host recognition and selection. Silencing OBP3 and OBP10 through RNAi led to a reduction in transcript levels and altered the olfactory responses. Oviposition studies revealed that β-ocimene is associated with oviposition preference for egg laying by whitefly, *B. tabaci*. These findings suggest that OBP3 and OBP10 play critical roles in the orientation and ovipositional behaviours of *B. tabaci.* The results of this study provide new insights into the functional roles of OBPs in *B. tabaci*. The molecular interactions of OBPs with volatile organic compounds hold the keys for developing novel pest management strategies.

48. REDEFINING FOOD SYSTEMS IN INDIA: MANAGING DIETARY CHANGES AND ENVIRONMENTAL IMPACTS FOR SUSTAINABLE DEVELOPMENT

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Abstract
The intensification of agricultural production, combined with population growth, rapid urbanization, and changing lifestyles, is reshaping food consumption patterns and increasing

environmental pressures. Sustainable development must prioritize healthy and fresh food consumption while aligning with sustainable production systems. In India, urbanization has boosted consumer incomes, enabling diversification into luxury and convenience foods. This shift has led to a rise in food start-ups focusing on direct delivery of fresh produce and dairy products to consumers. While there is greater demand for high-value agricultural products like meat, fish, and diverse fruits and vegetables, this trend is uneven across different societal groups and has contributed to environmental issues such as increased greenhouse gas emissions and food waste. Despite the shift from traditional staples to higher-value and processed foods, Indian diets still fall short in meeting recommended intake levels for fruits, vegetables, and animal-source foods. Food systems significantly impact climate change, responsible for about one-third of global greenhouse gas emissions. Addressing the interplay between climate change and food systems is crucial for advancing towards the 2030 Agenda for SDGs. Inclusive solutions that consider the needs of women, youth, and rural communities are essential for equitable and effective outcomes. In India, where agriculture contributes 18% of greenhouse gas emissions and consumes 43% of freshwater resources, understanding the environmental impacts of dietsparticularly those related to animal-source foods and rice is key to achieving sustainable food system transitions and advancing SDGs.

A study was conducted on changes in food consumption patterns over the past two decades in India and Telangana, revealing significant transformations influenced by urbanization, economic growth, and cultural exchange. The study found a notable shift towards convenience and processed foods, coupled with a growing awareness of health and nutrition. In Telangana, while traditional staples such as rice, millets, and pulses continue to play a crucial role, particularly in rural areas where consumption patterns remain relatively stable, urban centers like Hyderabad have experienced a marked increase in the popularity of international fast foods and cafe culture. Additionally, there has been a discernible decline in rice consumption, with individuals increasingly opting for more nutrient-dense alternatives such as whole grains, millets, and vegetables. This decline is indicative of a broader trend towards healthier and more diverse diets, shaped by evolving health trends, dietary diversification, and lifestyle changes.

49. FOUNDATION COURSE AS ENABLER FOR ENTRY-LEVEL FACULTY OF AGRICULTURAL UNIVERSITIES

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Abstract

The faculty recruited to teach diverse subjects in agricultural and allied sciences (horticulture, veterinary, animal husbandry, fisheries, etc.) universities are undoubtedly experts in their domain knowledge. However, entry-level faculty in these universities face the challenge of discharging their duties and responsibilities in teaching to students, conducting research and delivering non-formal extension education to farming community. Besides keeping their subject knowledge updated, entry-level faculty have the responsibility to acquire necessary skills and aptitude to become consummate teachers. Having no prior exposure to service rules, conduct rules, administrative and financial procedures, makes their job daunting in their early career.

This necessitates a well-designed, tailor-made, subject-neutral foundation course as a Human Resource Management approach to enhance the functional competence of the entry level faculty of Agricultural and allied science universities. The present paper discusses the nuances of the design of a foundation course organized by ICAR-NAARM, Hyderabad for faculty of agricultural universities in view of the responses and feedback from 45 entry level assistant professors from 10 different State Agricultural Universities in India.

The foundation course of three weeks covered 68 sessions under six broad areas on socialization/ general aspects (15), research project formulation (15), Teaching competence/ education management (15), Extension systems/ transfer of technology (6), statistical analysis (12) and human resource management (5). The course was rated very highly by the majority with a rating of 4.44/5.00. It was relevant to the needs (4.22) and helped the trainees to acquire new knowledge and skills (4.67) to deliver their responsibilities in the universities. Besides valuing the interaction with the trainers very highly (4.84/5.00), the trainees appreciated the coordinators' skill and support (4.91) and logistic support during the training. About 64.2% of the trainees indicate 3 weeks as ideal for the course while about 30.95% of the trainees wanted the foundation course to be of at least 4 weeks or more. Additional days and sessions of the course were requested mostly on account of micro-teaching exercises, case studies, hands-on-practice of statistical and project management tools, and field and institutional exposure visits.

50. WATER MANAGEMENT FOR ENHANCING WATER USE EFFICIENCY AND RICE PRODUCTIVITY UNDER DIFFERENT RICE ESTABLISHMENT METHODS

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Abstract

To evaluate the suitable and promising irrigation management practices in different rice crop establishment methods a field trial was formulated and conducted from 2014 to 2023 at 10 locations across India. Split plot design was adopted with 3 main plots of irrigation management (I_1: Flooding, I_2: Saturation maintenance upto panicle initiation and after panicle initiation and I_3: Alternate wetting and drying) and 6 subplots of crop establishment methods (T_1: Mechanical transplanting method on puddled soil, T_2: Direct wet seeding on puddled soil followed by crop management practices as per direct wet seeded rice, T_3: Normal hand transplanting, T_4: Aerobic rice, T_5: Direct broadcast of seeds on well prepared unpuddled soil followed by crop management practices for direct dry seeded rice and T_6: Optional- Location specific) and replicated thrice. Over all mean grain yield across all the centres revealed that alternate wetting and drying resulted in the highest grain yield (5.13 t/ha) among irrigation management treatments. Similarly, among crop establishment methods, mechanical transplanting resulted the highest grain yield (5.79 t/ha). Cost of cultivation under flooding was higher across all the locations varied from Rs. 33443/- at Varanasi to Rs. 45850/- at Mandya. There was a saving of Rs 3800/- per hectare at Mandya under alternate wetting and drying over flooding. Similarly, input water also saved in the tune of 70 cm/ha.

51. BIOSYNTHESIS OF MANGANESE OXIDE NANOPARTICLES USING FRUIT EXTRACT OF *CORDIA MYXA* AND ITS POTENTIAL EFFICACY AGAINST PATHOGENIC MICROBES

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Abstract

Nanotechnology has emerged as a crucial field in modern science, predominantly in the synthesis of metal nanoparticles (NPs), which exhibit unique properties useful for various applications, including environmental remediation and biomedical practices. This study introduces an innovative approach to synthesize Manganese Oxide Nanoparticles (MnO_2 NPs) using a green synthesis method that employs the fruit extract of *Cordia myxa*. This fruit is esteemed not only for its delightful flavour and rich nutritional profile but also as a source of several useful phytochemicals known for their antioxidant and antimicrobial effects. The bioactive compounds present in *Cordia myxa* fruit extract serve as both reducing and stabilizing agents during the synthesis of MnO_2 NPs. These NPs were thoroughly characterized and assessed for their antioxidant properties, dye degradation capabilities, and potential biological applications. The study also tackles the significant issue of multidrug-resistant bacteria (MDR), which present a formidable challenge to global health. Characterization of the synthesized MnO_2 NPs was performed using various techniques, such as X-ray diffraction (XRD), transmission electron microscopy (TEM), and Fourier-transform infrared spectroscopy (FTIR). These analyses confirmed the crystalline structure, morphology, and functional groups associated with the NPs. The antioxidant activity of the synthesized MnO_2 NPs was evaluated through standard assays, revealing substantial free radical scavenging activity, indicating their potential as natural antioxidants. Moreover, the dye degradation activity was tested using Congo red dye as a model pollutant, demonstrating that MnO_2 NPs effectively catalyzed the degradation process under UV light, highlighting their potential application in industrial wastewater treatment. The synthesized MnO_2 NPs exhibited strong antibacterial properties against various drug-resistant strains, suggesting their effectiveness in combating multidrug resistance. The findings contribute to the expanding body of knowledge on green nanotechnology, which leverages eco-friendly methods to address pressing challenges in pollution and health. By utilizing plant extracts for nanoparticle synthesis, this approach minimizes environmental impact while enhancing the sustainability of nanotechnology practices.

52. ASSESSMENT OF HEAVY METAL TOLERANCE AND BIOSORPTIVE POTENTIAL OF *PSEUDOMONAS* ISOLATED FROM INDUSTRIAL EFFLUENTS

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Abstract

Now-a-days Heavy metal contamination is one of the important environmental concerns throughout the world. Textile efuents of West Bengal, India are grossly contaminated with heavy metals and needs to explore native microbes as effective bioremediation tool. The present study aimed to isolate heavy metal-tolerant bacteria from textile efuents and to assess their biosorptive potential. Out of 30 isolstes, 13 isolates shpwed metal tolerance potential against Ni and Co. Maximum tolerable limit and resistance against multimetals was also determined. Among these a particular bacterial strain showing highest tolerance to Ni and Co and multimetal resistance against Ni, Co and Cr at diferent levels was selected. ICP-OES revealed that this strain reduced Ni (50, 49%) after 24 h and Co (71, 68.6%) after 48 h. FT-IR was used to analyse functional groups and overall nature of chemical bonds. Changes in spectra of biomass were determined after absorption of Ni and Co by *Pseudomonas*. SEM indicated some changes in bacterial morphology because of metal stress. Both metals affected bacterial cell wall and generated pores in it. However, Ni had pronounced effect over Co. It was concluded that *Pseudomonas*, a native novel strain, possessed signifcant heavy metal tolerance and bioremediation potential against Ni and Co. It may be used in future for development of bioremediation agents for detoxifification of textile effuents at industrial surroundings.

53. MICROBIAL PROFILING AND SEASONAL VARIABILITY IN *SCYLLA SPS*. FROM VISAKHAPATNAM HARBOR

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Abstract

The intricate interplay between environmental factors and microbial communities in marine organisms is a compelling area of research. This study delves into the seasonal variability of bacterial flora associated with two commercially important mud crab species, *Scylla serrata and Scylla olivacea*, from Visakhapatnam Harbor. Microbiological assessments encompassed Total Plate Count (TPC), coliforms, Escherichia coli, Vibrio parahaemolyticus, Staphylococcus aureus, and Salmonella spp., with isolates identified through meticulous morphological and biochemical characterizations. The hepatopancreas consistently exhibited significantly elevated TPC and E. coli levels compared to muscle tissue. The highest TPC, observed in S. olivacea hepatopancreas during the pre-monsoon season ($26.64 \pm 1.9 \times 10^3$ CFU g^{-1}), contrasted sharply with the lowest TPC in S. serrata muscle in winter ($1.86 \pm 2.0 \times 10^3$ CFU g^{-1}). Similarly, E. coli concentrations peaked in S. olivacea hepatopancreas pre-monsoon (20 ± 1.26 CFU g^{-1}), while winter samples from S. serrata muscle recorded the lowest counts (1.4 ± 0.17 CFU g^{-1}). Notably, S. aureus and Salmonella spp. were absent in all samples, reinforcing the microbial safety of these crabs for consumption. This study not only underscores the influence of seasonal and anatomical factors on microbial diversity but also hints at broader ecological and food safety implications, revealing the critical need for continuous monitoring in aquaculture and seafood safety.

54. PHARMACOGNOSTIC EVALUATION OF LAATA- A TRADITIONAL, NUTRITIOUS, DIETARY COMPOUND FORMULATION PREVALENT IN THE CHITRAKOOT REGION OF MADHYA PRADESH-INDIA

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Abstract

Chitrakoot region is a remote area situated in the northern region of Satna district, Madhya Pradesh, India. It has strong local health traditions including home remedies and nutritional food materials in which medicinal plants play an important role. There are several folklore delicacies with herbal compound formulations used to maintain a healthy life. The present study highlights the documentation and standardization of a traditional herbal nutritiousformulation locally called Laata, prepared with dry Mahua flowers (*Madhuca longifolia* with other ingredients) and used as a nutritious dietary supplement by tribal and folk communities of the Chitrakoot region, Madhya Pradesh. This study deals pharmacognostic investigation, macroscopy, powder microscopy, physicochemical parameters, detection of heavy metals, nutritional value analysis, screening of microbiological parameters, and high-performance thin layer chromatography (HPTLC) fingerprints profile of methanolic extract. Microbiological analysis of pathogenic bacteria, *viz.Salmonella* sp., *Escheria coli*, *Pseudomonas aeruginosa* and *Staphylococcus aureus* were done and found that absent. Detection of heavy metals (Pb, Cd, As & Hg) tests were performed and found under limits/absent as per the WHO guidelines. Besides, nutritional value tests of four compound formulations of Laata were analyzed such as total calories range (395.10±0.33-469.91±0.45 kcal/100gm), total carbohydrates range (45.60±0.54-57.18±0.73g/100gm), total fat (17.40±0.91-22.63±0.54g/100gm), protein (10.75±0.54 -13.56±0.88g/gm), vitamin C (2.00±0.55-3.39±0.07mg/100gm), dietary fibre (3.90±0.58-4.89±0.47g/100gm), Iron (8.60±0.84-10.48±0.52mg/gm), Calcium (12.50±0.44-17.72±0.19mg/gm), Sodium (62.34±0.79-80.20±0.88mg/gm) and potassium (105.60±0.77-155.70±0.06mg/gm) were found. HPTLC fingerprint profiles of Laata samples with standard ferulic acid were performed and quantified. The identification and confirmation of the band were done based on the $R_f$value and color of the band. These findings indicate that Laata (a traditional herbal nutritious compound formulation) is a very good traditional herbal recipe used by the tribal of Chitrakoot region to maintain good health. These types of practices if integrated with the modern healthcare system could elevate the health status of thousands of rural people as well as urban people.

55. HISTOLOGICAL CHANGES INDUCED BY *MELOIDOGYNE INCOGNITA* IN THE RHIZODERMAL REGION OF *OCIMUM SANCTUM* IN JHANSI (U.P.), INDIA

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Abstract

Southern root-knot nematodes *Meloidogyne incognita* are detrimental sedentary endoparasites with a broad host range, including economically important medicinal plant species including Tulsi. Tulsi (*Ocimum sanctum*) is an important medicinal and aromatic plants (MAP) grown at Baruasagar town in Jhansi district where root-knot nematodes are a major threat in production fields. Plants infested with *Meloidogyne incognita* typically exhibit symptoms that affect both above-ground and below-ground structures. Above-ground symptoms can include yellowing leaves, wilting, and overall stunted growth, indicating physiological distress. Below ground, the most recognizable signs are the formation of galls on the roots, which can vary significantly in size, leading to complications in water and nutrient uptake. The infected *Ocimum sanctum* \root samples were collected from three different agro-ecosystem zones of Baruasagar town and processed for optical microscopic investigation. For ascertaining the histopathological modifications, the galled roots were collected and the egg masses were picked from them for culture. The giant cells observed with thicker irregular cell walls and possessed dense cytoplasmic contents with multiple nuclei.

56. FLEXIBLE AND PRINTED GFET WITH LIQUID GATE ARCHITECTURE FOR BIO-SENSING APPLICATIONS

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Abstract

To improve the quality of life with personal healthcare facilities, the demand for flexible and printed devices for healthcare and biomedical sensing is on the rise. Early detection of specific biomarkers is essential to curb and, in many cases, completely avoid the development of life-threatening diseases. In this direction, a flexible graphene-based field effect transistor (GFET) structure can be used for various biochemicals sensing providing a flexible and wearable sensing medium. Graphene being a two-dimensional conductive material holds the key for specific biomolecule detection on its large surface area and provides a sensitive and accurate sensing platform. Besides biosensing, graphene-based sensors are also popular as the sensing material to be used in various physical and chemical sensors. With this in mind, we fabricated a flexible GFET with a liquid gate architecture for biosensing applications. Here the target analyte works as the gate to the FET structure to modulate current in the graphene channel. The fabrication process involves dispensing printing and dry graphene transfer methods to avoid complex fabrication techniques. The Raman characterization confirms the successful transfer of monolayer graphene. The fabricated GFET shows the ambipolar transfer characteristics with reduced leakage current after the electrode insulation. Further, the proposed GFET structure can be used as a specific biosensor after necessary surface functionalization and calibration with the target analyte.

57. DEVELOPMENT AND CHARACTERIZATION OF BIO-ADHESIVE DRUG DELIVERY SYSTEM FOR THE TREATMENT OF SKIN CANCER

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Abstract

Skin cancer remains a growing global concern, with increasing cases in recent years. Conventional treatments like surgery and chemotherapy have limitations, but topical chemotherapy shows promise by minimizing systemic toxicity. Bleomycin Sulfate (BLM), while effective intravenously, faces challenges in skin penetration. Ethosomes, which enhance skin absorption, offer a potential solution. To target delivery, folic acid-conjugated ethosomes were prepared for localized treatment, avoiding systemic circulation. These ethosomes were incorporated into nanofibers, providing a structural base. Using thin film hydration, ethosomes with BLM were optimized via Response Surface Methodology. Folic acid was conjugated with stearylamine and used to create BLM-loaded, folic acid-conjugated ethosomes (FA-BLM-ETH5), which were further incorporated into nanofibers (FA-BLM-ETH5-NF4). Characterization showed efficient drug entrapment, favorable vesicle size, and zeta potential. *In vitro* drug release after 96 hours reached 82% for ethosomes and 62% for nanofibers. Kinetics studies indicated the ethosomes followed the Higuchi model, while nanofibers adhered to a non-Fickian diffusion model. *Ex-vivo* drug retention and cytotoxicity studies revealed enhanced therapeutic effects. The IC50 values were 5.32 μg/ml (24h) and 3.49 μg/ml (48h) for ethosomes, and 6.85 μg/ml (24h) and 3.94 μg/ml (48h) for nanofibers. Cellular uptake showed increased cytotoxicity over 48 hours, and *in vivo* studies confirmed skin safety. This research highlights a promising approach for localized skin cancer therapy, addressing drug penetration challenges.

58. THE EFFECTS OF SUSTAINABLE FARMING METHODS ON SOIL HEALTH AND CROP YIELDS: A REVIEW

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Abstract

As a dynamic living system, healthy soil provides a variety of ecosystem services, including maintaining plant production and water quality, regulating the breakdown and recycling of soil nutrients, and absorbing greenhouse gases from the environment. Lower productivity and deteriorated soil are two consequences of conventional farming methods. Carbon sequestration and soil health are the focal points of regenerative agriculture (RA), which proponents claim offers a solution to both problems. According to the literature, hat conservation tillage, crop rotation, cover crops, and reducing or eliminating the use of synthetic fertilizers and herbicides are examples of sustainable agricultural techniques that can improve soil health and increase vegetable yields. Increased agroecosystem resilience can be attained by these activities through promoting soil biodiversity, nitrogen cycling, and organic matter. This review will cover how utilizing the interactions between these practices can help create a resilient and sustainable global

food system, address the difficulties of feeding an expanding population while protecting natural resources, reduce negative environmental effects, and ultimately guarantee an effective and sustainable future for agriculture.

59. HARNESSING DIGITAL AGRICULTURE FOR ACCELERATED R&D: INNOVATIONS IN ICT FOR SUSTAINABLE AGRICULTURAL GROWTH IN INDIA

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Abstract

India's agricultural sector is vital to its economy, employing nearly half of the workforce and significantly contributing to GDP. Despite successes like the Green Revolution, the sector faces challenges such as climate change, resource constraints, and a digital divide between urban and rural areas. Digital agriculture, powered by Information and Communication Technologies (ICT), offers transformative solutions to enhance productivity and sustainability, improving the livelihoods of millions of smallholder farmers.

Innovative technologies such as precision farming, remote sensing, and data analytics empower farmers with real-time insights for informed decision-making. Tools like drones and Internet of Things (IoT) sensors enable efficient crop monitoring and resource utilization, leading to higher yields and reduced environmental impact.

The Indian Council of Agricultural Research (ICAR) plays a crucial role in this transformation by integrating ICT solutions into farming practices, focusing on climate-resilient crop development and pest management. ICAR's training programs enhance digital skills among farmers and agricultural professionals, facilitating the adoption of these technologies.

Digital agriculture accelerates R&D by utilizing data analytics, artificial intelligence (AI), and machine learning, enhancing crop resilience and pest management. Collaborative digital platforms improve communication among researchers, policymakers, and farmers, expediting research processes and providing timely information.

Challenges such as climate variability and the digital divide must be addressed for widespread adoption. ICT tools can mitigate climate impacts through early warnings and optimized resource management. Government initiatives like Digital India and AgriStack support the necessary digital infrastructure, while collaboration among stakeholders is vital for scaling innovations.

The success stories from various regions demonstrate the impact of digital agriculture, showcasing how advanced technologies have enhanced crop monitoring capabilities. Furthermore, innovative agri-tech startups like DeHaat and CropIn are revolutionizing the industry by offering real-time advisory services that empower farmers to make better decisions. However, for these digital initiatives to be fully effective, it is crucial to prioritize capacity building and the development of robust infrastructure.

The future of digital agriculture in India is promising, with potential for increased farmer incomes, reduced resource waste, and contributions to food security. By harnessing these advancements, digital agriculture can significantly support the vision of a Viksit Bharat— a prosperous and self-reliant India.

60. AN *IN SILICO* STUDY ON THE INHIBITION OF CORONA VIRUS DISEASE (COVID-19) PROTEASE BY THE EXTRACT OF INDIAN HERBAL PLANTS

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Abstract
The Corona virus (COVID-19) has quickly spread across the globe and becoming a pandemic. This disease has variable impact in different countries depending on their cultural norms, mitigation efforts and health infrastructure. In India, a majority of people upon Traditional Indian Medicine to treat human maladies due to less-cost, easier availability and without any side-effect. These medicines are made by herbal plants. This study aims to assess the Indian herbal plants in the pursuit of potential COVID-19 inhibitors using *in silico* approaches. We have considered 18 extracted compounds of 11 different species of these plants. Our calculated lipophilicity, aqueous solubility and binding affinity of the extracted compounds suggest that the inhibition potentials in the order; harsingar> aloevera> giloy> turmeric> neem> ashwagandha> ginger> redonion> tulsi> cannabis > black pepper. On comparing the binding affinity with hydroxychloroquine, we note that the inhibition potentials of the extracts of harsingar, aloe vera and giloy are very promising. Therefore, we believe that these findings will open further possibilities and accelerate the works towards finding an antidote for this malady.

61. ENDOPHYTIC FUNGAL DIVERSITY IN MANGROVE ECOSYSTEMS OF RAIGADH DISTRICT

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Abstract
Endophytic fungi are microorganisms that live within plant tissues, establishing intricate and often symbiotic relationships with their host plants. These fungi have garnered significant attention due to their potential as sources of chemically diverse bioactive compounds, including antioxidants, antimicrobials, and anticancer agents. The presence of endophytic fungi within plant tissues contributes to enhanced plant resilience, as they can influence gene expression, modulate biosynthetic pathways, and help plants cope with various environmental stresses. This symbiotic association not only strengthens the plant's innate defense mechanisms but also aids in protecting the plant against a wide array of potential pathogens, enhancing overall plant health and productivity.

The focus of our study is on exploring the diversity of endophytic fungi in the mangrove forests of the Raigad district in Maharashtra. Mangroves are unique ecosystems that provide a distinctive environment for microbial diversity, and the endophytic fungi associated with these plants are expected to exhibit unique characteristics compared to those in other ecosystems. By investigating the fungal populations in this specific region, our research aims to uncover how

the diversity of these fungi in Raigad's mangrove forests compares to that of other mangrove forests. This comparison could provide insights into regional variations in fungal communities, potentially influenced by factors such as local environmental conditions, plant species diversity, and ecological interactions. Understanding these differences not only enriches our knowledge of fungal biodiversity but also highlights the ecological significance of endophytic fungi in mangrove ecosystems, paving the way for discovering new bioactive compounds with potential applications in various industries.

62. IN SILICO ANALYSIS OF ANTI-QUORUM SENSING AND ANTIBIOFILM ACTIVITY OF DIOSGENIN AGAINST *PSEUDOMONAS AERUGINOSA* AND METHICILLIN-RESISTANCE STAPHYLOCOCCUS AUREUS

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Abstract
The quorum sensing mechanism relatively relies on the transcriptional virulence phenotypes, which orchestrate the synthesis of virulence factors, including toxins, enzymes, and biofilms. Quorum sensing & biofilm formation is a critical virulence factor of *Pseudomonas aeruginosa* and methicillin-resistant *Staphylococcus aureus* (MRSA) infections, significantly contributing to increased antibiotic resistance and persistent infections. Emerging therapeutic strategies for infection control encompass approaches that attenuate quorum-sensing systems. This study investigates the antibacterial, antibiofilm, and in silico anti-quorum sensing properties of Diosgenin. Minimum inhibitory concentration and antibiofilm activity of Diosgenin against *P. aeruginosa* and MRSA were evaluated. Furthermore, the molecular interactions and stability of key virulence factors, specifically LasI/R, PqsR, and AgrA/C, in complex with Diosgenin was also elucidated using advanced computational techniques. MIC of Diosgenin was determined to be 500 μg/ml for both the bacterial strains. Notably, Diosgenin effectively reduced bacterial growth and biofilm formation even at MIC and sub-MIC concentrations. Findings of molecular simulation study revealed that hydrogen bonding and hydrophobic interactions predominantly contribute to the stability of Diosgenin at the active sites of these proteins. These interactions are anticipated to interfere with the molecular mechanisms governing quorum sensing and biofilm formation in *P. aeruginosa* and MRSA by obstructing receptor proteins with Diosgenin. Collectively, these results suggest that Diosgenin holds promise as a therapeutic agent targeting crucial virulence factors, with its ability to inhibit biofilm development and disrupt quorum-sensing mechanisms highlighting its potential clinical significance.

63. DYE SEQUESTRATION FROM AQUEOUS SOLUTION USING SEMAL PLANT LEAF POWDER

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Abstract
Pollution emanating from effluents containing residual dyes which are not biodegradable has become a serious environmental problem in the last decade due to the increasing and fast growing usage of dyes in different applications. Even small amount of dye in water affects the aesthetic value and water transparency in water bodies. The easy parameter to classify the waste water is the color; therefore the contaminated dye in waste water needs to be removed before released to natural stream. The dye removal process which is the low cost of operation and occurred through the green reaction under the usage of the natural waste is the interested method.
Biosorption is leaded to the decolorizing the waste water by using the agricultural waste through the adsorption technique. In this study the Malachite Green (MG) adsorption onto Semal leaf powder was investigated in terms of both adsorption efficiency and kinetic study. The effect of various parameters i.e. initial dye concentration, contact time, adsorbent dosage, pH and temperature were investigated. The result shows that all parameters could affect the adsorption efficiency, adsorption isotherm and kinetics. The adsorption capacity of the adsorbent for the removal of MG dye was found from the kinetic and Langmuir isotherm model. The adsorption data fitted the isotherm model of Langmuir, Freundlich, and Temkin. The second order kinetics gave a better fit in line of with both first and second order kinetics. Thermodynamic parameters (Such as $\Delta G0$, $\Delta H0$, $\Delta S0$) were also determined to find out the spontaneity of the adsorption process. The experimental results showed that the adsorbent has heterogeneous surface activity and the adsorption of dye on it follows pseudo-second order kinetics and the adsorption is spontaneous and exothermic. The experimental data shows that Semal leaf powder was effective for the removal of MG from aqueous solutions.

64. EMPIRICAL EVIDENCE FOR ECONOMIC VIABILITY OF MECHANIZED DIRECT SEEDED RICE IN SOUTHERN INDIA

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Abstract
Crop establishment plays a crucial role in rice production, significantly influencing productivity, and environmental impacts. This paper provides scientific evidence for the benefits of mechanized direct seeding of rice as compared with the conventional crop establishment practice. The study was conducted in Bapatla district of Andhra Pradesh, in 2022. Primary data were obtained through a survey with a structured questionnaire, key informant interviews, focus group discussions involving 120 farmers, and field observations. The adoption of DSR has resulted in reducing the total cost of cultivation per hectare by 13%. The BC ratio for conventional and DSR methods was 1.2 and 1.3 respectively. Based on the energy equivalents of the inputs and outputs, the energy ratio (Energy use efficiency), energy productivity, specific energy and the net energy were calculated. The adoption of DSR ensured higher productivity with higher energy efficiency and returns. The average energy productivity was 0.29 kg/MJ for DSR method and 0.22 kg/MJ for the conventional method, which means 0.29 kg of paddy is produced per unit energy in the DSR method and 0.22 kg of paddy is produced per unit energy in the conventional method. The

results of the specific energy indicate that the conventional method requires 5.4 MJ of energy to produce a kilogram of paddy while with the DSR method, about 4.1 MJ of energy is consumed to produce one kilogram of rice. The results indicated that the DSR method is more energy efficient as compared to the conventional method.

65. EXPLORING THE USE OF SENOTHERAPEUTIC AGENTS AS AN ANTI-AGING INTERVENTION STRATEGY

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Abstract

Rutin (3,3′,4′,5,7-pentahydroxyflavone-3-rhamnoglucoside) is a flavonol abundant in plants such as passionflower, buckwheat, tea, and apple. It has demonstrated many pharmacological activities, including antioxidant, neuroprotective, cytoprotective, vasoprotective, anticarcinogenic, and cardioprotective effects. Recent studies have suggested the potential role of rutin as a Senotherapeutic agent. The present study aims to assess the Senotherapeutic ability of rutin and its possible application in anti-aging in an accelerated senescence rat model. D-galactose (300 mg/kg body weight subcutaneously) and Rutin (100mg/kg body weight orally) were administered simultaneously for 4 weeks to test the preventive effects of rutin against D-gal-induced accelerated aging and oxidative stress. In an accelerated senescence rat model, we examine a significant rise in Malonaldehyde (MDA), Protein Carbonyl (PCO) and Advanced Oxidation Protein Products (AOPP), and inflammatory parameters (Tumour necrosis factor alpha TNF-α, Interleukin- IL-6). Increased levels of ferric-reducing antioxidant potential (FRAP), Plasma membrane redox system (PMRS), and reduced glutathione (GSH) were also found. Our study suggests that Senotherapeutics may function as anti-aging agents by selectively targeting the senescent cells or by blocking the SASP (senescence-associated secretory phenotype). Thus alleviating alleviates age-related pathologies. This suggests their potential role in anti-aging and as a therapeutic strategy for reducing age-related pathologies.

66. INVESTIGATING THE DIAGNOSTIC AND THERAPEUTIC ROLE OF SESTRIN2 IN PARKINSON'S DISEASE

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Abstract

Parkinson's disease (PD) is a progressive neurodegenerative disorder affecting 1% of individuals over 60, characterized by motor dysfunction and cognitive decline. Sestrin2 (Sesn2) is a stress-inducible protein that plays a pivotal role in mitigating oxidative stress and promoting cell survival. This study investigated the serum levels of Sesn2 in patients with PD compared to an elderly control group, while also examining the neuroprotective effects of *Syzygium aromaticum* ethanolic extract.

The blood samples were collected from a total of 54 elderly controls and 36 PD patients recruited in the study. Surface plasmon resonance (SPR) was utilized to measure the concentration of Sesn2 in serum isolated from blood and the results were further confirmed by western blot. The serum levels of Sesn2 in PD patients were significantly higher (15.96 ± 2.428 ng/μl, $p<0.0001$) compared to those in the control group (13.65 ± 2.125 ng/μl). The area under the curve (AUC) of 0.76 and the threshold value of ≥14.58 ng/μl for differentiating PD from control was found.

In SH-SY5Y cells, paraquat-induced neurotoxicity downregulated p53, Sesn2 and phosphorylated-AMPK, both of which are involved in cellular stress response and energy homeostasis. Conversely, phosphorylated-p70S6K, a marker of protein synthesis, was upregulated, indicating altered mTOR signaling. Pre-treatment with the ethanolic extract of Syzygium aromaticum reversed these effects, suggesting its potential to restore cellular homeostasis and reduce oxidative damage. The rescue effect observed with *Syzygium aromaticum* ethanolic extract suggests it could be a promising therapeutic agent for PD.

67. SATELLITE MONITORING OF METHANE EMISSIONS FROM PADDY CULTIVATION IN ANDHRA PRADESH, INDIA

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Abstract

The increase in greenhouse gas emissions, particularly methane, poses a significant challenge to global environmental stability and contributes to climate change. Major sources of methane emissions include wetlands, paddy fields, livestock, industrial activities, and fossil fuels. Paddy cultivation, a vital component of India's agriculture, is a significant contributor to methane emissions due to the anaerobic decomposition in flooded fields. Traditional methods for estimating methane emissions from paddy fields are often limited in accuracy and scope. This study explores the use of remote sensing technologies to improve the quantification of methane emissions. Specifically, the Satellite-Integrated Methane Emission Estimator (SIMEE) Model was employed to estimate CH_4 emissions. This model is model more precise and reliable estimates of methane emissions from paddy fields were obtained, enhancing the understanding of agricultural contributions to greenhouse gas emissions. This approach not only addresses the limitations of conventional methodologies but also provides a framework for future studies aimed at mitigating methane emissions in agricultural regions. The findings underscore the importance of advanced technologies in environmental monitoring and the necessity of sustainable practices in agriculture to combat climate change.

The study focuses on Andhra Pradesh, a major rice-growing state in India. The estimation of methane emissions in Andhra Pradesh was carried out using the Google Earth Engine platform's capabilities with MODIS and Lands at imageries during 2014 to 2022. The results showed that, in 2014, emissions stood at 208294.79 kg, with a gradual decrease observed till 2016, reaching 170528.8 kg. However, emissions saw an upward trend from 2016 to 2019, with a peak of 203949.61 kg in 2019. Notably, a significant spike in emissions occurred in 2020, reaching 256005.48 kg, marking a substantial increase compared to previous years.

68. REGENERATIVE AGRICULTURE: PERSPECTIVES AND CHALLENGES

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Abstract

The demand for nutritional food has increased manifold with the growing world population and the advent of modern civilization. It is estimated that about 30% of the land has been degraded by anthropogenic activities. Soil erosion and consequent land degradation are the major threats to food security especially in developing countries. A new approach of regenerative agriculture is designed to reduce or eliminate dependence on external inputs (e.g., fertilizer) which restores and maintains natural systems. Under these situations regenerative agriculture can be chosen as climate-smart and resilient crops that have a minimal carbon impact in agricultural fields. These practices have a substantially smaller carbon footprint than other techniques, which can reduce the global carbon impact. We suggest that fully embracing modern regenerative agriculture to improve soil health, ecosystem biodiversity, land and resource conservation, for agricultural sustainability. Microbial communities are important for the functioning of the ecosystem, both about direct interactions with the plants and concerning biogeochemical cycles. The work highlights nutritional security, particularly in areas with extreme environmental conditions. There are several challenges need to be addressed to increase the adoption and production of nutritious food for the people. Future research should focus on improving the productivity and profitability of regenerative agriculture through the development of better varieties, improved agronomic practices to achieve UN sustainable development goals (UN-SDGs). Thus, there is a need to transform the agriculture system to achieve food and nutritional security for the sustainability of agroecosystems.

69. ASSESSING PRECLINICAL SAFETY IN PROBIOTIC RESEARCH: A CASE STUDY OF *LIMOSILACTOBACILLUS FERMENTUM*] NCDC 400

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Abstract

The safety of probiotic bacterial strains has been the subject of considerable discussion due to emerging health risks associated with their use in various health conditions. This necessitates an in-depth safety evaluation of any potential probiotic strains before food applications. Herein we integrated the safety and efficacy investigation of the potential probiotic *Limosilactobacillusfermentum* NCDC 400, whose probiotic attributes have been already proven. Whole genome analysis of NCDC 400 using suitable bioinformatics tools highlighted that the strain is potentially free from antibiotic resistance determinants and virulence factors. The genome of NCDC 400 was stable with few prophage and CRISPR sequences while absolutely

free from mobilomes carrying antibiotic resistance or virulence genes. In animal study, the daily oral administration of *L. fermentum* NCDC 400 at 10^8 (low dose) and 10^{10} (high dose) cells/ mouse for 15 days did not induce treatment-related toxicity either in terms of physiological behaviors or clinical parameters in cyclophosphamide induced immune compromised mice model. Episodes of *L. fermentum* NCDC 400-mediated bacterial translocation to extra-intestinal organs were unnoticed. Oral administration of NCDC 400 augmented the immune status of mice by immune stimulation. *L. fermentum* NCDC 400 did not foster any adverse effects like genotoxicity even at a high dose (10^{10} CFU/mice/day). Owing to these findings, a dose of 10^{10} CFU/mouse/day may be considered NOEL (No Observable Effect Level). Moreover, NCDC 400 intervention resulted in enhancing the richness and diversity of beneficial gut bacteria. Overall, the results that emerged from this study underscore the safe and non-toxic behavior of *L. fermentum* NCDC 400 and thereby call for and should facilitate further human clinical trials.

70. DANGEROUS EFFECT OF RABIES ON HUMAN HEALTH IN INDIA AND EASY PREVENTION OF THIS DISEASE

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Abstract

Introduction - At present there is a huge outbreak of rabies disease in entire parts of our country. If this rabies disease occurs to any human race, it becomes very difficult and impossible to survive. Whichever Human being gets this rabies disease, it ultimately takes its life.

Origin of Rabies Disease -This rabies disease is caused by the bite of animals like dogs, cats, monkeys, jackals etc. If any animal like dogs, cats, monkeys, jackals etc. bites any human being and mixes its saliva in the wound of the human being, then in this situation rabies disease will enter the body of the human being.

Successful Prevention of Diseases Like Rabies - The Government of India has launched the National Action Plan - 2030 to deal with and control rabies disease. This scheme has been operated by the National Center for Disease Control, Directorate General of Health Services, Ministry of Health and Family Welfare, Government of India, New Delhi.

Successful Solution to Rabies Disease - To eradicate rabies disease in our country Animal Welfare Board of India (AWBI) Ministry of Fisheries, Animal Husbandry and Dairying, Government of India, Ballabhgarh, Faridabad - Haryana has launched Animal Birth Control and Anti Rabies Vaccination (A Central Sector Scheme) has been conducted. Under this, Animal Birth Control and Anti-Rabies Vaccination (ABC - ARV) is being conducted by the Animal Welfare Board of India (AWBI) Government of India on the instructions of the Supreme Court in the Greater Municipal Corporation area, Municipal Corporation area, District Panchayat area and Cantonment Council area of India. Under which Animal Birth Control and Anti-Rabies Vaccination (ABC - ARV) will be done in all these areas, and Anti-Rabies Vaccination (ARV) will be given to all dogs, cats, monkeys, jackals etc. Apart from this, Animal Birth Control (ABC) of all dogs, cats, monkeys, jackals etc. will also be done. There is also a provision of a special budget for this Animal Birth Control and Anti-Rabies Vaccination work.

71.ECO-ASSESSMENT OF HIMALAYAN RIVERS IN INDIA USING BENTHIC DIATOMS

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Abstract

Indian development prioritizes sustainable economic growth. This is achieved by biomonitoring natural resources like rivers, ensuring long-term clean water availability without endangering ecosystems. The present study was designed to evaluate the limno-ecological conditions of Himalayan rivers of Kumaon region, Uttarakhand using diatom indices and multivariate approaches according to the European Water Framework Directive (WFD) requirements. Diatoms are effective bioindicators of environmental conditions in freshwater ecosystems due to their sensitivity to changes in water quality. Samples were collected from 17 locations of Kumaon region, Uttarakhand in November,2022. Descriptive analysis was used to calculate the mean and standard deviation of 14 physicochemical variables of the 17 sampling stations. Three clusters were identified based on the hierarchical agglomerative cluster analysis performed on physicochemical data: pristine, less polluted, and highly polluted. The groupings seen in PCA and the clusters that emerged were coherent. The computed values of WQI allocated a good water quality class to most of the sites. CCA revealed a significant association between diatom assemblages and 14 environmental variables, separating sampling stations into 4 groups. Diversity indices indicated a clean to mildly polluted river streams with a diverse benthic diatom community. Benthic diatom populations can assess water quality, with strong correlations with TDI, IPS, IDG, and EPI-D indices. The current study reveals that the pollution levels in the rivers Ladhiya, Lohawati, and Kosi are relatively low, although higher than those in other Kumaon region rivers. Improved management plans for this delicate ecosystem were made possible by including diatom analysis into environmental monitoring of the high-altitude environment.

72. ASSESSMENT OF AMBIENT AIR QUALITY INDEX AND SEASONAL VARIATION OF SATNA CITY

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Abstract

Air pollution is an immense problem due to its detrimental health effects on human populations. The present study assessed the impacts of seasonal variation on the atmospheric abundance of pollutants particulates ($PM_{2.5}$ and PM_{10}) and gaseous air (SO_2, NO_2, O_3, NH_3) at Satna city. This investigation represented the assessment of ambient air quality with respect to $PM_{10,}$ PM2.5, Nitrogen dioxide (NO_2) and Sulphur dioxide (SO_2), Ammonia (NH_3) and Ozone (O_3).

It has been observed that the concentrations of all major parameters of pollutants are higher in winter except ozone in comparison to the Pre-monsoon, Monsoon and Post monsoon season. This finding revealed that the lowest concentration of air pollutants during monsoon was associated with the washout effect of precipitation on atmospheric pollutants. Investigation results elucidates that construction works, vehicular traffic etc. are responsible for the high concentration of pollutants in this area. In the present study, it was noticed that all parameter was within standard limit except the concentration of PM_{10} was 111 μg/m^3 in January during winter season, which was exceeds the prescribed limits 100 μg/m^3 as stipulated by Central Pollution Control Board (CPCB) New Delhi, India. It is obvious that air quality degradation during winter months; hence, the higher concentration of air qualities are recorded during this period; On the other hand, these results confirmed the strong seasonality aspects of dust concentration and gaseous, highest levels in winter and lowest levels in monsoon.

73. MODULATING THYROID IMPAIRMENT IN A MICE MODEL OF ENDOTOXEMIA

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Abstract

Lipopolysaccharide (LPS) is an outer membrane component of Gram-negative bacteria of the gastrointestinal-tract (GIT). Factors such as aspathogens, antibiotics, and imbalance of gut-microbiota increase the LPS in GIT. LPS, with receptors TLR4/MD2/CD14 complex, disrupts the gut-barrier and activates immune cells, producing inflammatory mediators (NF-kb, TNF-ά). LPS (via systemic circulation) can reach the extra-intestinal tissues(thyroid), to cause inflammation and impair its functioning. LPS may disrupt the sodium-iodide symporter (NIS) of the GIT and thyroid. NIS mediates dietary absorption of iodine (I2), an essential element in thyroid hormone (TH) biosynthesis that might be affected due to inflammation. Neurotensin (NTS), a peptide of entero-endocrine cells, involved in inflammation modulation. The anti-inflammatory effect of NTS was shown using the Type-1-receptor (NTS1) agonist.The present study hypothesized that treatment with NTS1 agonist may ameliorate thyroid inflammation. Swiss-albino female mice (8-weeks) were maintained in six groups (6/Group): Group-I/Control, Group-II/(LPS-exposed:1mg/kg,bw, intraperitoneal/i.p, 5 days). After 5 days of LPS-exposure, PD149163 treatment (i.p.50 and 100μg/kg,bw) was done to Group-III/(LPS+PD50) and Group-IV/(LPS+PD100)respectively. GroupV/(PD50) and VI/(PD100) were only agonist-treated groups for 28 days. Systemic inflammation was indicated by increased plasma levels of pro-inflammatory cytokines and decreased anti-inflammatory cytokines in the LPSgroup. LPS–induced histopathological-alterations in thyroid (irregular follicles with flat epithelium containing elliptical nuclei) were evident along with the hormonal impairment of the thyroid-axis. PD149163 reduced the pro-inflammatory, increased anti-inflammatory cytokine, normalised histopathological alterations and plasma levels of THs. Further in research, PD149163's therapeutic potential could be explored for treatment of thyroid-related diseases under inflammation.

74. GIBBERELLIC ACID INDUCED HEMOLYMPH AND OVARIAN BIOCHEMICAL MODULATIONS, IN THE GRASSHOPPER, *POEKILOCERUS PICTUS*

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Abstract
The biochemical alterations induced by Gibberellic acid (GA3) in fifth instar nymph *Poekilocerus pictus* were assessed. Insects were divided into five groups, group I- control, II- solvent/vehicle control, III- 10mg/ml (low), IV- 30mg/ml (medium), and V- 50mg/ml (high). Newly emerged 5th instar nymphs were exposed to GA3, through forced ingestion. Hemolymph total protein and carbohydrate levels as well as ovarian total protein levels were analysed after 2, 4, 8 and 12 days of treatment. A significant decrease ($p < 0.05$) in hemolymph total protein and carbohydrate levels was observed at the highest concentration (50mg/ml) after 8 days, with values recorded 63.54 ± 1.5 μg/μl and 10.6 ± 1.2 μg/μl, respectively. The analysis further revealed that treatment with GA3 caused a significant ($p < 0.05$) decrease in ovarian total protein concentrations from the fourth day of imaginal life depending on the GA3 doses. The ovarian protein concentration was recorded in 8-day-old female treated with the highest concentration (50mg/ml) was 88.34 ± 8.8 μg/mg whereas in control was 197.75 ± 12.1 μg/mg. GA3 significantly altered haemolymph metabolites. Gibberellic acid also caused disturbances in the incorporation of the hemolymph proteins in the oocyte resulting in a significant reduction in their concentrations in the ovaries. The treatment applied the pre-ovipositional phase provokes a significantly impacted the reproductive potential of adult females. These findings suggested that GA3 has the potential to be developed as an eco-friendly insecticide for managing insect pest populations.

75. STUDY ON THE VARIABILITY OF PLUMBAGIN CONTENT AND ELITE CHEMOTYPE IDENTIFICATION AMONG THE GERMPLASM OF *PLUMBAGO ZELYNICA* LINN. COLLECTED FROM WESTERN GHATS OF INDIA

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Abstract
Metabolite stuffing may depend upon the session of the collection, soil condition, and geographical regions of the collection site and this induces the biological potential of the plant species. A total 11 accessions of *Plumbago zeylanica* were collected from different locations of Western Ghats of India to cover the entire range of topography from foothills up to the highest peak. High-performance thin layer chromatography-ultra violet detector (HPTLC-UV) method is used for the quantification of plumbagin and UPGMA cluster analysis for the identification of elite sources. The aim of the present investigation is to identify the best quality planting material of *Plumbago zeylanica*, in terms of elite chemotype collected from different locations of Central India.

UPGMA cluster analysis reveals the variation of Plumbagin content (% dry weight basis) among the collected accessions of *Plumbago zeylanica.* The cluster analysis of plumbagin content depicted the distinctness in plant metabolite contents between the individuals as they were clustered the difference between accessions. This study will also promote the use of *Plumbago zeylanica* in herbal drug development and will aid in the site-specific exploration of elite chemotype(s) with validated pharmacological action to meet the medicinal and commercial demands.

76.STRENGTHENING FARMER-CENTRIC EXTENSION SYSTEM IN INDIA-ISSUES AND STRATEGIES

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Abstract

Agriculture in India, in 21st Century, to contribute significantly towards country's economy, needs transformational change to address the issues of rural poverty, *per capita* income, inclusiveness, health and nutrition, sustainability, climate change and quality of life. Agricultural Production in the Country, grows by 2.3%, whereas the population grows by 2.9%, which recommends efficient export management and competitiveness. In addition, practicing sustainable agriculture is also essential for attaining Sustainable Development Goals (SDGs). Knowledge-based pathways are needed to guide agriculture towards sustainability, addressing climate change, monsoon variability, degradation of natural resources (soil, water, biodiversity, forest and climate), biotic and abiotic stresses and market challenges. This paper analyses extension approaches for meeting out challenges faced by Indian agriculture. It analyses 'agrarian distress' and means of its mitigation; an overview of the National Agricultural Extension System (NAES); and contextualizing agricultural Extension towards contemporary agrarian challenges towards extension research, production to market orientation, harnessing ICTs, promotion of agri-based profitable enterprises; farmer to farmer extension, promotion of FPOs and protection of farmers rights. It also analyses the challenges of agricultural extension system in terms of extension pluralism, investment, manpower, partnerships and linkages. This paper, depicts technology application framework, apart from explaining issues and priorities of extension. To conclude, it lists the strategies for extension system to be farmer-centric.

77.ANALYSIS OF PHYTOCHEMICAL FROM METHANOLIC SEEDS EXTRACT OF *MUCUNA PRURIENS* BAK. PLANT BY GAS CHROMATOGRAPHY MASS SPECTROMETRY (GC-MS) METHOD

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Abstract

Mucuna pruriens Bak.is a climbing legume and belongs to Family-Fabaceae and used in the treatment of various ailments. It is commonly known as *Cowitch* or velvet bean. Traditionally, it was used in

treating male infertility. The main aim of this study was to identify the bioactive materials present in the methanol extract of *Mucuna pruriens* Bak. seeds by Gas Chromatography Mass Spectrometry (GC-MS) technique. The analysis by GC-MS reveals the presence 5 major compounds namely, Pentadecanoic acid, 14-methyl-, methyl ester, Dodecanoic acid, 9,12-Octadecadienoic acid (Z,Z)-, methyl ester, 9,12-Octadecadienoic acid and 2-Myristynoyl-glycinamide. By comparing with the references of earlier studies, it was clear that these major compounds played a major role in its neuroprotective, antioxidant, anti-inflammatory, anticancer, hepatoprotective, and antimicrobial effects. The presence of antioxidants has been linked with neurogenesis in the brain. The presence of these compounds may authenticate the scientific evidences of many of its proposed therapeutic potentiality of the seeds of *Mucuna pruriens* Bak. plant. (GC-MS).

78. ETHNO-BOTANY AND ANTIMICROBIAL EVOLUTION OF LEAVES EXTRACT OF PARIJAT (*NYCTANTHES ARBOR-TRISTIS* L.): A HOLY PLANT OF BRAJ REGION WITH ANTIMICROBIAL SOURCE

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Abstract

Medicinal plants serves as a rich source of antimicrobial agents and play a significant role for the treatment of various disease since ancient times. Parijat (*Nyctanthes arbor-tristis* L.) from Oleaceae family is a small tree known as Night Jasmine, growing as ornamental plant in garden and temple side of Braj region. The present study examined ethnobotany and examined antimicrobial efficacy against four pathogenic microorganisms. Ethnobotanical survey, structured interview conducted randomly to collect information from five villages nearby Yamuna bank of Agra-Mathura. Antimicrobial activity was checked by disc agar diffusion method. Soxhlet extraction was used for leaf fractions and different concentration 200, 100, 50, 25, 12.5, 6.26, 3.126 mg/ml were prepared. In the present investigation, Petroleum ether and Ethanol leaf extracts showed the maximum antimicrobial properties with 18mm zone inhibition against *Staphylococcus aureus*while the aqueous extract exhibit lowest activity (12mm zone inhibition). The aqueous extract showed promising antibacterial action against all the tested bacteria. Ethanol and petroleum ether extracts shows highest antifungal properties with maximum zone (17mm), (14mm) against *Microsporum gypseum* and *Rhizopus stolonifer* while aqueous extracts exhibit lowest antifungal activity. Flowers, leaves, fruits and bark is used in traditional medicine to treat a variety of disease by local people. Plant fractions have excellent antibacterial properties and can be used to treat infectious disorders caused by resistant pathogens. Therefore, it should reproduce and promoted cultivation in rural as well in urban areas and further studied used and evaluated for their biological activity by modern techniques.

79. OCCURRENCE AND PATHOLOGICAL EFFECTS OF CESTODE PARASITES ON FRESHWATER FISHES IN SAGAR DISTRICT, MADHYA PRADESH

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Abstract

The study investigates the occurrence and pathological effects of cestode parasites in freshwater fish populations within Sagar District, Madhya Pradesh. Cestode infections are known to significantly impact fish health, leading to both economic losses in fisheries and potential disruptions in aquatic ecosystems. This research aims to assess the prevalence and Pathological effect such as histological and hematological changes as well as SEM with EDX of infected organ of fishes, and seasonal variations of cestode parasites in key freshwater fish species across various water bodies in the region. A parasitological survey was conducted over a one-year period from February 2023 to January 2024 involving the collection and examination of different fish species, including commercially important varieties. Standard parasitological techniques were employed to identify and classify the cestode parasites. In addition, histopathological analyses were carried out to study the tissue damage caused by parasitic infections, focusing on the gills, intestines, liver of infected fishes. The results revealed a significant prevalence of cestode parasites, with infection rates varying among different fish species and seasons. The findings demonstrated severe pathological changes, including tissue necrosis, inflammation, and organ dysfunction, particularly in heavily infected fishes. These pathological effects have implications for fish growth, reproductive success, and survival, as well as for the overall health of the freshwater ecosystem.

80. ROLE OF CYANOTOXINS ON THE DEVELOPMENT AND PROMOTION OF CANCER

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Abstract

Cyanotoxins are primarily produced by different species of cyanobacteria, also known as blue-green algae, and have appeared as environmental poisons, that have various toxic effects on animal health including humans. The role of cyanotoxins has been linked to the development and promotion of various cancers in recent studies. Important cyanotoxins such as microcystins, nodularins, and cylindrospermopsin have been found to play a significant role in the development and promotion of various cancers. These toxins are generally responsible for oxidative stress and DNA damage, which are the primary cause of mutations and thus, the development of cancers in the various cells. We know that cancer is a multistep process and is caused when multiple mutations occur in the normal cell. This review is made to provide a detailed account that how different cyanotoxins are playing their role in the development and promotion of cancer. For example, microcystin-LR inhibits protein phosphatases (PP1 and PP2A), which leads to abnormal cell proliferation and tumor development. Similar inhibition of PP1 and PP2A is shown by

nodularin and in fact, their mechanism of carcinogenesis is the same as that of microcystine to some extent. Cylindrospermopsin, inhibits protein synthesis and thus, has genotoxic effects, and may promote the development of liver cancer. Anatoxin-a and saxitoxins are well-known neurotoxins but, are supposed to have carcinogenic properties based on the fact that they can induce oxidative stress and DNA damage in cells by producing reactive oxygen species.

81. BOOSTING RESILIENCE OF AGROECOSYSTEMS WITH BANANA-BASED DIVERSIFIED CROPPING SYSTEM IN EASTERN UTTAR PRADESH

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Abstract
Crop diversification, the practice of cultivating multiple crops rather than depending on a single type, strengthens agroecosystem resilience by reducing risks. This study focuses on the ecological benefits of diversification in Mirzapur district, Eastern Uttar Pradesh. It examines its effects on soil quality (including nutrient content and microbial diversity), biodiversity, agricultural productivity, economic outcomes, and contributions to dietary diversification. Soil samples from different cropping patterns were analyzed following standard laboratory protocols to assess these impacts. The results revealed that banana-based cropping systems had higher water holding capacity (43.4%), available phosphorus (10.45%), and microbial activity in comparison to wheat monocropping system. The BT (Banana + Turmeric) cropping system showed increased soil enzymatic activity such as FDHA, ALP, and ACP up to 15.70%, 16.53%, and 15.87%, respectively, while the BC (Banana + Cabbage) cropping system enhanced urease activity by 18.43%. The metagenomics analysis reveals more abundant genera (Rhodococcus and Mycolicibacterium) and functional traits compared to the wheat monocropping system. The Banana-based diversified cropping systems had the greatest net economic benefits when compared to other monocropping systems. To maintain agricultural resilience and sustainability, the study emphasizes the urgent need to transition away from monoculture systems and promotes the use of diversified cropping system.

82. TOWARDS DIGITAL MECHANIZATION IN SUGARCANE

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Abstract
Sugarcane is cultivated in 130 countries, covering 26.3 million hectares, with an annual yield of 1859.4 million tonnes. However, climate change poses a significant threat to its productivity, with potential yield losses of up to 83% due to inadequate agronomic practices, farm mechanization and plant protection strategies. A key solution lies in data-driven agriculture and the adoption of advanced smart farming technologies like precision agriculture, the Internet of Things (IoT),

sensor applications, robotics, and artificial intelligence (AI). AI has gained significant boost over the past decade, especially in agriculture where it is now moving into sugarcane farming. AI technologies can predict weather patterns, assess crop sustainability, and detect pests, diseases, or nutrient deficiencies through data inputs such as temperature, precipitation, wind speed, and solar radiation, combined with satellite and drone imagery. These insights help farmers efficiently manage sugarcane cultivation by assisting in cultivar selection, land preparation, and crop health monitoring. AI also predicts weather anomalies and crop conditions for future planting seasons, enabling timely recommendations for pesticide and fertilizer application before issues arise. Deep learning (DL) technologies further optimize water usage and reduce labor requirements. The Indian Institute of Sugarcane Research (IISR) Lucknow has developed DL models for weed management and insect-pest, disease detection with >95% accuracy. Drone-based agrochemical applications in sugarcane for precision farming are also getting boosted at IISR. This indicates that the shift toward digital mechanization has great potential to enhance sustainability, optimize resource use, and promote more efficient sugarcane cultivation.

83. DOCUMENTATION AND STANDARDIZATION OF *JANMAGHUTTI*- A TRADITIONAL HERBAL FORMULATION FOR CHILD HEALTHCARE IN CHITRAKOOT REGION OF MADHYA PRADESH

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Abstract

Chitrakoot is a remote region situated in the northern part of Satna district of Madhya Pradesh, India. The tribals (Kol, Gond, Mawasi, Khairwar) of this region have well developed folklore practices used to maintain the basic health care need. A survey was carried out among the tribal community of the Chitrakoot region of Satna district, Madhya Pradesh to explore the traditional knowledge on the use of Janmghutti (a traditional medicinal formulation) using semi-structured interviews among the local healers and elderly women ranging in age group of 45-80 years. A total of 757 interviews conducted in 98 intensive field visits were carried out during 2019-2020, covering almost all the seasons of the years, who have been actively engaged in preparation of Janmaghutti. A total of 11 plant ingredients, belonging to 8 families and 3 other ingredients were found to be used to make Janmaghutti powder. As per the standardization parameters of AYUSH *viz.* macroscopy, powder microscopy, physicochemical tests, heavy metals test, screening of microbiological species and high-performance thin layer chromatography (HPTLC) fingerprints of methanolic extract were performed and nutritional value analysis is also done. Macroscopy and microscopy characters establish the internal characteristics of Janmaghutti formulation and its ingredients. Physicochemical parameters and heavy metals (Pb, Cd, As & Hg) tests were performed and found as per the limits of WHO guidelines. Microbiological analysis of pathogenic bacteria, *viz.Salmonella* sp., *Escheria coli, Pseudomonas aeruginosa* and *Staphylococcus aureus* were done and found absent in Janmaghutti samples. Nutritional value analysis of two compound formulations of Janmaghutti samples (JI & J2) were done such as total fat % by wt. 11.7%, 16.8%, Protein (N*5.95)% by wt. 6.7%, 9.4%, Crude fibre% by wt. 3.4%, 3.2%, Total dietary fibre % 16.44%, 14.13%, Carbodydrates by difference, % by wt. 44.2%, 43.0%, Energy value K

cals/100mg 310, 361, Vitamin D mg/100g 0.01, 0.01, Sodium mg/100gm 3601.30,3239.30, Calcium mg/100gm 478.8, 413.80, Iron mg/100g 19.28, 16.70, Potassium mg/100gm 1070.87 and 1020.50 were found respectively. These findings indicate that Janmaghutti (a traditional formulation) is a very useful traditional herbal formulation used by tribal communities of the Chitrakoot region as an immunity booster to maintain the health system against common ailments of children. As the market of ayurvedic medicine increases day by day, In the future, it can be used as a strength promoter and immune modulator not only the rural India but also in urban societies.

84. IMPACT OF TITANIUM DIOXIDE NANOPARTICLES ON ALLERGIC AIRWAY INFLAMMATION AND SOCS3 REGULATION THROUGH THE NF-KB PATHWAY IN ASTHMATIC MICE

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Abstract
Titanium dioxide nanoparticles ($nTiO_2$), once thought to have low toxicity in both *in-vitro* and *in-vivo*studies, are classified as possibly carcinogenic to humans. Recent findings suggest their potential as adjuvants, promoting allergic sensitization and altering immune responses. In an ovalbumin (OVA)-induced mouse model of asthma, we previously observed increased expression of Socs3 alongside reduced levels of Stat3 and IL-6. However, the specific signaling pathways underlying the adjuvant effects of $nTiO_2$ in this context remain unclear. In the present study, we examined the status of Stat3, IL-6, and Socs3, along with their relationship to NF-kB when $nTiO_2$ is used as an adjuvant in a mouse model of asthma. We found that co-administration of $nTiO_2$ with OVA during the sensitization phase significantly heightened airway hyper-responsiveness (AHR), increased biochemical markers of lung damage, and elicited a mixed Th2/Th1 immune response. Notably, levels of Stat3, Socs3, NF-kB, IL-6, and TNF-α were all significantly elevated. Additionally, transient in vivo blockade of NF-kB using NF-kB p65 siRNA resulted in downregulation of Socs3, IL-6, and TNF-α expression. Our findings indicate that nTiO2 exacerbates inflammatory responses in the lungs of pre-sensitized allergic individuals, with these effects regulated through the NF-kB signaling pathway.

85. BISPHENOL A AND F EXPOSURE IN ZEBRAFISH: MACROPHAGE ACTIVATION AND IMMUNE DYSFUNCTION

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Abstract
Bisphenol A (BPA) and Bisphenol F (BPF) are widely used in polycarbonate plastics and resins found in industrial and consumer products globally. Recently, BPF has emerged as a growing

concern for human health. Both BPA and BPF are known to cause immunotoxicity, reproductive toxicity, and disrupt thyroid function in zebrafish. However, their specific impact on the adult brain and immune system remains unclear. In this study, we found that exposure of BPA and BPF in adult zebrafish results into an increase in macrophage proliferation and altered cytokine expression, leads to immune suppression. Western blot analysis of the zebrafish brain revealed higher macrophage expression following exposure to both compounds. Notably, BPF exposure induced similar CD68 expression levels to BPA, indicating a stronger immunotoxic effect. Additionally, differential expression of immune-related genes confirmed the immunosuppressive potential of BPA and BPF. The upregulation of NOS2A further highlighted an altered immune response, causing inflammation. These findings suggest that BPF, like BPA, not only affects immune function but may also contribute to neuroinflammation and potentially more severe immunotoxic outcomes. In summary, this study demonstrates that BPF has significant immunosuppressive effects in zebrafish, implying possible health risk for humans as well.

86. THE ROLE OF COENZYME Q10 IN COUNTERACTING MICROCYSTIN-LR-INDUCED OXIDATIVE STRESS AND CARDIAC DYSFUNCTION

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Abstract
Cyanobacterial blooms are hazardous for humans, animals and other aquatic organisms due to the production of toxic secondary metabolites known as microcystins which is a cyclic heptapeptide. Studies have suggested that besides the liver, the heart may be another target organ of Microcystin-LR (MC-LR) intoxication. Coenzyme Q10 (CoQ10) is an important vitamin-like substance that has been reported to be important for the proper functioning of many organs and biochemical reactions in a living system. Recent reports have indicated that CoQ10 supplementation may have a positive effect on various pathophysiologies. In the present study, BALB/c mice were randomly divided into 3 groups with 5 mice in each group. The animals of the normal control group (N) received water and normal diet *ad libitum* and MC-LR as well as the MC-LR+CoQ10 group received MC-LR (10µg/kg bw/day, ip) for 14 days. After two weeks of MC-LR treatment, mice of (MC-LR+CoQ10) received coenzyme Q10 (10 mg/kg bw, im) for 14 days. In the current study, CoQ10 normalized various antioxidant parameters in the heart that were altered due to MC-LR-induced toxicity. Thus, the findings indicate that coenzyme Q10 has the potential to be developed as a preventive therapeutic agent against Microcystin-LR-induced toxicity, implying that this treatment might ameliorate MC-LR-induced cardiotoxicity in mammalian systems.

87. EFFECT OF SOURCE OF NITROGEN AND WEED MANAGEMENT PRACTICES ON GROWTH AND YIELD OF WET DIRECT SEEDED RICE (*ORYZA SATIVA* L.)

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Abstract
Rice (Oriza Sativa L.) a member of the poaceae family, it is said to have come from South-East Asia. In both regions of the temperate region and the tropics, it is one of the most singnificant cereal crops. A variety of Agricultural ecologies, including irrigated uplands, rainfed, lowlands,and rice habitats that are vulnerable to flooding are used to grow rice. In terms of area and output, India is the second-largest producer of rice in the world after China. Rice iscultivated world-wide over an area of about 167.24 million ha with an annual production of about 756.74 million tonnes and productivity 4.60 tone ha^{-1} in 2020-2021 (FAO, 2021). About 90% of all rice grown in the world is produced and consumed in the Asian region. It accounts 43% of total food grain production and 55% of cereal production in the country. It is a high caloric food, which contain 75% starch, 6-7% protein, 2-2.5% fat, 0.8% cellulose and 5-9% ash. In India, an area of about 43.86 million ha with an annual production of rice during 2020-2021 is estimated at a record 124.37 million tone and productivity of 2.8 tone ha^{-1} (Anonymous, 2021). Uttar Pradesh is the largest rice growing state only after West Bengal in the country, in which itis grown over an area of 5.74 million ha with production and productivity of 15.52 million tone and 2.70 tone ha^{-1}, respectively (Anonymous, 2021). Though average productivity of rice in the state is nearly equal to national average, it ranks seventh after Punjab, Tamil Nadu, Haryana, Andhra Pradesh, Karnataka and West Bengal.

88. COMPARATIVE GENOMIC ANALYSIS UNCOVERS THE DIVERSITY OF ODORANT BINDING PROTEINS AND CHEMOSENSORY PROTEINS IN WHITEFLY, *BEMISIA TABACI* SPECIES COMPLEX

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Abstract
Genome-wide analysis unravelled the diversity of odorant-binding proteins (OBPs) and chemosensory proteins (CSPs) in the Asia II-1 genetic group of whiteflies, *Bemisia tabaci*, a global invasive pest. The analysis characterized 14 OBPs, including six novel genes which are new to science. Phylogenetic analysis traced the evolutionary lineage of OBPS in Hemipteran insects. Comparative analysis revealed biotype-specific landmarks and six key motifs among the *B. tabaci* cryptic species Asia II-1, MEAM1, and MED. The genome-wide analysis also uncovered the diversity of 14 CSPs in *B. tabaci* Asia II-1, their exon-intron boundaries, retrotransposon insertion sites, and splicing variants. Chromosome mapping highlighted the clustering patterns OBPs and CSPs in the *B. tabaci* genome Temporal and spatial expression analysis identified tissue and stage-specific expression of OBP and CSP genes in *B. tabaci*. Functional characterization using *in-silico* docking coupled with competitive fluorescent binding assays with candidate ligands showed that OBP3 and OBP10 may be associated with host selection and oviposition behaviour of *B. tabaci*. High-affinity binding with the insecticides suggested that these CSPs may play indirect roles in insecticide resistance. The functional role of select OBPs/CSPs was further confirmed by RNA interference (RNAi) experiments and bioassays. Overall, this study enhances our understanding of the molecular diversity, genomic organization, and functional roles of OBPs and CSPs in *B. tabaci* Asia II-1. It presents potential avenues for developing innovative pest management strategies targeting these chemosensory proteins to control *B. tabaci* infestations in crops.

89. QUERCETIN EXERTS A POTENT ANTI-AGING EFFECT IN A RAT MODEL OF ACCELERATED SENESCENCE

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Abstract
Quercetin (3, 5, 7, 3′, 4′-pentahydroxy flavone) is a flavanol that is comprehensively apportioned in fruits and vegetables. It is found in apples, onions, scallions, broccoli, and teas. Recent studies have also demonstrated that it is associated with the appetite modulations. The objective of the current study is to explore the anti-aging effects of quercetin through appetite modulation in an accelerated senescence rat model. D-galactose (300 mg/kg body weight subcutaneously) and Quercetin (100mg/kg body weight orally) were administered simultaneously for 4 weeks to test the preventive effects of quercetin against D-gal induced accelerated aging and oxidative stress. In an accelerated senescence rat model, we discovered a significant rise in Malonaldehyde (MDA), Protein Carbonyl (PCO) and Advanced Oxidation Protein Products (AOPP) and inflammatory parameters (Tumour necrosis factor alpha TNF-α, Interleukin- IL6). Increased levels of Ferric reducing anti-oxidant potential (FRAP), Plasma membrane redox system (PMRS) and reduced glutathione (GSH) were also found. Our study suggests that appetite modulators may function as anti-aging agents by maintaining redox homeostasis in rat erythrocytes and plasma during aging. This indicates their potential as a therapeutic strategy for reducing oxidative stress and mitigating age-related cellular damage.

90. POWER GENERATION FROM CROP RESIDUE BY GASIFIER BASED PORTABLE SYSTEM

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Abstract
The compact gasifier based portable power generation system has been developed for remote and rural applications. The gasifier is equipped with inbuilt tar cracking unit and other controls as well. The fuel feeding capacity of the gasifier is 30 kg in form of pellets. A 4 hp petrol engine has been coupled with the gasifier which runs an AC generator. Modification of the engine inlet has been done for running it with producer gas. Two butterfly valves have been provided in the engine inlet for varying the gas flow and the air flow.The gas from gasifier is cooled down indirectly with water to condense heavy tars. The sensors are connected to a microcontroller board for continuous recording of temperature and rotation of grate. Flammable gas is produced within 10 minutes of starting the gasifier. Engine is started using petrol and then fuel is switched to producer gas using the butterfly valve.Chickpea straw pellets of 6 mm diameter have been used as fuel. Initially charred pellets of previous runs are fed to the oxidation zone for quick production of gas. Gas sampling was done at the end to determine tar content. The tar content in gas has been found in the range of 06 to 6.2 mg/Nm^3. The unit could deliver 2 kW continuous power for a test run of 50 hours with a fuel consumption of 4.2 kg/h.

91. 3D PRINTED TUBULAR SMALL INTESTINE MODEL FOR REGENERATIVE APPLICATION

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Abstract

This study explores the implantation of a 3D-printed small intestine construct using chitosan bioink and Freeform Reversible Embedding of Suspended Hydrogels (FRESH) bioprinting technology. It addresses the significant clinical challenges posed by inflammatory bowel disease (IBD) and short bowel syndrome (SBS), conditions that often necessitate surgical procedures resulting in a considerable reduction of small intestine (SI) surface area. Traditional treatments, including total parenteral nutrition and small bowel transplantation, are hindered by high costs, side effects, and donor shortages. As a result, the development of engineered artificial intestines has become a critical priority.

The study used chitosan, a natural biopolymer known for its biocompatibility and blood compatibility, as the base material for the bioink. The 3D-bioprinted constructs were subjected to mechanical testing, blood compatibility evaluations, and antibacterial assays. Mechanical characterization revealed that the constructs could withstand substantial deformation, while blood compatibility tests showed minimal haemolysis, confirming the material's suitability for implantation. Additionally, antibacterial tests demonstrated the constructs' ability to inhibit bacterial growth, lowering the risk of implant-related infections.

After implanting the constructs in rats, post-implantation analysis showed successful integration with no significant adverse reactions. Although inflammatory markers were slightly elevated, other biochemical parameters were reduced in later stages. The results suggest further investigation into these bioprinted materials for their potential applications in regenerative medicine and tissue engineering.

92. TOPIC-CHALLENGE AND REMEDIES FOR P & K FERTILIZER INDUSTRY

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Abstract

This study explores the implantation of a 3D-printed small intestine construct using chitosan bioink and Freeform Reversible Embedding of Suspended Hydrogels (FRESH) bioprinting technology. It addresses the significant clinical challenges posed by inflammatory bowel disease (IBD) and short bowel syndrome (SBS), conditions that often necessitate surgical procedures resulting in a considerable reduction of small intestine (SI) surface area. Traditional treatments, including total parenteral nutrition and small bowel transplantation, are hindered by high costs, side effects, and donor shortages. As a result, the development of engineered artificial intestines has become a critical priority.

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93. GREEN SYNTHESIS OF SILVER NANOMATERIALS OF AN ALGA *VAUCHERIA SESSILIS* D.C - ITS CHARACTERIZATION AND BIO-CATALYTIC POTENTIAL

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Abstract

In recent times green nanotechnology gained profound importance to synthesize nanoparticles because of their cost effectiveness and biosafety. In the present invesatigation, silver nanoparticles were synthesized by using extract of *Vaucheria sessilis* as a capping and reducing agent. Characterized of nanoparticles thus synthesized were done by UV–Visible spectroscopy, FTIR spectroscopy, Scanning electron microscopy, energy dispersive X-ray spectroscopy, and XRD analysis. A typical Surface Plasmon Resonance peak of 451 nm at was exhibited by the synthesized Silver nanoparticles. Scanning electron micrograph revealed the spherical morphology and average particle size of 52.7 nm. The antibacterial, antifungal, and membrane damage activities were also determined. The maximum antibacterial activity was observed for Pseudomonas aeruginosa (18 ± 1.2 mm) whereas *Fusarium solani* (14.3 ± 0.6 mm) showed maximumantifungal activity, In membrane damage assay, *Pseudomonas aeruginosa* exhibited maximum peak values of 0.286 at 25 µg/mL, 0.434 at 35 µg/mL and 0.629 at 45 µg/mL of silver nanoparticles at A_{260} wavelength . The membrane damage assay confirmed that nanoparticles are responsible in bacterial cell membrane damage.Therefore It is concluded that silver nanoparticles can easily be synthesized by *Vaucheria sessilis* as a capping as well as reducing agent. So, silver nanoparticles can be exploired for therapeutic applications *in near future.*

94. SIDEROPHORE OF PSB IMPROVES PLANT GROWTH PROMOTION THROUGH RHIZOSPHERIC LEGUME-RHIZOBIA INTERACTION

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Abstract
Phosphorous (P) is an essential macro element for plant, often available in un-available form in soil. P solubilization in soil is mediated by several mechanisms referred as phosphorous solubilizing micro-organisms. *Paraburkholderia* sp. igkv1 isolated from soil is a potent phosphate solubilizing bacteria (PSB). It showed phosphate solubilization up to 1.71 μg $ml^{-1}day^{-1}$ and acid hydrolase activity of 1406 μg pnp released g^{-1} soil. PSB improved nodulation by 1.9-folds and 3-folds in pigeonpea and chickpea respectively when inoculated with *Bradyrhizobium* sp. Organic acids and siderophore mediated phosphate solubilization were analyzed and it was found that 600 mg l^{-1} siderophores solubilized insoluble phosphate up to 176 μg ml^{-1}. Siderophores (1mM) increased 2.4-folds nodulation in chickpea as compared to organic acids. HPLC-MS revealed presence of a unique chromophore hydroquinidine in siderophores. Siderophore solubilized different phosphate salts in the order $Ca_3(PO_4)_2$>$FePO_4$>$AlPO_4$. Under field condition siderophores applied as seed coat increased the grain yield of soybean by 1.63-folds. Study highlights that PSB *Paraburkholderia sp* secretes siderophore which improves plant growth promotion by enhancing nodulation and N2 fixation in legumes, suggesting its use as a biomolecule inoculant for improving productivity of legumes.

95.CLIMATE RESILIENCE & SUSTAINABILITY ASSESSMENT AND BIOMONITORING OF FEW TRACE ELEMENTS USING BIO-INDICATOR

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Abstract
To assess the role of few trace elements on marine food safety is the objective of present study. Analysis of 8 trace elements (K, Ca, Mn, Fe, Cu ,Zn, Rb and Sr) in muscle and carapace of a crab, *Scylla olivacea* and sediment, done by using EDXRF technique to know their repercussion on human health. Results showed that enrichment factor (EF) of sediment recorded high values with Fe and Mn; bioaccumulation factor (BAF) recorded >10 in carapace with trace elements of Ca & Sr and 1-10 with Cu & Zn in muscle; while estimated daily intake (EDI) normal values with some elements and higher with other. The results suggest that the crabs of present study are an excellent source of some trace elements for human consumption and also useful to estimate the impact of metal pollution in the coastal environment.

96. IN-SILICO IDENTIFICATION AND CHARACTERIZATION OF NAC TRANSCRIPTION FACTOR FAMILY MEMBERS IN ANDROGRAPHIS PANICULATA AND THEIR EXPRESSION ANALYSIS UNDER UV-B STRESS.

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Abstract
Andrographis paniculata is a medicinal herb belongs to Acanthaceae family in which three major secondary metabolites andrographolide, neoandrographolide and 14-deoxy-11, 12-

didehydroandrographolide are identified and it is effective against various diseases. In a natural environment, plant growth is affected by various environmental factors that impede the normal growth and development of plants, resulting in a decline in plant yield and ecological economic value. Plant secondary metabolic pathways are regulated by the activity of transcription factors, among which NAC (NAM, ATAF, and CUC) is one of the largest and most diverse families of plant-specific transcription factors (TFs) and plays important roles in regulation of plant growth, development, and metabolism, biotic and abiotic stresses. In this study, a total of 102 NAC protein sequences were identified and sequences were further studied for physicochemical properties, sub-cellular localization, gene structure, and conserved motif identification. Based on how similar their protein sequences were, these ApNAC genes were divided into 14 branches, while the phylogenetic relationship analysis showed that the ApNAC genes within the same clade had a similar number of conserved motifs and intron-exon. The cis-acting regulatory analysis of ApNAC genes indicated a higher number of light-responsive cis regulatory elements followed by hormone-responsive, plant growth-and-development-related, and stress-responsive elements were present in the promoter region. In-silico expression analysis revealed that few ApNAC members related to plant growth and development are highly up-regulated under UV-B stress. This study establishes a framework for investigating NAC transcription factor functions and regulatory mechanism in Andrographis paniculata.

97. THE GUT-BRAIN AXIS: GUT MICROBIAL UREASE ACTIVITY PREDICTS HEPATIC ENCEPHALOPATHY IN PATIENTS WITH CIRRHOSIS

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Abstract

Hepatic Encephalopathy (HE) represents an important complication of cirrhosis and its early detection is essential to reduce mortality and morbidity in these patients. Ammonia is a key factor in pathogenesis of HE. Metabolism of ammonia is influenced by both the host's metabolic machinery and gut microbial community. We studied contribution of gut microbial urease to gut ammonia production in liver disease. We gavaged live and pasteurized urease-producing bacteriain gut-cleansed controls and cirrhotic rats, and then investigated plasma ammonia levels, gut and stool urease activity (SUA). In cirrhotic rats, given live urease bacteria, both SUA and plasma ammonia were increased as compared to those given attenuated bacteria. In clinical studies, a total of 30 hospitalized patients of cirrhosis without baseline HE and 12 healthy non-diseased controls were studied. **Baseline** normalized**plasma ammonia (AMM-ULN) and SUA were assessed.** Also, we compared AMM-ULN and SUA as predictors of HE by univariate and multivariate logistic regression analysis. SUA was significantly increased in patients with cirrhosis vs controls and emerged as an independent predictor of HE within 3 months in multivariate analysis. The cutoff values of SUA for HE prediction were 15.25units/L, with sensitivity of 76.7% and specificity of 77.8%. Our findings conclude that increased gut or stool microbial urease activity is a significant contributor of hyperammonemia. Elevated SUA serves as a valuable early predictor to identify HE in patients with cirrhosis.

98. INVESTIGATING THE PROTECTIVE ROLE OF GLYCYRRHIZIN AGAINST UVBINDUCED HYPERTHYROID-ASSOCIATED TESTICULAR OXIDATIVE STRESS

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Abstract

Ultraviolet B (UVB) radiation exposure can disrupt the hormonal balance, leading to hyper thyroidism, a condition associated with impaired male fertility. This study delves into the protective potential of glycyrrhizin, a key constituent of licorice root, against UVB-induced testicular dysfunction and oxidative stress. Glycyrrhizin's established antioxidant and antiinflammatory properties suggest its possible efficacy in mitigating these detrimental effects.

The experiment will employ a rodent model, where mice exposed to controlled UVB irradiation will mimic hyperthyroidism-induced testicular damage. We will assess various parameters to gauge testicular function, including sperm quality and motility. Additionally, oxidative stress markers like malondialdehyde (MDA) and antioxidant enzyme activity (SOD, CAT, GSH) will be evaluated. Histological examination of testes will provide insights into potential alterations in spermatogenesis and seminiferous tubule structure.

A crucial aspect of this investigation involves the administration of glycyrrhizin to a designated group of UVB-irradiated mice. By comparing the aforementioned parameters between control, UVB-exposed, and glycyrrhizin-treated groups, we can elucidate the potential of glycyrrhizin in reducing oxidative stress and preserving testicular health.

In conclusion, this research aims to shed light on the protective role of glycyrrhizin against UVBinduced testicular toxicity. By evaluating its efficacy in mitigating oxidative damage and preserving testicular function, this study can contribute valuable insights for developing therapeutic strategies to safeguard male reproductive health following UVB exposure. The findings may hold particular relevance for individuals engaged in occupations or activities with high UVB exposure or for those undergoing phototherapy treatments that utilize UVB radiation.

99. ALLELOPATHIC POTENTIAL OF MUSTARDON THE GROWTH OFWEED, *AMARANTHUS VIRIDIS*: IMPACT ON PHOTOSYNTHESIS AND OXIDATIVE STRESS

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Abstract

The primary need of sustainable agriculture is to ensure food security. Hence, the present work was undertaken to explore bio-herbicide potential of mustard on the weed, *Amaranthus viridis*. The metabolic extract of dried leaf of mustard [*Brassica juncea*(L.) Czern.]was prepared and different concentrations (5%, 15% and 25%)was foliar applied to 15-day-old *Amaranthus viridis* L.seedlings.

Extract at tested doses significantly suppressed the growth attributes, photosynthetic pigments, photosynthetic oxygen yield and performance of PS II photochemistry of selected weed.The effect was more pronounced at 25% of the tested extract. In contrast, the tested extract caused excessive accumulation of oxidative biomarkers (superoxide radical, hydrogen peroxide and lipid peroxidation products) as a result of disturbed metabolism. Furthermore, even accelerated anti-oxidative enzymatic antioxidants (SOD, POD, CAT and GST) could not keep the reactive oxygen species under control; hence the growth performance of selected weed was severely affected. The study concludes that the allelopathic potential of mustard may be exploited to eradicate the weeds from crop fields. This technique appears to be cost-effective and can be easily adopted by farmers to minimize the loss of productivity.

100. ECOLOGICAL HEALTH ASSESSMENT OF RIVER TAPTI, INDIA

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Abstract

The Tapti River, originating in central India, is a vital freshwater resource, supporting diverse ecosystems and livelihoods along its 724 km stretch. Assessing its ecological health is crucial for ensuring its sustainability amidst increasing environmental stressors, including pollution and climate change. This study focuses on evaluating the ecological health of the Tapti River by employing Barbour's (1999) standard protocol, which integrates biological, chemical, and physical habitat assessments. Macroinvertebrate diversity serves as a key biological indicator, as these organisms are highly sensitive to environmental changes and water quality degradation. In addition to biological assessments, riparian habitat quality was analysed, focusing on vegetation cover, bank stability, and anthropogenic disturbances. Data were collected from various sites along the river, covering upstream zones, to account for spatial variability. The Barbour protocol, coupled with riparian habitat analysis, provided a comprehensive view of both in-stream and surrounding environmental health.

Findings revealed significant spatial variations in macroinvertebrate diversity and habitat quality, with downstream regions showing more signs of ecological stress due to urbanization and agricultural runoff. Water quality indicators also varied, highlighting areas of concern for pollution and ecosystem degradation. The study emphasizes the need for climate-resilient water management practices and riparian restoration efforts to enhance the ecological sustainability of the Tapti River, ensuring its resilience to climate change and human-induced pressures. This approach provides a replicable framework for other river systems facing similar challenges.

101. ANTI DIABETIC EFFECT OF *OCIMUM SANCTUM* LEAF EXTRACT AND ALLOXAN INDUCED DIABETIC RATS

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Abstract
Diabetes is a group of metabolic disease and associated with impaired glucose metabolism, resulting from defect in insulin secretion, action and both. The present study was undertaken to evaluate the anti-diabetic effects of Ocimum sanctum extract in diabetic rats.

Method: Type I diabetes was induced by giving single intravenous injection of alloxan monohydrate, 75 mg/kg body weight, dissolved in 0.9% solution of sodium chloride. The animals were checked for blood glucose level 48 h after alloxan injection, and the rats with blood sugar level above 200 mg/dl were considered as diabetic and were used for the experiment.

Ocimum sanctum (Holy basil or Tulsi) leaves were obtained from botanical garden of our campus, cleaned and aqueous extract was prepared and 2.5 mg/kg body weight was given orally to the rats of group 2 and 5 with the help of cannula, daily, for two weeks.

102.MICROWAVE ASSISTED SYNTHESIS OF MOLYBDENUM DOPED TIO_2 NANOCOMPOSITES VIA SOL-GEL METHOD

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Abstract
Microwave assisted sol-gel synthesis was utilized to create the Mo-doped TiO_2 nanoparticles. Using 2-propanol and titanium tetra isopropoxide as precursor materials, we obtained the results of this study, which were then calcined at 650ºC to form the rutile phase. Transmission electron microscopy (TEM), field emission scanning electron microscopy (FE-SEM) were utilized to characterize the crystalline structure, chemical valence states, and morphology of TiO_2 nanoparticles, and X-ray diffraction (XRD) was employed to characterize the as-prepared samples. The TiO_2 nanoparticles' rutile phase has formed, as shown by the XRD data. When TiO_2 nanoparticles were doped with 2% Mo, their band gap energy was 2.56 eV less than that of TiO_2. The size of the Mo-doped TiO_2 crystallite is likewise observed to be significantly smaller than that of the undoped TiO_2 crystallite. Because of their high specific surface area and low band gap energy values, the synthesized semiconductors would be very beneficial in photocatalytic applications.

103. ZINC ADSORPTION DESORPTION BEHAVIOUR AND SEQUENTIAL EXTRACTABLE POOLS IN SUGARCANE-BASED CROPPING SYSTEMS OF WESTERN INDO-GANGETIC PLAIN

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Abstract

The fractionation of Zn and its adsorption at soil matrix are crucial for careful management to attain the sustainability in Western Indo Gangetic Plain (IGP) region. To fulfil the objectives, the soil at the three depths (15, 30, 45cm) were collected from the farmers field in 2021-22 from five different cropping systems (sugarcane - ratoon – wheat, sugarcane - ratoon - wheat - rice, sugarcane + mustard - ratoon - rice, sugarcane + cucumber - ratoon, sugarcane - ratoon – potato) which are practicing the same cropping sequence since from 12 years and a reference soil which remains uncultivated from last 50 years. The soil was sandy loam to sandy clay loam in texture with BD 1.33gm/cc and 22% water holding capacity. The pH and EC revealed neutral to moderate alkaline, low to medium organic carbon (0.59mg/kg), medium to high Olsen's phosphorous (30.14mg/kg) and low to sufficient DTPA-Zn (1.82mg/kg). Sugarcane - ratoon - wheat among cropping system revealed highest total (86.94mg/kg), residual (67.95mg/kg) and sequentially extractable Zn (19mg/kg) fractions which implies that Zn is retained and released for longer duration. The retention of Zn at the soil matrix were further clarified by sorption mechanism which invoked maximum %Zn sorption occurs at S_1 (49.17%). The sorption phenomena of Zn on soils are spontaneous (ΔG is negative) and is physically adsorbed (E <8kJ/mol). Monolayered Zn sorption depicted from Langmuir Isotherm constants (Q_o = 8.67μg/gm, K_L = 0.25ml/μg) occurs at silt (r^2 = 0.813) and calcium carbonate surface (r^2 = 0.943*) of top soil while at sub-surface multilayered sorption from Freundlich Isotherm constant (K_F = 3.07μg/gm, n = 6.27gm/ml) is pH-dependent (r^2 = 0.910*) and occurs at clay surface (r^2 = 0.812).

104. STUDIES ON ESSENTIAL OILS OF *CYPERUS ESCULENTUS* L. AGAINST FOOD BORNE PATHOGENS

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Abstract

Food security is a major emerging global issue in recent year. Food production and preservation are important components. Nowadays, several synthetic preservatives are being used to preserve foods that are injurious to human health and environment. Therefore, the present investigation was done to evaluate the possible role of essential oil in preserving food materials against food borne bacterial pathogens. Essential oils were obtained from *Cyperus esculentus* L. is dissolved in a DMSO, and then further diluted by sterile distilled water. Antimicrobial activity was tested against 4 strains of food borne bacteria, 2 Gram positive: *Staphylococcus aureus* ATCC 25923 and *Enterococcus faecalis* ATCC 29212, and 2 Gram negative: *Pseudomonas aeruginosa* ATCC 27853 and *E. coli* ATCC 25922. In this test, Muller Hinton agar (MHA) was used as a culture media. Different concentrations of essential oils (12.5,25,50,100 μg/ml were loaded on 6mm sterile individual discs. The essential oil was recorded to possess significant antibiotic potential against *Staphylococcus aureus* and *Enterococcus faecalis* under in vitro condition. The study demonstrated the importance of *C.esculentus* L. essential oils in preserving the food materials against food-borne bacteria.

105. NATURALLY GROWN WILD PLANT *CROTON BONPLANDIANUS* L. ASSOCIATED ENDOPHYTIC MICROBIOME AND ENDOPHYTE *ALCALIGENES FAECALIS* SSP8 IN SALINE STRESS MANAGEMENT IN PADDY SEEDLINGS

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Abstract
The *Croton bonplandianus*, an exotic wild plant of *Euphorbiaceae* family has economically important for its medicinal as well as phytoremediation properties. In order to examine leaves core-endophytic microbiota, upper three leaves from shoot apex were collected from naturally growing plants on sodic unproductive soils of Prayagraj (25.913824 N; 83.529715 E) Uttar Pradesh, India. After that, 16S r-RNA metagenomic next generation sequencing was conducted using Illumina MiSeq. The V3-V4 amplicon region represents 1,63,683 reads and exhibited G+C content of 52.29%. The OTUs represent dominant bacterial core-microbiota belongs to phyla *Proteobacteria* (76%), class *Gammaproteobacteria* (72%), order *Pseudomonadales* (56%), family *Pseudomonadaceae* (64%) and genus *Pseudomona*s (66%). The data submitted in NCBI-USA with Bio-project Number: PRJNA865511 and Sequence Read Archive (SRA) Accession Number: SRR20770404. Furthermore, two isolates (SSP6 and SSP8), isolated from *C. bonplandianus* plant efficiently produces IAA (22.80 μg mL^{-1} and 29.5 μg mL^{-1}) and ACC deamianse (311 nmol α-keto-butyrate mg $protein^{-1}$ h^{-1} and 257 nmol α-keto-butyrate mg $protein^{-1}$ h^{-1}), and evaluated for induction of salt (NaCl) stress tolerance in paddy seedlings. The strains SSP8 has identified as *Alcaligenes faecalis* based on 16s r-RNA gene sequencing and submitted to NCBI with Accession no OR225818. The *acds* gene amplicon in SSP8 confirm ACC deaminase positive activity. *A. faecalis* strain SSP8 significantly enhanced paddy seedlings growth parameters, photosynthetic pigments, photosynthesis, respiration, regulate antioxidant enzymes activities, leave gas exchange parameters and declined oxidative stress biomarkers under different NaCl doses. Thus, endomicrobiome of naturally stressed plants contains multiple hidden secrets and offer potential solutions for sustainable paddy agriculture.

106. MELATONIN AND NITRIC OXIDE CROSS TALK IN MITIGATING CHROMIUM TOXICITY IN CYANOBACTERIUM *NOSTOC MUSCORUM* ATCC 27893

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Abstract
The signalling role of melatonin (MT) and nitric oxide (NO) is an emerging area to mitigate the impact of abiotic stress in plants; however, their role in cyanobacteria is not adequately

understood. The present study is aimed to explore the mitigating role of melatonin and nitric oxide against chromium (Cr, 120 μM) toxicity in nitrogen fixing cyanobacterium *Nostoc muscorum* ATCC 27893. Chromium exposure caused considerable impact on growth, exopolysaccharide, light-harvesting pigments, photosynthetic oxygen yield and PS II photochemistry (FV/FM, Psi_o, Phi_Eo, PIABS and Fv/Fo and energy fluxes ABS/RC, TRo/RC, ETo/RC, and DIo/RC) as a result of intracellular Cr accumulation. Under tested stress enzymatic antioxidants could not kept the oxidative biomarkers (reactive oxygen species and malondialdehyde equivalents contents) under limit, hence their levels were alarmingly increased. Exogenously applied melatonin and nitric oxide, alone and together significantly relieved the cyanobacterium from oxidative stress, thereby considerable improvement in growth and related attributes (pigments, photosynthetic oxygen yield and PS II photochemistry) was noticed, and the alleviating effect was more pronounced with combine treatment of both the signalling molecules. The application of NO scavenger (PTIO) and its biosynthetic inhibitor (L-NAME) clearly demonstrated that NO is an essential acquisition for functioning of MT in regulating Cr toxicity in test cyanobacterium. In conclusion, the current finding suggests that MT and NO work synergistically and may strengthen the survival of biofertilizer *Nostoc muscorum* ATCC 27893 even in Cr contaminated crop fields.

107. STUDIES ON THE PHYSICOCHEMICAL PARAMETERS, PLANKTON DIVERSITY, AND SEASONAL VARIATION IN KHANWARI POND OF DISTRICT KAUSHAMBI (U.P.),INDIA

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Abstract

Planktons include zooplanktons and phytoplanktons. These act as integral component of aquatic food chain. The zooplanktons are microscopic organisms and contribute significantly to the productivity of fresh water ecosystem. Phytoplanktons and zooplanktons perform first and second trophic levels in energy flow, respectively and switch over to detritus matter contributing to aquatic animal food matter. In the present investigation we have tried to assess the zooplankton and phytoplankton species richness to predict their species diversity in the khanwari pond of Kaushambi district. In addition, physicochemical parameters of the minor lake were also analyzed and samples from different transects were collected and studied. The physicochemical parameters taken in the present study were water temperature, turbidity, pH, dissolved oxygen, salinity, TDS, chlorides, hardness, BOD, and plant nutrients like phosphates, nitrates, and some other organic and inorganic contents.

Total 43 species of zooplanktons and 34 species of phytoplanktons were identified, of which zooplanktons belonged to rotifers, copepods, cladocera, and ostracoda and phytoplanktons belonged to Chlorophyceae, Cynophyceae, Bacillariophyceae and Euglenophyceae. Plankton population is showing positive significance with the results of physicochemical parameters mentioned earlier whereas these are showing negative significance with rainfall and salinity. Seasonal variations in the plankton diversity were observed. The physicochemical parameters of Khanwari pond were suitable for the growth of aquatic animals, plants and pisciculture practices.

108. THE ROLE OF UPR IN MICROCYSTIN-LR INDUCED TOXICITY AND THE POTENTIAL MITIGATING EFFECTS OF COENZYME Q10

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Abstract

Microcystin-LR (MC-LR), a potent hepatotoxin produced by certain cyanobacteria, is primarily responsible for endoplasmic reticulum (ER) stress, leading to cellular dysfunction and toxicity. In male mice, MC-LR was administered at a dose of 10 μg/kg bw/day, intraperitoneally (ip) for 14 days, while microcystin-LR-treated mice were co-administered coenzyme Q10 (10 mg/kg bw/day, intramuscularly) for 14 days. This study investigates the role of the unfolded protein response (UPR) in MC-LR-induced toxicity and evaluates the potential protective effects of coenzyme Q10 (CoQ10). The expression levels of key UPR markers, including GRP78, GRP94, IRE1α, XBP1, PERK, eIF2α, ATF4, and ATF6, in response to MC-LR exposure and subsequent CoQ10 treatment were measured. These findings reveal a significant upregulation of UPR markers GRP78 and GRP94, indicating the activation of the UPR as a response to ER stress caused by MC-LR. Additionally, elevated levels of IRE1α, XBP1, and PERK were observed, further verifying the engagement of the UPR mechanism. Moreover, CoQ10 treatment considerably reduced the expression of these UPR markers and mitigated the harmful effects of MC-LR, suggesting its potential as a therapeutic agent. These findings highlight the potential of CoQ10 as a treatment in reducing ER stress and cellular damage caused by MC-LR and offer a critical understanding of the involvement of UPR in MC-LR toxicity. This study highlights how crucial it is to target UPR pathways when creating treatments that protect against cyanobacterial toxins.

109. EXPLORING THE IMPORTANCE OF BANANA ROOT EXUDATES IN FUSARIUM WILT DISEASE

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Abstract

An intricate interaction exists between plant roots and microorganisms in the rhizospheric region. Many plant species have varied composition of root exudate that significantly affects the rhizospheric microorganism population dynamics. Metabolites found in the root exudates either promote or restrict some organism's ability to flourish. Understanding the composition and importance of exudates in microbial interaction will shed light on the community ecology that can be further exploited to reduce disease severity by facilitating beneficial organisms and inhibiting the pathogenic ones. The significance of banana root exudates in Fusarium wilt disease caused by the root pathogen *Fusarium oxysporum* f. sp. *cubense* (Foc) is not well studied. Foc exhibits host specificity and this host specificity can be attributed to root exudates released

by the banana plant. In order to understand the effect of banana root exudates on Foc, the root exudates of four different cultivars of banana (namely Rasthali, Red Banana, Grand Naine, and cv. Rose) were collected and tested for their ability to promote Foc growth and development. Susceptible cultivars Rasthali and Red banana showed significant stimulatory effect on the Foc spore germination and higher chemotaxis index as compared to the resistant cultivars Grand Naine and cv. Rose. Moreover, similar Foc response was seen when it was treated with malic and oxalic acid which are key metabolites identified in plant root metabolomes. This study will further aid in specifically understanding the banana-*Fusarium* interaction and develop innovative management strategies.

110. SEASONAL CHANGES IN NEURONAL SPACING OF PREOPTIC AREA OF *HETEROPNEUSTES FOSSILIS*

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Abstract
Fish brain differs among species with respect to anatomical and histological observations but they show resemblances in the number of brain compartments. Preoptic area (POA), a part of teleostean brain has been suggested to play an important role in cognition and learning. It has been reported that POA is involved in spawning behavior. Neurons/nerve cells are the structural and functional unit of the nervous system and are responsible to transmit information in the form of electrical impulses and chemical signals. The earlier studies on fishes have reported that the fluctuation in season leads to changes in terms of brain size whereas the present investigation indicates spaces between neurons i.e, neuronal spacing in POA of teleost fish along with seasonal variations. In this study brain of *Heteropneustes fossilis* during the non-spawning and spawning phase was perfused with 10% formalin solution and stained with Cresyl-violet staining (basic dye) for the cytoarchitectonic study. It was observed that neuronal spacing in POA region of female*H. fossilis* significantly accredited during spawning phase of fish. Neuronal plasticity in POA region is accompanied by seasonal changes. The result suggest better functioning and networking of the region concerned during spawning phase of fish as POA is responsible to control both social and sexual behavior in teleost.

111. UNSEEN DANGERS: DIETHYL PHTHALATE'S ROLE IN MITOCHONDRIAL DYSFUNCTION AND NEUROTOXICITY

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Abstract
Behind crippling brain diseases like Alzheimer's, Parkinson's, Huntington's, and ALS is a complex and harmful process called neurodegeneration. The characteristic of neurodegeneration

is the progressive loss of neuronal structure and function, which is essential for information transmission via chemical and electrical impulses. Despite being deemed harmless in the past, diethyl phthalate (DEP), which is widely utilised in consumer items, has become a health risk for people. DEP may have detrimental effects on human health, according to recent studies. Plasticisers can be ingested, inhaled, or come into contact with the skin by people due to their leaching from cosmetics, plastics, and personal hygiene products. DEP has been linked to mitochondrial dysfunction in brain cells, contributing to neurotoxicity and potential cognitive decline. DEP exposure is associated with increased oxidative stress, leading to the overproduction of reactive oxygen species (ROS). Elevated ROS levels result in lipid peroxidation, compromising mitochondrial membrane potential and integrity. Additionally, it interferes with mitophagy, the process of removing damaged mitochondria, resulting in their accumulation and further cellular dysfunction. These mitochondrial disturbances may play a critical role in the pathogenesis of neurodegenerative diseases, as chronic mitochondrial dysfunction is a hallmark of conditions like Alzheimer's and Parkinson's disease. DEP exposure during neurodevelopment may also have long-term consequences, leading to cognitive impairments and behavioural abnormalities. Understanding the mechanisms of DEP-induced mitochondrial dysfunction is crucial for assessing its neurotoxic potential and developing strategies to mitigate its harmful effects. Further research is required to elucidate these molecular pathways and their broader implications.

112. INVASIVE ALIEN SPECIES: A THREAT TO BIODIVERSITY

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Abstract

The second worst threat is the biological invasion of alien species (Convention for Biological Diversity, 1992). The global extent and rapid increase in invasive species is homogenizing the world's flora and fauna and is recognized as a primary cause of global biodiversity loss. Bio-invasion may be considered as a form of biological pollution and significant component on global change and one of the major causes of species extinction.

In the new ecosystems, invasive alien species become predators, competitors, parasites, hybridizers, and diseases of our native and domesticated plants and animals. Invasive alien species are animals, plants, fungi and microorganisms entered and established in the environment from outside of their natural habitat. They reproduce rapidly, out-compete native species for food, water and space, and are one of the main causes of global biodiversity loss.

IAS are primarily spread by human activities, often unintentionally. People and the goods we use, travel around the world very quickly and they often carry uninvited species with them. It has been observed that many of the plants which are adventives in nature have altered the floristic composition of many areas.

The negative effects of invasive alien species on biodiversity can be intensified by climate change, habitat destruction and pollution. Loss of biodiversity will have major consequences on

human well-being. This includes the decline of food diversity, leading to malnutrition, famine and disease, especially in developing countries. It will also have an important impact on our economy and culture. Thus, invasive species are a serious hindrance to conservation with significant undesirable impacts on the goods and services provided by ecosystems.

Effective measures against eradication of invasive alien species are need of the hour. Once invasive weeds are identified, it is important to take action to ensure that they do not spread to uninfected areas. Prevention, early detection and eradication of weed species is the most economical and effective means of invasive plant management. Educate yourself and others about weeds in your area.

113. CAGE AQUACULTURE AS EMERGING TECHNOLOGY FOR FISH PRODUCTION IN NORTHEAST INDIA

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Abstract

Cage aquaculture is emerging as a transformative technology for fish production in Northeast India, a region characterized by its vast (3.77 lakh ha) and diverse aquatic resources (including 21,237 ha reservoirs; 1, 34, 209 ha wetlands/ beels; 1, 03, 211 ha derelict waterbodies; 20,875 ha rivers and canals) and socio-economic challenges. This technology involves the use of floating cages or enclosures in natural water bodies, enabling the efficient cultivation of various fish species. Cages are suitable for culturing high value indigenous fishes such as *Osteobrama belangeri, Anabas testudineus, Ompok bimaculatus, Chana straitus*; medium carps such as *Labeo bata, L. gonius, L. calbasu* and *Cirrhinus reba*; and exotic carps such as *Cyprinus carpio, Ctenopharyngodon idella* and *Hypophthalmicthys molitrix*. A stocking density of 30 and 40 fingerlings/m^3 was optimum for rearing *Labeo bata* and *L. gonius* respectively in wetlands of Assam. The endemic carp *Osteobrama belangeri* grew to marketable size in 6 months with highest net benefit at stocking density of 20 fingerlings/m^3. Polyculture of *C. carpio, L. rohita* and *Barbonymus gonionotus* was found to be suitable for Umiam lake of Meghalaya while *H. molitrix* was suitable for Mapithel reservoir of Manipur reaching over 1 kg in 8 months culture period. By utilizing local water bodies, this technology minimizes the need for extensive land use, reducing competition with agriculture. Challenges includes limited access to technology, inadequate training for fish farmers and concerns about environmental impacts. However, initiatives aimed at capacity building and research is increasingly being introduced to address these issues. Local governments, NGOs, and research institutions are collaborating to provide training, develop best practices, and promote sustainable fish farming technologies. Cage aquaculture not only promises increased fish production but also contributes to food security, economic development, and the livelihoods of local communities.

114. ESTIMATING SUSPENDED SEDIMENT LOAD OF THE GODAVARI RIVER BASIN: A DEEP LEARNING APPROACH

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Abstract
Suspended sediments, comprising clay, silt, and sand particles carried by turbulent flow, are critical in rivers, streams, lakes, and oceans due to their significant environmental impacts. Accurately estimating suspended sediment load (SSL) is essential for effective water resource management. However, traditional empirical and physically based models often fail to capture the complex, nonlinear dynamics of sediment transport. This study explores the potential of three advanced deep learning (DL) models—Gated Recurrent Unit (GRU), Long Short-Term Memory (LSTM), and Recurrent Neural Network (RNN)—for SSL prediction. Using a 50-year dataset (1970–2020) of daily discharge and SSL from the Godavari River, we assessed SSL at daily, weekly, 10-day, and monthly scales. To analyze the impact of dam construction, the dataset was divided into pre-1990 (pre-dam) and post-1990 (post-dam) periods. Our results indicate that the LSTM model consistently outperforms both the RNN and GRU models across all time scales and scenarios, both before and after dam construction. Key performance metrics, including Nash-Sutcliffe Efficiency (NSE), Mean Absolute Error (MAE), Root Mean Square Error (RMSE), and correlation coefficient (R), confirm the LSTM model's superior predictive accuracy. This study highlights LSTM's potential for improving SSL estimation, especially in the context of significant anthropogenic changes like dam construction. Future research should incorporate additional environmental variables and test model performance in diverse geographical and climatic settings.

115. PHYTOREJUVENATION OF *BACOPA MONNIERI* PREVENTS CYPERMETHRIN-INDUCED HYPOTHYROIDISM AND MAY REDUCE THE RISK OF DEVELOPING NAFLD IN MICE.

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Abstract
Cypermethrin (CYP) is extensively utilised in aquaculture and agriculture. It is acknowledged as a potent endocrine disruptor in organisms. Hypothyroidism constitutes a worldwide issue. This may result from metabolic and hormonal dysfunction due to significant exposure to insecticides, pyrethroids, and other environmental factors. A recent complication associated with hypothyroidism is non-alcoholic fatty liver disease (NAFLD). The correlation between hypothyroidism and NAFLD remains debatable due to insufficient research supporting the complex and poorly understood aetiology. This study seeks to investigate the efficacy of *Bacopa monnieri* in mitigating CYP-induced hypothyroidism, which may progress to NAFLD in mice. The experiment consisted of four groups: the control group (CN), which received water and an unrestricted regular diet, and the CYP and CYP+BM groups, which were administered 15 mg/kg

body weight of cypermethrin orally via gavage. The BM group was administered 200 mg/kg body weight of *Bacopa monnieri*, whereas the CYP+BM group received concurrent administration of BM for 28 days. The results indicated that the CYP-induced hypothyroidism group observed significant alterations in hormone levels (decrease in T3 and T4 and increase in TSH), lipid profile, and liver enzyme markers. The antioxidant enzymes SOD, CAT, and GPx were significantly diminished, whereas the levels of oxidative markers (LPO, AOPP, and H_2O_2) increased simultaneously. The significant reduction in THR-β receptor expression affects metabolism and hepatic cells. NAFLD results from hepatic fat accumulation, evidenced by elevated SERBP-1 expression. BM co-administration can phytorejuvenate CYP-induced hypothyroidism and its related effects. Moreover, further research is required to elucidate the relationship between hypothyroidism and NAFLD, along with the underlying mechanisms. Regular thyroid function tests are essential for all patients with liver disease to mitigate morbidity and mortality.

116. IMPACT OF ORGANIC FARMING ON LOW GLYCEMIC INDEXED RICE TELENGANA SONA

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Abstract

Rice (*Oryza sativa*) is the most widely used staple food, with over 3.5 billion people relying on it as their primary source of calorie. It is one of the most genetically diverse crop in the world with thousands of diversity. In the present scenario Telengana Sona (RNR-15048) is a short, slender, blast resistance, low glycemic indexed & short duration rice variety which can be grown in both rabi and kharif season. Organic framing technique was deployed for cultivating the rice variety, in 5 different plots. Plot 1 was treated with N, P, K (Control), Plot 2 with a mixture of vermi compost, cow dung and azolla, Plot 3-azolla, Plot 4-vermi compost and plot 5-cow dung. The morphological growth analysis was carried out with plant height, tillering, grain count & panicle length with vigoursity in Plot 2. The biochemical estimation comprises of chlorophyll, protein & carbohydrate with optimum amount. As protein was enhanced, so in-gel activities were carried out by SDS-PAGE. It has been recorded that a moderate molecular weight protein was more intense (approx.50 KDa.) under the treatments given in Plot 2. This protein must be a stress related protein which get suppressed under the influence of hazardous chemical nutrients showing an insignificant band. However organic nutrition was much more preferable instead of chemicals for better yield in low glycemic indexed rice variety which is very much essential for hypo/hyper glycemic patients. Agricultural community particularly in India must/ should realize that organic farming is a major challenge for future agronomic practices.

117. THREE-DIMENSIONAL ESTIMATION OF THE NOSE FOR FACIAL RECONSTRUCTION AMONG NORTH INDIAN ADULTS

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Abstract

Forensic anthropology is the application of the knowledge and methods of physical anthropology in a medico-legal context. The unknown skeletal remains are examined to assess and assist in the identification of the human remains. When the standard methods fail to establish the identity, the facial reconstruction technique comes into play. The nose is a crucial morphological feature for identification. In the skull, a partial bony bridge with a large hollowed nasal aperture is available. Hence it becomes a challenge for a Forensic scientist to build a soft nose based on scant bony information/structure of the skull. The present study was conducted on 409 individuals (226 males and 183 females). Three facial soft tissue depths (FSTD), five distances on the face, and six distances on the skull with three angles were measured to determine the nasal structure. Five parameters were used to construct the regression models to assess the different dimensions of the nose. The Pearson's correlation coefficient (r) of the models ranged from 0.189 to 0.894 and was significant at $p \leq 0.05$ level. A morphological study was conducted on the above subjects to find the most frequent structure of the nose in the present population. The present study based on the Indian data will assist Forensic scientists to reconstruct a nose on the skull which may be akin to his antemortem face.

118. SEASONALITY IN ANURANS

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Abstract

Seasonality is a critically important aspect of environmental variability and strongly shapes all aspects of life for organisms living in highly seasoned environments. It has played a key role in generating biodiversity and has driven the evolution of extreme physiological adaptations and behaviors. An essential characteristic of the nervous systems of animals that inhabit seasonal environments is seasonal plasticity. Seasonal plasticity may also be necessary for restoring phase synchrony in the master circadian clock network. The nervous system's capacity to adjust to changes in its surroundings is known as neuronal plasticity which encompasses both anatomical and functional alterations, including the creation of new synapses, the genesis of new neurons, and the remodeling of existing neurons. The anuran medial pallium, formerly known as the archipallium or primordium hippocampi, is homologous to the mammalian hippocampal formation. In frogs and toads, it has been observed that seasonality affects hormonal levels as well as secondary sexual characteristics. It has also been noted that seasonality and brain size of anurans have been observed to be negatively associated. The size of most brain regions has been reported to be unaffected by seasonality except for the optic lobes being larger in frogs from

stable environments. The causal processes affecting neuronal changes in the medial pallium of anurans have not yet been examined and the elaborately described neuronal plasticity on the mammalian hippocampus may provide hypotheses for investigating the effect of seasonality in the medial pallium of anurans.

119. LASER INDUCED FLUORESCENCE STUDY OF THE BUTTER

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Abstract
Quality of food is very important issue from the health point of view. To monitor the quality, several methodologies are developed/adopted. However these methodologies are highly market oriented and have many demerits. Some of the important choice factors are cost-effectiveness, user-friendly, rapid data generation, non-destructiveness, remote access, free from processing and extraction processes, solvents. Inspite of this, market forces demands more compact, cost-effective, rapid, miniaturised devices for the quality monitoring. Recently optical techniques gaining popularity in this area due to their noncontact nature, quick data generation, free from sample preparation, non-destructive, cost-effectiveness, portability, and robust capabilities. In this sequence, laser based techniques are more prominent and highly capable. The laser induced fluorescence is highly selective, cost-effective, portable and non-destructive when used with optical fibre. When the optical fibre coupled with chemometrics, the laser induced fluorescence technique is highly selective, and capable to extract desired information in a given specimen.
In the present study, fibre optic coupled spectrometer together with diode laser, has been applied as a miniature device to check the authenticity of the dairy products on-line and in-situ manner. The results of the presence of phytochemicals in the dairy product like butter have been reported by analysing the acquired laser induced fluorescence spectra.

120. NEUROPROTECTIVE EFFECT OF MELATONIN IN 'ARTIFICIAL LIGHT AT NIGHT' INDUCED CIRCADIAN DISRUPTED MODEL OF RAT DURING AGING

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Abstract
Circadian disruption (CD) induced by Artificial Light at Night (ALAN) is a global emerging concern to the modern society as light pollution. In our study we investigated the protective role of melatonin on redox alterations and neurochemical deficits in ALAN-induced CD model of rat. Young (3 months) and aged (22 months) male Wistar rats were exposed to ALAN and received melatonin supplementation (10 mg/kg, orally) for 10 days. The results exhibited a significant increase in the redox biomarkers: reactive oxygen species, lipid hydroperoxidation, protein carbonyl, nitric oxide and decrease in total thiol levels, ferric reducing antioxidant potential,

activities of superoxide dismutase and catalase in the brains of rats with higher amplitude in old ALAN rats. These oxidative modifications were protected by subsequent melatonin administration. Alteration in the activity of mitochondrial complexes (C-I to C-IV) in both young and old ALAN rats was attenuated by supplementation of melatonin. Histopathological analysis revealed dense cytosolic staining and neuronal loss in the cerebral cortex and hippocampus, with more pronounced effects in old ALAN rats and melatonin treatment moderated these changes. RT-PCR data analysis indicated that melatonin reduced neuroinflammatory (IL-6, TNF α), neurodegenerative genes (Ngb), while increasing the expression of the aging marker (Sirt 1) in both young and old melatonin treated rats exposed to ALAN. Therefore, our findings could enhance the understanding of the extent of photo-oxidative damage triggered by ALAN during aging and melatonin could serve as a potential chronobiotic for alleviating redox modulations and strengthen circadian regulation in aged populations.

121. ETHYLENE AND HYDROGEN SULFIDE MITIGATE CHROMIUM TOXICITY ON GROWTH AND PHOTOSYNTHETIC ACTIVITY IN MUNG BEAN SEEDLINGS BY REGULATING OXIDATIVE STRESS THROUGH ASCORBATE GLUTATHIONE CYCLE

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Abstract

Food security has become worldwide issue and sustainable agriculture may achieve this goal. Application of plant hormones / signaling molecules is getting momentum to improve the crop productivity even in stress challenged crops. The present investigation is aimed to understand the ameliorating effect of ethylene (25μM ethephon; donor) and H_2S (10μM NaHS; donor) in chromium [Cr (VI), 50 μM] stressed seedlings of mung bean (*Vigna radiata*). Cr (VI) suppressed the growth and photosynthetic gas exchange attributes (photosynthetic rate, stomatal conductance, sub cellular CO_2 concentration and transpiration) and that was accompanied by intracellular Cr accumulation. The diminished growth and photosynthetic gas exchange attributes were directly associated with higher buildup of oxidative stress biomarkers: $O_2^{\bullet -}$, H_2O_2, malondialdehyde equivalents and membrane injury. Chromium effectively disturbed AsA-GSH cycle (glutathione reductase, ascorbate peroxidase, monodehydroascorbate reductase and dehydroascorbate reductase activity and also ASA and GSH contents), thereby greater accumulation of H_2O_2 led to disturbed cell metabolism. When ethylene and H_2S were applied to the Cr stressed seedlings a considerable reduction in Cr accumulation relived the AsA-GSH cycle, thereby limit the oxidative stress biomarkers, hence restored the photosynthesis that led to improved growth of mung bean seedlings. The study concludes that ethylene appears to be prime player where H_2S played downstream signaling to ethylene in regulating Cr(VI) toxicity. Both the growth regulators, ethylene (ethephon) and H_2S (NaHS) are cost effective and easily availability to farmers, hence may be considered for sustainable agriculture in metal contaminated soils.

122. DISSECTING THE ROLE OF TWO NOVEL STRESS RESPONSIVE PROTEINS IN REGULATING OSMOTIC STRESS TOLERANCE IN RICE

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Abstract
Among various abiotic stress factors, drought has a devastating effect on rice production. Plants have several carbohydrate-binding proteins. Among them, lectins are essential for regulating different biotic and abiotic stress conditions including drought. The rice lectin protein, Osr40c1, has been reported to form a multiprotein complex with two novel stress responsive proteins under drought stress and regulate drought tolerance in rice. However, the functional mechanism of these two novel stress responsive proteins still remains obscure. In this study, we have dissected the function of the two novel stress responsive proteins in response to osmotic stress. The expression of the Novel stress responsive protein I and Novel stress responsive protein II genes were found to be differentially regulated in indica rice cultivar, Khitish, and Ajit under drought stress. Furthermore, the overexpression of each of these genes confers drought tolerance, whereas their silencing leads to drought sensitivity. Moreover, the ectopic expression of these genes in tobacco showed a similar phenotype. Together this study deciphers a novel role of Novel stress responsive protein I and Novel stress responsive protein II genes in imparting drought tolerance in rice.

123. ESTIMATION OF WATER BUDGET COMPONENT OF KOSI RIVER BASIN USING SWAT MODEL USING HIGH-RESOLUTION REMOTE SENSING DATA

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Abstract
It is essential to simulate and quantify the availability of water resources using hydrological model with accurate data. Henceforward the current investigation effectively calibrated and

validated the water balance of Kosi river basing using the Soil and Water Assessment Tool (SWAT) model. India Meteorological Department (IMD) daily gridded rainfall and monthly stream flow data were employed to construct the model from 2000 to 2013. The model executed well with statistical value of Nash-Sutcliffe and correlation coefficient greater than 0.70 and 0.72 during calibration and 0.67 and 0.70 during validation respectively. The spatio-temporal variations of water budget component were estimated over study area. The result showed that approximately 35 % of precipitation was lost due to evapotranspiration. The geographical distribution of evapotranspiration was higher on northwestern region. This study will strengthen the conception of water budget component response on sparse rainguage network in hilly region of Uttarakhand. This model set up can be used as reference for calculating water budget component under climate change in the context of water food nexus in the furure.

124. IL-10 INDUCES ITS OWN EXPRESSION IN SILICA NANOPARTICLES TRIGGERED PULMONARY FIBROSIS THROUGH STAT3-DEPENDENT AUTOREGULATORY LOOP

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Abstract

Inhalation of crystalline and amorphous silica dust has been critically associated with pulmonary fibrosis and is consequentially considered as one of the most prevalent occupational disease worldwide. Persistent pulmonary inflammation with exaggerated fibroblast proliferation and collagen deposition are key etiology associated with the disease. Albeit the involvement of several cytokines, chemokines and signal molecules have been reported to regulate the TH1/Th2 paradigm, a possible regulation of IL-10, a crucial anti-inflammatory cytokine and its contribution in the disease etiology has not been elucidated. The current study demonstrates the role of IL-10 across Stat3 immune axis in pulmonary silicosis. We, herein, report that amorphous $nSiO_2$ could induce pulmonary fibrosis with significant upregulation of IL-10 post 30-D dose administration in mouse model. Subsequently, an elevation in both Stat3 and SR-A/CD204 was also observed. We further confirm that Stat3 mediates IL-10 expression through the process of trans-activation, by allowing its localization over two putative binding sites in IL-10 promoter region. The regulation of IL-10 through an autoregulatory loop in silicosis could offer novel molecular targets for therapeutic interventions.

125. EVALUATING THE IMPACT OF URBANIZATION ON URBAN TEMPERATURE REGULATION: A CASE STUDY OF VARANASI CITY

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Abstract

The unprecedent rate of urbanization in the developing countries like India, poses significant challenges in offsetting the rapid urban growth with environmental sustainability. These

challenges become even more pronounced in cities like Varanasi, which holds profound religious and historical significance along with accommodating a population of around 12 lakhs in an area of around 82.10 sq.km. Varanasi, being one of the smart cities, experiencing swift urbanization from the past years where the natural settings are being transformed into concrete jungles with increasing impervious surfaces and reduction in urban greenery, such changes contribute to high land surface temperature (LST) and hence affecting human and environmental well-being. Therefore, the present study carried out spatial analysis to assess Land Surface Temperature (LST) and correlated it with various spectral indices to map vegetation cover and built-up areas in Varanasi. The results showed that densely built-up areas had much higher LST, aggravating the Urban Heat Island (UHI) impact. In contrast, areas with vegetation had lower LST, highlighting the cooling advantages of green cover. This spatial analysis of Varanasi's land use and LST, in combination with spectral indices, provided crucial insights into the environmental consequences of urbanization. This underscores the importance and need of strategic urban planning to prioritizes expansion and equitable distribution of green spaces to ensure a sustainable and resilient city development and thus contributing in achievement of global goals (United Nations-Sustainable Development Goals, UN-SDGs) i.e., SDG 11 (Sustainable Cities and Communities) and 13 (Climate Action).

126. ESTIMATION OF LATITUDINAL VARIATION IN SOLAR ROTATION USING SDO/AIA IMAGES AND ESTABLISHING ITS CORRELATION WITH SOLAR CYCLE

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Abstract
Solar rotation responsible for various solar activities is an unanswered problem of solar physics since long time. In recent decades the information about solar rotation strongly improved. Solar rotation can be measured by tracking the tracers across the solar disk, or via solar spectroscopy, or via flux modulation method using radio waves, X-rays, and UV rays that emitted out in the space. SDO, a space mission of NASA to understand the magnetic changes in the Sun. Analysis of SDO data could help to build up the capability of forecasting solar variations that can affect life on Earth. SDO/AIA SFD data can be used to estimate the rotation of solar atmosphere, which in turn used to draw the information about the change in solar magnetic field as the variation in sunspot cycle and magnetic reversal cycle. In the present work feasible variation in latitudinal solar rotation is estimated. To find latitudinal variation in solar rotation, the SGD images at wavelengths (193 Å, 211 Å and 304 Å), at a cadence of one per day, obtained from SDO/AIA have been used for each year of the whole mission period (2010 -2022). In flux modulation method, the variation in flux emitted over the latitudinal bin (formed on equally separated latitude regions of SFD images that extended from 800N to 800S) on solar disk generates annual time series for each latitude. The periodogram analysis of each time series of any latitude bin on the SFD images for a year gives the estimation of solar rotation period as a function of latitude.

Estimated result shows sometimes rigid rotation and sometimes differential rotation in solar coronal and transition region in different epoch. This variation in solar rotation found to be linked with the solar activity cycle.

127. EMPOWERING RURAL COMMUNITIES: THE ROLE OF MICRO HYDROPOWER IN RENEWABLE ENERGY TRANSITION

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Abstract
This study undertakes a comprehensive examination of micro hydropower (MHP) systems, a viable solution for rural electrification in remote and off-grid areas. Focusing on the technical, environmental, and socio-economic dimensions of MHP projects, this research investigates the potential for harnessing kinetic energy from small streams or rivers to generate renewable energy. A detailed analysis of MHP system design, efficiency, and capacity is conducted, with particular emphasis on factors influencing energy output, including water flow rate, turbine efficiency, and site selection. The environmental implications of MHP installations are also assessed, highlighting the minimal ecological disruption and sustainability benefits, such as reduced greenhouse gas emissions and enhanced energy security. Case studies from diverse geographical contexts are presented to demonstrate the feasibility and adaptability of MHP projects. Additionally, this research explores the crucial role of community involvement, policy frameworks, and financial mechanisms in promoting MHP adoption. The investigation acknowledges challenges associated with MHP technology, including seasonal variability in water flow, initial capital investment, and maintenance requirements. Nevertheless, the findings underscore the substantial potential of micro hydropower as a decentralized energy solution, contributing to rural development, environmental sustainability, and the global transition toward cleaner energy systems.

128. CAFFEIC ACID MODULATING NEUROENDOCRINE HOMEOSTASIS OF GASTROINTESTINAL TRACT

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Abstract
The gastrointestinal tract (GIT) is considered the largest neuro-endocrine organ in the body. The GIT mucosa is having the entero-endocrine cells (EEC) distribute among the enterocytes of the gut. The EECs release a variety of neuropeptides, such as Neurotensin (NTS). GIT harbors a dynamic population of micro-organism termed as microbiota. The resident microbiota contribute in maintaining neuro-endocrine immune homeostasis of the GIT. Various external pathogen,

frequent antibiotic or drug usage, improper diet, can all lead to GIT infections, which may result in microbiota dysbiosis (increase endotoxin eg; Lipopolysaccharide/LPS), resulting in alteration of the makeup of beneficial microbiota population. The gut's mucosal barrier may be harmed by the GIT infection, making it possible for the pathogen to enter and cause inflammation. This GIT inflammation may affect the neuro-endocrine cell including NTS cells. Several reports are present that supports the evidence of anti-inflammatory and anti-apoptotic role of NTS, which get affected because of GIT inflammation. There are several reports to support that plant derived compounds have the potential to restore gut function alleviating inflammation. Caffeic Acid (CA), a plant-derived phenolic compound as a dietary supplement reported to have anti-inflammatory, anti apoptotic potential for improving intestinal health. The present study conducted to elucidate efficacy of CA in modulation of the LPS induced inflammation model through the maintenance of NTS level and further maintaining anti-inflammatory biomarkers.

129. UNRAVELING THE MECHANISM OF ACTION OF *GLYCYRRHIZA GLABRA* L. ON KEY DRUG-DISEASE TARGETS IN SILICOSIS THROUGH NETWORK PHARMACOLOGY

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Abstract

Glycyrrhizin, an active constituent derived from the rhizomes of *Glycyrrhiza glabra* (Licorice) exhibits significant anti-inflammatory, antioxidant, and immunomodulatory properties, which may contribute to mitigating silicosis (pulmonary fibrosis) in lung tissue. Upon integrating data from these extracts, we identified a set of genes that serve as key markers for silicosis. However, the mechanisms underlying alterations in lung tissues damaged by silica remain complex and poorly understood. Given the lack of allopathic treatments for silicosis, exploring the molecular mechanisms of glycyrrhizin through network pharmacology and molecular docking presents a novel theoretical framework for employing herbal remedies in the treatment of this condition. Here in we gathered information on glycyrrhizin-related targets using PharmMapper and SwissTargetPrediction. We comprehensively compiled silicosis-related targets from the NCBI GEO database, leading to the identification of several upregulated and downregulated key genes. Additionally, marker genes were identified at the interface of disease etiology and potential drug targets. Cross-cutting drug-disease targets were derived through screening with the Jvenn tool. These genes were further integrated into a network pharmacology model using Cytoscape 3.10.2 and STRING databases to construct a protein-protein interaction (PPI) network map of the intersecting targets and associated pathways. The identified intersecting targets may serve as novel therapeutic markers for early-stage silicosis and represent potential interventions within the realm of alternative and complementary medicine, as opposed to conventional chemotherapies. This approach offers a new perspective for therapeutic strategies in the management of silicosis.

130. SYNTHESIS AND BIOLOGICAL APPLICATIONS OF QUINOLINE AND ITS DERIVATIVES

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Abstract

Quinoline is one of the advantageous heterocyclic moiety which is observed to be an essential assembly motif for the formation of novel drug substances. Quinoline and its substituents evaluated with widespread biological activity form a significant group of compounds for novel drug synthesis. Quinoline and quinolone are omnipresent in nature, and they mostly behave as structural subunits of more complicated natural products. A series of tetrahydroquinolines and quinolines can be synthesized following the synthetic routes .The styrylquinoline moiety has been observed to be very favourable leading structural framework specifically, that a novel synthetic procedure provided much more potential and flexible pathways for these compounds. Quinoline and quinolone derivatives owe broad range of pharmacological features like anti-bacterial,anti-inflammatory, anti-cancer, anti-HCV, anti-tubercular,anti-malarial, anti-HIV and anti-alzheimer activities, signifying essential groups of biologically active heterocyclic scaffolds in the branch of pharmaceuticals. On the basis of molecular fragment, a diverse series of quinoline related molecules were analyzed for their activity in comparison to the wide combination of pathogenic fungi. Quinazoline, quinazolone as well as dioxoquinoline are the various quinolines related molecular frameworks utilized for the development of antifungals. 4-Quinolone scaffold is found in sitafloxacin, a novel antibiotic of the diverse characteristic spectrum. Recently, several molecular adaptations of quinoline substitutes have been reported with favourable anticonvulsant effects. A series of 5-alkoxy-[1,2,4]triazolo[4,3-a]quinoline substitutes with anticonvulsant feature analyzed by the maximal electroshock test (MES) and also their neurotoxicities were examined and calculated by the rotarod testing procedures.

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