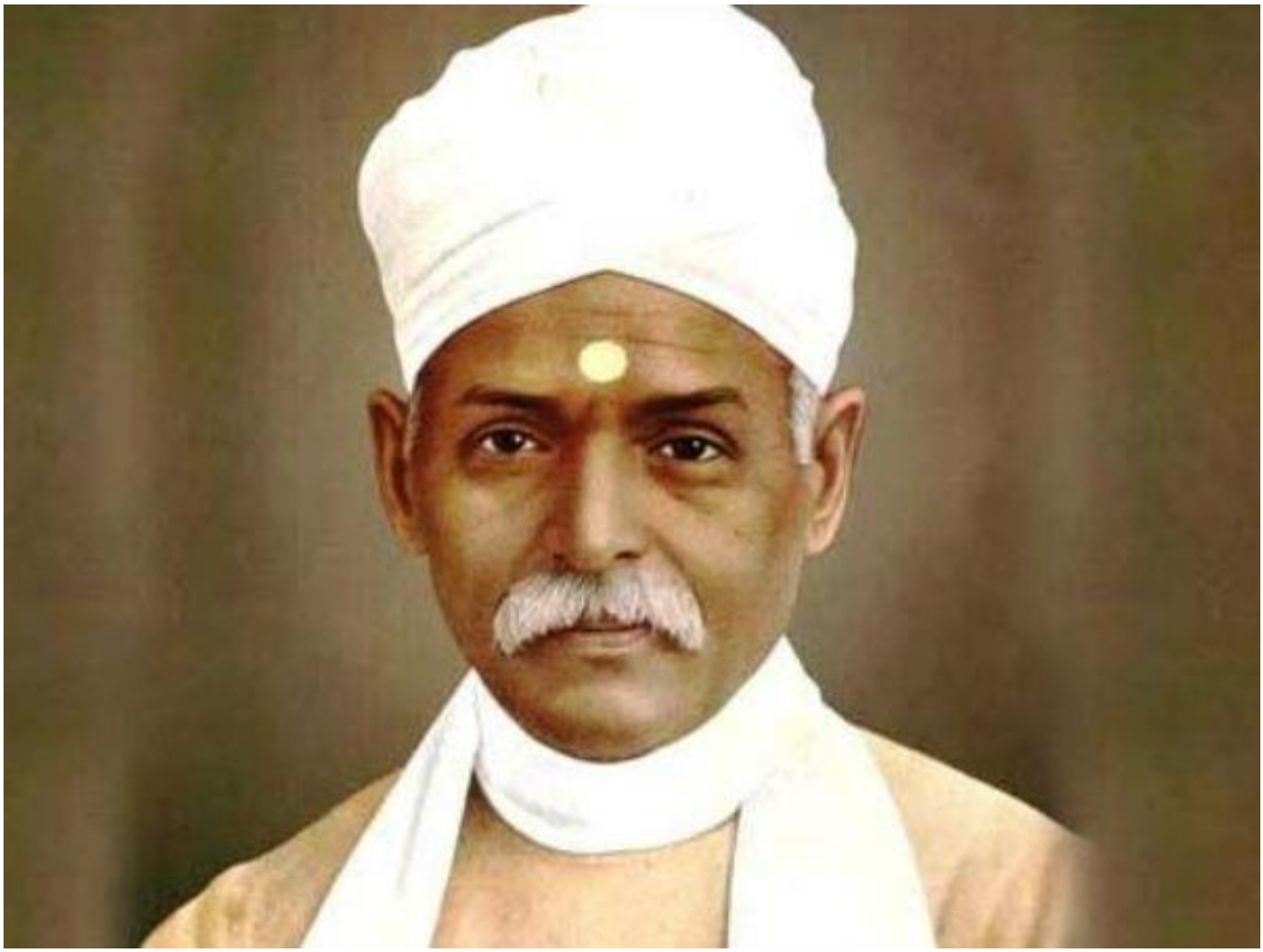
NATIONAL CONFERENCE ON NATURAL SCIENCES AND SUSTAINABLE DEVELOPMENT FOR ENVIRONMENT: CONTESTATIONS AND AFFIRMATIONS (NSSECA -2023)

20 – 21st January 2023

MMV BHU, Varanasi

CONVENERS

Prof. Neelam Srivastava
Dr. Gautam Geeta Jiwatram



Pt. Madan Mohan Malviya
(25th December 1861 - 12th November 1946)

Malaviyaji strove to promote modern education among Indians and co-founded the Banaras Hindu University (BHU) at Varanasi in 1916, which was created under the 1915 BHU Act. It is the largest residential university in Asia and one of the largest in the world,with over 40,000 students across arts, commerce, sciences, engineering, linguistic, ritual, medicine, agriculture, performing arts, law, management, and technology disciplines from all over the world. He was the vice chancellor of the Banaras Hindu University from 1919 to 1938. Malaviya was posthumously awarded the Bharat Ratna, India's highest civilian distinction, on 24 December 2014, a day before what would have been his 153rd birthday

मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ।
यह तीन लोकों से न्यारी काशी ।
सुज्ञान धर्म और सत्यराशी ।।
बसी है गंगा के रम्य तट पर, यह सर्वविद्या की राजधानी ।
मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ।।
नये नहीं हैं यह ईंट पत्थर ।
है विश्वकर्मा का कार्य सुन्दर ।।
रचे हैं विद्या के भव्य मन्दिर, यह सर्वस्रष्टि की राजधानी ।
मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ।।
यहाँ की है यह पवित्र शिक्षा ।
कि सत्य पहले फिर आत्मरक्षा ।।
बिके हरिश्चन्द्र थे यहीं पर, यह सत्यशिक्षा की राजधानी ।
मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ।।
यह वेद ईश्वर की सत्यवानी ।
बने जिन्हें पढ के ब्रह्मज्ञानी ।।
थे व्यास जी ने रचे यहीं पर, यह ब्रह्मविद्या की राजधानी ।
मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ।।
यह मुक्तिपद को दिलाने वाले ।
सुधर्म पथ पर चलाने वाले ।।
यहीं फले फूले बुद्ध शंकर, यह राजऋषियों की राजधानी ।
मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ।।
सुरम्य धारायें वरुणा अस्सी ।
नहायें जिनमें कबीर तुलसी ।।
भला हो कविता का क्यों न आकर, यह वाक्विद्या की राजधानी ।
मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ।।
विविध कला अर्थशास्त्र गायन ।
गणित खनिज औषधि रसायन ।।
प्रतीचि-प्राची का मेल सुन्दर, यह विश्वविद्या की राजधानी ।
मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ।।
यह मालवीय जी की देशभक्ति ।
यह उनका साहस यह उनकी शक्ति ।।
प्रकट हुई है नवीन होकर, यह कर्मवीरों की राजधानी ।
मधुर मनोहर अतीव सुन्दर, यह सर्वविद्या की राजधानी ।।

काशी हिन्दू विश्वविद्यालय
BANARAS HINDU UNIVERSITY

सुधीर कुमार जैन
कुलपति
Sudhir K. Jain
Vice Chancellor

January 09, 2023

MESSAGE

I am happy that the National Conference on Natural Sciences and Sustainable Development for Environment: Contestations and Affirmations (NSSECA-2023) will be held at the Mahila Maha Vidyalaya, Banaras Hindu University, Varanasi during 20-21 January 2023.

Science and technology have a very substantial impact on human existence and civilization in the modern world. Besides this, the necessity for sustainable development is always essential for maintaining natural harmony for advancing society so that people can live better lives. I understand that this conference will offer a forum for exchanging views on all facets of natural science as well as for discovering and filling knowledge gaps to promote modern science.

I welcome all the delegates and participants and wish all the best to the organizers.

(Sudhir K Jain)

Banaras Hindu University, Varanasi, 221005, U.P., India
Phone: +91-542-2368938, 2368339| E-mail: vc@bhu.ac.in | Website: www.bhu.ac.in

काशी हिन्दू विश्वविद्यालय
BANARAS HINDU UNIVERSITY

प्रो.अनिल कुमार त्रिपाठी, निदेशक, विज्ञान संस्थान
Prof. Anil Kumar Tripathi,
J C Bose National Fellow, FNA, FASc, FNASc, FNAAS
Professor, School of Biotechnology
Director, Institute of Science
Banaras Hindu University, Varanasi-221005

December 30, 2022

Message

I am delighted to know that the Mahila Maha Vidyalaya of Banaras Hindu University in Varanasi is going to organize a National Conference on Natural Sciences and Sustainable Development for Environment: Contestations and Affirmations (NSSECA-2023) during January 20-21, 2023. This conference is expected to bring together eminent scientists, upcoming researchers, and passionate undergraduate and graduate students in biological and physical science to jointly explore and evolve strategies to deal with the challenges in ensuring environmental sustainability.

This conference will offer a common ground for the development of research interfaces and may result in the development of comprehensive approach in finding solutions to the problems. The participation of researchers and students from the domains of Chemistry, Physics, Botany, and Zoology will make this conference truly multidisciplinary. The talks covering fundamental research as well as applications related to cutting-edge problems is expected to make the event useful for the new generation of researchers.

I compliment the organizers and convey my best wishes to the participants.

Anil K Tripathi

BHU
Email:director.inst.science@gmail.com
tripathianil@rediffmail.com
Website: www.bhu.ac.in
Varanasi 221005, UP, India
T : 91-542-2369670
T : 91-8887161518

काशी हिन्दू विश्वविद्यालय
BANARAS HINDU UNIVERSITY
ESTABLISHED BY PARLIAMENT BY NOTIFICATION NO. 225 OF 1916

प्रो0 मधूलिका अग्रवाल
संकाय प्रमुख, विज्ञान संस्थान,
काशी हिन्दू विश्वविद्यालय
PROF. Madhoolika Agrawal
Dean, Faculty of Science, BHU

No. I.Sc./ Dean/ 2022-23/ Dated: January 6, 2023

MESSAGE

We are delighted to hear that "National Conference on Natural Sciences and Sustainable Development for Environment: Contestations and Affirmations (NSSECA -2023)" is being organized by the Science Departments at Mahila Mahavidyalaya, BHU during January 20-21, 2023.

The main goal of this conference is to understand the contribution of science technology and innovation to sustainable development. This conference would bring together a large number of young people and provide them with a multidisciplinary form for interaction and discussion of new ideas/emerging concepts in the field of natural science with an emphasis on various environmental issues and probable measures to be taken for sustainable development.

I hope all participants will use this opportunity to meet new people and discuss the emerging issues in this very important area. The goal is to make new contacts for a growing network and long-lasting collaborations. I wish the NSSECA-2023, a grand success, and best wishes for the entire endeavour.

MAgrawal

(Dr. Madhoolika Agrawal)
DEAN
Faculty of Science

Varanasi - 221005, UP, INDIA
Mob. : 8004930513
E : dean_sci@bhu.ac.in
W : www.bhu.ac.in

Principal Message

It is a great pleasure for me to state that the Science departments of Mahila Mahavidyalaya is organizing an interdisciplinary conference on "National Conference on Natural Sciences and Sustainable Development for Environment: Contestations and Affirmations (NSSECA -2023)" during 20 – 21st January 2023.

As we know, there is a complex interaction exists between life forms, their environment, and advancement in the field of science and technology. The need of the day is to develop consensus and seek ways and means for achieving sustainability in all human activities. This conference being interdisciplinary would be extremely useful in understanding issues related to the environment and promoting research. I hope there will be fruitful creative discussion, exchange of ideas, and dissemination of knowledge among the learned delegates which will be for the benefit of all participants.

I would like to extend a warm welcome to this august gathering of participants including scientists, teachers, and students.

I wish the Conference a grand success.

Inu Mehta
12/01/2023
Prof. Inu Mehta
Principal

Varanasi 221005, UP, INDIA
T : 91-542-2367927
E-mail Id: principalmmvbhu@gmail.com

काशी हिन्दू विश्वविद्यालय BANARAS HINDU UNIVERSITY
AN INSTITUTION OF NATIONAL IMPORTANCE ESTABLISHED BY AN ACT OF PARLIAMENT

Dr. Neelam Srivastava
Professor of Physics
IQAC (MMV) Coordinator
Prof-in-Charge Training and Placement Cell (MMV)
Convener-NSSECA-2023

Message from Convener's Desk

Development is an inseparable part of humanity. We seek knowledge in attempting to improve our community through new research, yielding better instruments and techniques. However, to maintain our trajectory in the future, we need our research to factor in nature and the environment that harbours it. Thus, orienting research to sustainable development is an imperative need of time. It requires a cumulative multi-disciplinary effort from all spheres. The present conference is a step in this direction by bringing researchers from different disciplines to a common platform. It will help us understand the challenges in various fields, bolstering our attempt at sustainable research and development.

The organizing committee is thankful to all the eminent speakers for delivering Keynote and Plenary talks in their busy schedules. The number of participants quantifies a conference's success. We are happy to declare that besides eight keynote / plenary speakers, we have nearly 70 invited and contributed papers. I welcome all the researchers and hope that after this conference we will certainly identify some topics of common interest and start collaborative work for betterment of our society and mother nature in sustainable way.

With warm welcome and regards

Dr. Neelam Srivastava

BHU capital of knowledge

Varanasi-221005, UP, India
T: 05426701066, **M:** +919415424782
W: http://srivastavaneelam.weebly.com
E: neelamsrivastava_bhu@yahoo.co.in, neel@bhu.ac.in

काशी हिन्दू विश्वविद्यालय BANARAS HINDU UNIVERSITY

Dr Gautam Geeta J.

Assistant Professor

Zoology Department, MMV, BHU

Email: geeta2713@gmail.com Mobile No. 09415992482

Message from Convener's Desk

It is an honour to serve on the organising committee for the National Conference on Natural Sciences and Sustainable Development for Environment: Contestations and Affirmations (NSSECA-2023), which will take place on January 20 and 21, 2023, at the Mahila Mahavidyalaya, Banaras Hindu University. On behalf of the organising committee, I would like to extend a warm welcome to all of you at NSSECA 2023 and Banaras Hindu University, one of the most esteemed institutions of higher learning in the world.

In the modern world, science and technology significantly impact human life and civilization. Numerous fields, including health science, medicine, psychology, agriculture, climate change, mathematics, space technology, nuclear energy, and many others have benefited from their influence. However, to maintain environmental harmony and advance society and ensure that people can live better lives, sustainable development is always essential. This conference would offer a venue for exchanging thoughts on all facets of natural science as well as for discovering and closing knowledge gaps to improve science. To examine the techniques and difficulties encountered in the sustainable development of the environment, the current conference intends to bring together eminent scientists, budding researchers, and eager undergraduate and graduate students from biological and physical science. This conference will offer a common ground for the development of research interfaces and may result in a comprehensive approach to the problems encountered and potential solutions.

We are optimistic that the conference's discussions will be thought-provoking and that the sessions will address foundational research and applications as well as contemporary issues while also exploring pragmatic answers. We hope that the attendees will enjoy being a part of this significant future-oriented discussion and wish them a pleasant stay at BHU, Varanasi.

Dr Gautam Geeta Jiwatram

BHU capital of knowledge

Chief Patron:

Prof. S K Jain,
Honourable Vice Chancellor, BHU

Patrons:

Prof. Inu Mehta,
Principal MMV, BHU
Prof. Anil Kumar Tripathi,
Director Institute of Science, BHU
Prof. Madhoolika Agrawal,
Dean Faculty of Science, I.Sc., BHU

Conveners:

Prof. Neelam Srivastava
Dr. Gautam Geeta Jiwatram

Organizing Secretaries:

Dr. Usha Kumari
Dr. Swarn Lata Singh
Dr. Krishna Kumar Choudhary
Dr. Sandeep Kumar Singh Patel

Treasurer:

Dr. I Panneer Muthuselvam

Advisory Committee:

Prof. Sunita Singh
Prof. Bhaskar Bhattacharya
Prof. Nishi Kumari
Prof. Preeti Lahiri
Prof. Richa Raghuwanshi
Dr. Sailaja S. Sunkari

Organizing committee:

Dr. Surendra Gond
Dr. Subhashini
Dr. Anima Tripathi
Dr. Ganesh K. Maurya
Dr. Sachi Singh
Dr. Piyush Sonkar
Dr. Divya Kushwaha
Dr. Manasi Ghosh
Dr. Andrew L. Fanai
Dr. Awadhesh Kumar

NATIONAL CONFERENCE

on

NATURAL SCIENCES AND SUSTAINABLE DEVELOPMENT FOR ENVIRONMENT: CONTESTATIONS AND AFFIRMATIONS (NSSECA-2023)

(January 20 & 21, 2023)

Technical Program

Day -1

20th January 2023

8:00 – 9:00 am – Registration

9:00 AM-10:00 AM

Inaugural Session

Compering: Dr. Gautam Geeta J.

9:00 am: Floral tributes to Bharat Ratna Mahamana Pt. Madan Mohan Malviya ji

9:05 am: BHU Kulgeet by MMV Students

9:10 am: Welcome Address by Principal (MMV) Prof. Inu Mehta

9:20 am: About the conference by Prof. Neelam Srivastava (Convener NSSECA-2023)

9:30 am: Inaugural Address by Chief Guest Dr Nandita Singh

Consultant Scientist at NBRI, Lucknow

10:00 am: Presidential Address by Prof. Madhoolika Agrawal,

Dean (Faculty of Science), I.Sc. BHU

10.15 am: Formal vote of thanks by Dr. Usha Kumari (Organizing Secretary, NSSECA-2023)

10:15-11:00 am: High Tea

Session-1 **Chairperson: Prof Meenakshi Singh**		
11:00 AM - 11:45 PM	Keynote talk	Dr. S. Venkata Mohan, Senior Principal Scientist, IICT, Hyderabad Topic: **Waste fed Biorefineries for Sustainable Fuels and Chemicals**
11.45AM - 12:15PM	Plenary talk	Prof. Sanjeev K. Thakur Department of Botany, Central University of Punjab, Bathinda Topic: **STRATEGIES TO DEVELOP CLIMATE RESILIENCE IN CROP PLANTS**
12.15 PM - 1.30 PM	Poster Presentation	
1.30 PM-2.30 PM Lunch		
Session-2 **Chairperson : Prof. Sunita Singh**		
2.30 PM - 3.15 PM	Keynote talk	Prof. S. B. Agrawal, Department of Botany, Institute of Science, Banaras Hindu University, India Topic: **Understanding the response of Ozone pollution on Indian Crop plants, food security and human health**
3.15 PM - 3.45 PM	Plenary talk	Dr. Arvind Singh Geosciences Division, Physical Research Laboratory (PRL) Navrangpura, Ahmedabad Topic: **Ocean: a solution to the present climate crisis**
3.45 PM – 5.00 PM	**Tea Break and** **Poster Presentation**	
Day -2 **21th January 2023**		

8.00 AM-9.00 AM- Breakfast	
Session-3: Invited Lectures **Chairperson : Dr P. C. Abhilash**	
9:00 AM-11:30 AM – Invited talks	
9.00 AM-9.15 AM	Dr. K. Suresh. Surface & Environmental Control Plasma Lab, Department of Physics, Bharathiar University,Coimbatore Topic: **Degradation of Ofloxacin by MicroDischarge Plasma**
9.15 AM-9.30 AM	Ashok Manwani Indian Pearl Culture is Design Pearl Culture Topic: **Indian Pearl Culture is Design Pearl Culture**
9.30 AM-9.45 AM	Dr Prashant Singh Department of Botany, Banaras Hindu University, Varanasi, Uttar Pradesh-221005 Topic: **The case study of *Nostoc* and *Nostoc*-like taxa from the tropical and sub-tropical regions**
9.45 AM-10.00 AM	Dr. Syamli Singh Indian Institute of Public Administration Topic: **Sectoral Approach for Solid Waste Management and Water Management**
10.00 AM-10.15 AM	Dr. Bhanu Pandey CSIR-Central Institute of Mining and Fuel Research Topic: **Effects of air pollution and foliar dust deposition on trees around Jharia coalfield, India**
10.15 AM-10.30 AM	Dr. Rakesh Verma Department of Zoology, Banaras Hindu University Topic: **Protective Actions of Melatonin Against BPS Induced Testicular Dysfunctions**
10.30 AM-10.45 AM	Dr. Vijay Tripathi Department of Molecular Cellular Engineering

		SHUATS, Allahabad Topic: **Characterization of Rhizospheric and Endophytic Bacteria from Wastewater irrigated Tomato plants**
10.45 AM-11.00 AM		Dr. Hema Patel, Project officer, Technical Department, National Mission for clean Ganga Topic: **Toxicity assessment of Ordinary Portland Cement (OPC) solidified chemical sludge generated from textile wastewater treatment plants**
11.00 AM- 11.15 AM		Dr. Subhasish Roy Birla Institute of Technology and Science-Pilani, K K Birla Goa Campus Topic: **Bio-inspired Supramolecular Soft Materials**
11.15 AM- 11.30 AM – Tea Break		
Session-4 **Chairperson: Prof. Bhaskar Bhattacharya**		
11:30 AM-12:15 PM	Keynote talk	Prof. U. P. Singh KIT Bhubaneswar Topic: **Advances in Kesterite based thin film solar cells and Future Ahead**
12:15 PM-12:45 PM	Plenary talk	Dr. Pradeep Kumar Sharma Senior Scientist IITR, Lucknow Topic: **Elucidating the role of environmental endocrine disrupting chemicals in metastatic induction of hormone-dependent breast cancer cells**
1:00 PM-2:00 PM - Lunch		
Session-5 **Chairperson: Prof Nishi Kumari**		
2:00 PM-2:30 PM	Plenary talk	Prof. Kavita Shah,

		Institute of Environment and Sustainable Development, Banaras Hindu University Topic: **Unsustainable to Sustainability: Bridging scientific gaps with traditional know-how**
2.30PM- 3.00 PM	Plenary talk	Prof. Radha Chaube Department Of Zoology, Institute of Science, BHU Topic: **Heavy Metal toxicity modulates aromatase expression in the catfish *Heteropneustes fossilis***
3:00 PM-3:30 PM	Pre-valedictory Special Lecture **(Online)**	Mr. Sangeeth Kumar Parvatam Product Manager in the energy sector, exploring Nature Based Solutions to achieve zero carbon emissions, both for corporates and countries. He leads the Forests By Heartfulness initiative, helping with strategy, industry outreach, and collaboration with other NGOs.
4:00 PM-5:30 PM -Valedictory Function **Compering: Dr. Swarn Lata Singh**		
4:00 pm Floral tributes to Bharat Ratna Mahamana Pt. Madan Mohan Malviya ji 4:05 pm Welcome address by Prof Rita Singh, Senior most Professor MMV 4:10 pm Conference report by Dr Krishna Kumar Choudhary 4:20 pm Declaration of Poster Presentation Award 4:30 pm Address by Chief Guest Prof A. S. Raghubanshi Director, IESD,BHU 4:45 pm Feedback of Participants 4:55 pm Formal Vote of Thanks by Dr. Sandeep Kumar Singh Patel		
5:00 PM High Tea		

INDEX

IL 8	**Hema Patel**, Suneel Pandey, Davendra Pratap Mathuria	Toxicity assessment of Ordinary Portland Cement (OPC) solidifiedchemical sludge generatedfrom textile wastewater treatment plants
IL 9	**Nivedita Chaudhary**, Shailesh Kumar, Ashok Natwadiya, Naziya Tarannum	Qualitative assessment of dust deposition and responses of plants against dust pollution in kishagarh region of rajasthan
IL 10	**Prashant Singh**	The case study of nostoc and nostoc-like taxa from the tropical and sub-tropical regions
IL 11	**Subhasish Roy**	Bio-inspired supramolecular soft materials
P 1	**Mainak Ghosal** and Arun Kumar Chakraborty	Nanotitanium dioxide cement composite sand the benefits arising there of.
P 2	**Shubham Abhishek,** Bhanu Pandey	Phytostabilization of coal mine waste using lemongrass with different amounts of cow dung manure
P 3	**Anup Kumar Singh** and V. Sudhakar	Fabrication of multipurpose self-sanding hybrid scaffolds from laboratory waste silica hazards
P 4	Suman Kushwaha, **Anamika Chaudhari**	Fabrication, characterization and comparative analysis of dye-sensitized solar cell using natural dye extracts
P 5	**Anjali Yadav** and Shachi Singh	Enhancing bioactive phytochemicals and antioxidants capacity of seed sprout and wheatgrass (Triticumaestivum L.) by using salicylic acid.
P 6	**Bhargawi Mishra**, Geeta J. Gautam, VijayaNath Mishra	Accumulation of heavy metals in water, sediment and different fishes of river Ganga in Varanasi and its health risk assessment
P 7	**Parvati Madheshiya**, Supriya Tiwari	Interactive Effects of Elevated Ozone and Nitrogen Amendments on Antioxidants activities of lemongrass
P 8	**Tuhina Gayen**, Anchal Tripathi, Swati Mittal, Usha Kumari	Environmental relevant concentrations of aspirin induces stress response in the liver of juvenile *Labeo rohita*.
P 9	**Vishavjeet Singh** and Surabhi Mishra	Isolation and Screening of Microorganisms from fish gills
P 10	**NaziyaTarannum**, Shailesh, Ashok Natwadiya, Nivedita Chaudhary	Qualitative assessment of Dust deposition and Biochemical responses of selected trees against Air pollution in the mining and non-mining area of Kishangarh, Rajasthan
P 11	**Anchal Tripathi**, Tuhina Gayen, Usha Kumari, Swati Mittal	Sublethal concentrations of triclosan induce oxidative stress and neurotoxicity in the fish Cyprinus carpio

P 12	**Ankita Verma**, Rupendra Kumar Yadav and Deepak Kumar Gond	Dioecious Plant Diversity: Ecological Traits and their Conservation Status of Allahabad District, Uttar-Pradesh, India
P 13	**Anupriya Kumari** & Raghvendra Singh	A novel strain of Peroneutypa (Xylariales, Ascomycota) on Dalbergia sisso based on morpho-molecular studies
P 14	**Sagarika Pal** and Prashant Singh	Characterization of two cyanobacterial strains from the biodiversity-rich Northeast region of India by using polyphasic approach.
P 15	**Ashish Mishra**, Dr. Hema Singh	Effect of altered soil properties on the Plant Growth Attribute of Leucaena leucocephala seedlings
P 16	**Prakash Rajaka**, Hema Singh	The impacts of Invasive Mesquite (Prosopis juliflora) on the environment and human and animal health
P 17	**Rashmi Singh**, Alok Kumar Khare	Phenolic and Flavonoid Contents in the Seeds Extract of Most Commonly Consumed Fruits in India and Their Antioxidant Properties
P 18	**Sarika Sharma** and Shachi Singh	Evaluation of Withania somnifera L. Dunal seed germination at various phytohormone concentrations and its impact on enzymatic activity among the varieties
P 19	**Pooja Singh** and Krishna Kumar Choudhary	Field study responses of pearl millet (Pennisetum glaucum L.) cultivars HHB-272 and HHB-67 under elevated UV-B radiation
P 20	**Anupriya Kumari** & Raghvendra Singh	Characterization of Peroneutypa indica sp. nov. (Xylariales, Ascomycota) on host plant Dalbergia sisso based on polyphasic approach
P 21	**Madan Mohan**, Aadil Mansoori, Anirudh Kumar	Evolution of phytochemicals and antioxidant activity of Finger millet (Eleusine coracana) landraces.
P 22	**Jigyasa Prakash** and Madhoolika Agrawal	Modulation of growth and biochemical characteristics of Beta vulgaris L.under simulated acid rain.
P 23	**Suman**, Radha Chaube, and Gautam Geeta Jiwatram	Comparative effect of an environmental xenoestrogen 4-Nonylphenol on two species of Catfish and fresh water murrel.
P 24	**Amantika Singh** and Krishna Kumar Choudhary	Assessmentof morphological and biochemical aspects of Vigna radiata L.cultivars (HUM 1 and HUM 16) for agronomical yieldunderthe different levels of salinity
P 25	**Preeti Maiti**, Akansha Jain, B. K. Sarma	Effects of rice rhizosphere microbiome on some common cereal, legume, and oil seed crops
P 26	**Seema Dwivedi** and Shachi Singh	Elicitation ofPlumbago zeylanica L. by exogenous phytohormone to improve seed germination and plant growth

P 27	**Sreedevi.P.R** and K.Suresh	Characterization of Green mussel shell powder as a potential adsorbent of heavy metals
P 28	**Suman Kumari** and Sweta Singh	Synthesis of ambient pressure dried porous carbon aerogel via sol-gel Polymerization techniques
P 29	**Abhishek Kumar**, Thakur Prasad Yadav, M. A. Shaz, and N.K. Mukhopadhyay	Effect of hardness and microstructure on annealing the BCC phase based Ti16.67V16.67Mn33.32Co16.67Ni16.67 HEA
P 30	**Gopal K Gupta**, Sudesh Kumar Singh, Monika Srivastava, Sanjay Kumar Srivastava, and Amit Srivastava	Synthesis and electrochemical performances of NiFe2O4/rGO hierarchical nanostructure-based electrodes for hybrid supercapacitors
P 31	Gopal K Gupta, Sudesh Kumar Singh, Monika Srivastava, Sanjay Kumar Srivastava, and **Amit Srivastava**	A Facile synthesis of graphene quantum dots from Marigold flower for potential supercapacitor applications
P 32	**Deeksha Kumawat** and Sunita Mahavar	An experimental investigation of novel component materials of a single-sbasin solar still
P 33	**Vivek Kumar Pandey**	Onset and withdrawal of the Indian monsoon
P 34	Suman Kushwaha, **Aman Kumar**	Fabrication, characterization and comparative analysis of dye-sensitized solar cell using natural dye extracts
P 35	**Dipti Yadav**, Rakesh Kumar, Kanak Agarwal, Sanjeet, Neelam Srivastava	Harvesting Renewable Polymers for Energy Storage Materials
P 36	**Yogesh Kumar Yadav**, T. P. Yadav, M. A. Shaz	Synthesis of nanocrystalline high entropy alloy (HEA) in Al-Cu-Fe-Ni-Ti system through high energy ball milling
P 37	**Satrajit Dutta**	Trend Analysis of Energy Related Emission in India (1990-2020)
P 38	**Akanksha Dwivedi** and Rajesh Kumar Sharma	Responses of Eclipta albaL. a medicinal herb under Cd stress
P 39	**Shreya Bhowmick**, Dheeraj Kr. Singh, Swarnendu Bhattacharya and Subhadeep Halder	Climate change impact on Soil Moisture and Groundwater in India: Local versus remote feedbacks and implications
P 40	**Amritasen Yadav**, Prof. Kalpna Gupta	Food security and agroecosystem
P 41	**Devesh Vishwakarma** and Shikha	Biopolymer-based adsorbents and their application in wastewater treatment: a review

P 42	**Sameer Shekhar**, Bhanu Pandey, Siddharth Singh, Lal Babu Roy, Reddi Ganesh, Ranjeet Kumar Singh	Monitoring of particulate and gaseous pollutants and future predictions for mica, feldspar and quartz mining project using fugitive dustmodel
P 43	**Annesha Ghosh** and S.B. Agrawal	Assessing the efficacy biochar generated from biomass on reducing the phytotoxicity caused by exposure to tropospheric ozone in an indian wheat cultivar
P 44	**Narvdeshwar,** Angesh Kumar Maurya and Piyush Kumar Sonkar	Carbon nanotubes integrated nickel dimethylglyoxime based composite for glucose sensor
P 45	**Mausami**, Bani Mahanti	Neutral cyclometalated ir(iii) complexes
P 46	**Pratibha Gaurav**, Suman, Gautam Geeta Jiwatram	Identification and Characterization of Plant Extract Having Ameliorative Effect on the Effects Caused by Endocrine Disruptor
P 47	**Arunima**, Swati Mittal, Usha Kumari	Epidermal keratinization and mucous secretion in a hill stream fish hara hara
P 48	**Sandeep Kumar Chauhan**, S. K. S. Patel	Synthesis, structural and magnetic characterization of Nd-doped BiFeO3 nanorods
P 49	**Prabha Kushwaha** and Vivek Kumar Pandey	Seasonal variability of the Arabian Sea and its impact on seasonal changes of the upper ocean characteristics using Regional Ocean Model System
P 50	**Yogesh Kumar Yadav**, T. P. Yadav, M. A. Shaz	Synthesis of nanocrystalline high entropy alloy (HEA) in Al-Cu-Fe-Ni-Ti system through high energy ball milling

WASTE FED BIOREFINERIES FOR SUSTAINABLE FUELS AND CHEMICALS

S Venkata Mohan
Chief Scientist and Abdul Kalam Technology Innovation National Fellow
Bioengineering and Environmental Sciences Lab, Department of Energy and Environmental Engineering, CSIR-Indian Institute of Chemical Technology (CSIR-IICT), Hyderabad – 500 007, India
E-mail: svmohan@ict.res.in; vmohan_s@yahoo.com

Abstract

Climate change issues, unsustainable consumption of materials and waste generation are prompting to a gradual shift from a fossil-based linear economy to a circular economy. To meet our energy and material needs, renewable and sustainable resources are essential. Cradle to cradle approach offers a sustainable and green path to utilize waste through decarbonization pathways to produce bio based products analogous to the Petro-based refinery. This communication will provide an overview of bio refinery systems in the framework of the circular economy keeping waste in the nexus of water-food-energy that can positively impact the resilience of ecosystem services and climate change issues. The scope of implementing 'circular loops' that strategically direct the flow of resources, their use, extracting value in the form of nutrients, energy and materials post-consumption within the system will be discussed. Optimized integrations of unit operations across closed loops with process intensification in the context of resource recovery efficiency will be discussed by discussing bio hydrogen production at the focal point.

UNDERSTANDING THE RESPONSE OF OZONE POLLUTION ON INDIAN CROP PLANTS, FOOD SECURITY AND HUMAN HEALTH

S. B. Agrawal
Emeritus scientist (CSIR), Department of Botany, Institute of Science, Banaras Hindu University, Varanasi – 221 005, U.P., India

Abstract

Tropospheric ozone (O_3), a secondary air pollutant and amajor greenhouse gas, has already been recognized as a prime component of predicted global climate change. Numerous studies have confirmed the negative impact of O_3 on agricultural productivity throughout the world. Ozone, a strongoxidant, enters plants through the stomata where it can bedissolved in the apoplastic fluid. Ozone can directly react withthe plasma membrane through “ozonolysis” or it can beconverted into reactive oxygen species (ROS), which can alter the major cellular functions causing celldeath, premature senescence, and also the up-or down-regulation of specific genes. Like other tropical countries, India is also severely threatened by O_3 pollution. Our studies with major crops, i.e. rice, wheat, soybean, linseed, etc., clearly established the damaging effect of O_3 on the Indian scenario. The yield of all the crops was significantly decreased under ambient levels of O_3; however, the reduction was increased by many folds with an elevation of O_3 levels. Distinct foliar injuries were also observed in O_3-exposed plants. Different growth parameters, like – shoot height, root height, the total number of leaves, leaf area, NAR, RGR, etc. were also affected. Plants, generally possess a vast array of anti-oxidants to cope with prevailing ROS; however, under O_3 stress, the amount and activity of those anti-oxidant molecules were induced by many times, irrespective of the nature of the plants. Even the reproductive structures like viable floral composition, viability, and germination of pollen grains were also affected under O_3 stress. RAPD analysis demonstrated that O3 severely affected the ‘genome template stability’ (GTS) in all the studied plants, and acted as a potent mutagen. In-depth proteomics analysis; through 1-DGE, and 2-DGE coupled with protein sequencing, and immuno-blotting; again, revealed that major photosynthetic proteins, like – RuBisCO, RuBisCO activase, O_2 evolving protein; primary metabolism-related proteins were highly affected under O_3 stress; whereas, defense /stress-related proteins were induced. Physiological traits; especially stomatal conductance in plants, act as a very important parameter under O_3 exposure and control the overall gaseous exchange; hence deciding the crop cultivar's sensitivity. Recently, it is speculated that O_3 pollution has become a serious threat to India’s food security. The order of sensitivity in major crops is wheat>mustard>rice>maize under ambient O_3 concentration. Results obtained so far would definitely helpin selecting suitable resistant cultivars of crop plants to get optimum growth, and yield and also in strengthening the knowledge of the molecular mechanism of action of O_3.

Ozone is highly reactive and oxidative gas that induces adverse effects on human health, including mortality and morbidity. Studies have shown that O_3 exposure has affected the respiratory system, cardiovascular system, reproductive system and nervous system and can ultimately cause mortality depending upon age and pre-health conditions.

ADVANCES IN KESTERITE BASED THIN FILM SOLAR CELLS AND FUTURE AHEAD

Udai P Singh
Center of Excellence in Thin Film Materials and Solar cells
School of Electronics Engineering,
Kalinga Institute of Industrial Technology (Deemed to be University)
Bhubaneswar-751024 (India)
*singhup@kiit.ac.in

Abstract

In thin film solar technology, Kesterite (Cu_2ZnSnS_4) based absorber layer is one of the most attractive technology due to non-toxicity, earth abundant and environmental friendly. It is a P-type direct band gap material with high absorption coefficient (>10^4 cm^{-1}). The band gap of Kesterite material can be varied between 1 to 1.5 eV with the variation in Se and S in the composition of CZTSSe. Kesterite material is also flexible with the deposition technique. It can deposited by several vacuum and non-vacuum technique. The maximum power conversion efficiency obtained at lab scale is 12.6% reported in 2014 using Hydrazine-Based solution technique. It has to go long way to compete with established CIGS and CdTe based thin film solar cells.

Several studies have happened to increase the efficiency beyond 12.6%, with no success to break the barrier of 12.6%. The challenging task is to control the growth and defect formation during absorber formation. Fluctuations in composition lead to the formation of intrinsic point defects (anti-sites, vacancies and interstitials) and deep level defects in the Kesterite material resulting in degradation in the $V_{oc}$and carrier lifetime.

To increase the efficiency of the CZTS/Se based solar cell, many researchers started doping and alloying with different element to improve its electrical, electronic, interface and charge transport properties.

There has been attempts to fabricate Kesterite based thin film solar cells on flexible substrate with a limited efficiency, maximum efficiency reported on flexible substrate (stainless Steel) is 10.3%.

In the present presentation, we will discuss the advancement and limitation of Kesterite based thin film solar cells and its future prospects.

Keywords: Kesterite based solar cells, Thin-film, Efficiency, Defects, flexible substrates

UNSUSTAINABLE TO SUSTAINABILITY: BRIDGING SCIENTIFIC GAPS WITH TRADITIONAL KNOW-HOW

Kavita Shah

Environmental Biotechnology, Lab No. 6, Institute of Environment and Sustainable Development, Banaras Hindu University, Varanasi 221 005

Abstract

When current advancement is made at the expense of future generations, this results in unsustainable development. Improper planning and resource exploitation can degrade the environment and harm ecosystems by producing waste and pollution. Such actions cannot be sustained over time. The idea of sustainable development is not new but a concept long inherited in Indian culture, traditions and practices. Living in peace with nature requires being fully aware of the needs of not only ones own self but of every other species with whom we interact. Sustainable development therefore, is a dynamic process that enables everyone to reach their potential and improve their quality of life while also preserving and enhancing the planet's natural ecosystems. A sustainable development plan is inherently eco-friendly and has the ability to withstand sudden changes in the present and the future. It is the socio-political development which is key to sustainable development programmes that gives equal consideration to all societal groups while promoting both economic growth and environmental protection. Additionally, a source of identity, invention, and creativity for everyone, culture is also crucial to human growth because it offers long-lasting answers to regional and global problems. It is a catalyst and driver of sustainable development and is essential to such programmes. Cultural tools can be employed to safeguard the environment from indiscriminate use of natural resources, deforestation, erosion, bushfires, desertification, and natural disasters. The understanding of a conceptual framework on how sustainability prevailed in India and how it has been imbibed by us making it an integral part of our traditions and cultural practices. This needs revisiting and is important for future management of natural wealth and ecosystem.

Key-Words: Culture, Development, Ecosystem, Sustainable, Tradition

STRATEGIES TO DEVELOP CLIMATE RESILIENCE IN CROP PLANTS

Sanjeev Kumar

Department of Botany, Central University of Punjab-Bathinda 151401

Abstract

Zero hunger and climate change are important and interlinked UN Sustainable Development Goals. Although an agricultural reliant country where ~58 % population rely upon agriculture sector, India still ranks 107 out of 121 in global hunger index. The climate change is a long-time effect but frequent episodes of heat wave, floods, snowstorms has become a problem in curtailing the crop production worldwide. The surface temperature of our planet has increased 1.1°C,carbon dioxide to 400ppbin last one century consequently the ice layers are melting, and sea level is increasing. The most affected place on earth where climate change is quite visible is Third Pole, which comprise of 100,000^{2}Km of glaciers feeding river systems and lakes. The northwestern part of India is relying upon these glaciers for drinking and irrigation water as their melting coincides with the crop development. Regular episodes of heat have devastating impact on the crop plants, especially Wheat. UNEP has given six-sector solution which can reduce carbon dioxide emission and limit the rise in temperature. The biggest challenge is to feed ~1.41 billion of population, which is expected to surpass China in 2027, therefore, climate resilient crops are needed to meet the global food security and Sustainable Development Goals. We need sustainable agricultural practices with changing climate for sustainable development and to manage the Zero hunger. To understand climate resilience in crop plants, multi-omics strategy, harnessing traits from landraces and crop improvement using modern breeding tools along with efficient agronomic practices are ahead challenges to fulfill the future food requirements. Our lab is involved in developing a potential agronomic practice by exposing plants to drought stress and induce plant defense against incoming chilling and/or high temperature stress in Chickpea and wheat. Targeted transcriptomics and metabolomics techniques are being employed to decipher the cross-tolerance response mechanisms.

Keywords: Climate Change, High Temperature, Resilience, Multi-omics, Crops

OCEAN: A SOLUTION TO THE PRESENT CLIMATE CRISIS

Arvind Singh

Geosciences Division, Physical Research Laboratory (PRL), Navrangpura, Ahmedabad

Abstract

It is becoming increasingly clear that over the coming decades we might need reservoirs that can store up to trillions of tons of carbon dioxide (CO2) emitted from the anthropogenic emissions, which would otherwise pose a serious threat to climate and ecosystems if it were left in the atmosphere. Based on our understanding of the intense chemical weathering resulting in global cooling at times in the geological past, it has been proposed that the enhanced ocean alkalinity through large scale mineral dissolution has potential to provide a solution to store large amount of CO2 in the ocean. Mineral dissolution will lead to a change in the ocean carbonate chemistry equilibrium towards bicarbonate; and carbonate; (i.e, increase in alkalinity) so that additional CO2 from the atmosphere could be dissolved and stored for a long time (>1000 years?) in the ocean. It may be possible to sequester up to trillion tons of carbon without surpassing present day carbonate saturation states in the ocean. In turn, the impacts of elevated alkalinity will be potentially small and may even help to reduce the effects of ocean acidification on microbial ecosystem but these aspects have not been tested experimentally. In addition, the local impacts may still be acute but will be dependent on the quantity and the type of minerals to be used. In this talk, I shall discuss the concept of ocean alkalinity enhancement and its potential impacts on ocean biogeochemical cycling

ELUCIDATING THE ROLE OF ENVIRONMENTAL ENDOCRINE DISRUPTING CHEMICALS IN METASTATIC INDUCTION OF HORMONE-DEPENDENT BREAST CANCER CELLS

Pradeep Kumar Sharma, **and Mohammad Imran Ansari**

Food Drug and Chemical Toxicology Group, CSIR-Indian Institute of Toxicology Research, Vishvigyan Bhawan 31, MG Marg, Lucknow-226001, Uttar Pradesh

Abstract

Currently, hormone-dependent cancers are among the most frequent malignancies in males and females across the globe. Metastatic breast cancer is a major concern among clinicians and researchers as it is associated with the majority of cancer-related deaths in women. Among the several risk factors, environmental exposures to chemicals those having endocrine disruptive potency are highly suspected as a risk factor in the breast malignancies. Given that up to 70% of breast cancers are estrogen sensitive, there remains a considerable interest in studying the role of environmental endocrine disrupting chemicals (EDCs) in carcinogenesis of estrogen-sensitive breast cancers. Moreover, humans are exposed to these low dose EDCs or their mixture almost on a daily basis for their lifetime. However, studies that deals with therepeated exposure of EDCs and their effect onmetastasis progression inbreast cancer are scarce. Our study showed that a repeated exposure of bisphenol A (BPA; a well-studied EDC) induces metastatic changes in hormone-sensitive human breast cancer (MCF-7) cells at environmentally relevant concentrations. Besides cumulative estrogenic effects, the repeated treatment of BPA enhanced the migration and invasion potentialvia epithelial-to-mesenchymal transition (EMT), and enhanced the expression of several key mesenchymal proteins. Most importantly, these plasticity changes were stable and did not reverse even in the absence of BPAin the culture media. Repeated exposures to BPA altered metabolic pathways where PGC-1α mediated mitochondrial biogenesis played a key role in survival as well as in EMT. Interestingly, the siRNA-mediated knockdown of PGC-1α suppressed BPA-induced proliferation, EMT changes and mitochondrial biogenesis in MCF-7 cells. Overall, a repeated exposure to EDCs like BPAmay result in the stablemetastatic plasticity and aggression in hormone-sensitive breast cancercells via PGC-1α signaling.

Keywords: Breast Cancer, Metastasis, Bisphenol A, Endocrine disruptors, Epithelial-to-mesenchymal transition, PGC-1α

BIODIVERSITY AND ITS CONSERVATION – AS A CITIZENS MOVEMENT

Sangeeth Parvatam

Heartfulness Institute (http://heartfulness.org/)

Forests By Heartfulness (https://heartfulness.org/forests/)

Sangeeth Parvatam, Heartyculture Nursery, Kanha Village, Nandigama Mandal,
Rangareddy Dt, Telangana 509325
email: Sangeeth.p@volunteer.heartfulness.org

Abstract

Biodiversity and its conservation – As a Citizens movement we often hear about animal species going extinct, but rarely do we hear about grasses, shrubs, tree species going extinct, unless you're a botanist yourself. Species loss among flora is happening at an alarming rate and the reasons are many including climate change, soil degradation, unsustainable harvesting, human developmental activities. At Heartfulness Institute, we have been working on conserving several species which have fallen in the vulnerable, endangered, and critically endangered list of IUCN. This initiative is named "Forests By Heartfulness". This work is through a series of interventions which are categorized under seven archetypes of projects. The speaker will also discuss various financing models for biodiversity conservation and restoration of degraded ecosystems.

HEAVY METAL TOXICITY MODULATES AROMATASE EXPRESSION IN THE CATFISH HETEROPNEUSTES FOSSILIS

Radha Chaube
Department of Zoology, Institute of Science, Banaras Hindu University, Varanasi-221005
Email i.d: chauberadha@rediffmail.com

Abstract

Heavy metal toxicity in aquatic ecosystem is one of the most important deleterious contaminants. Aquatic organisms are potential bioindicators towards assessment of impact of heavy metal pollution through anthropogenic activity.Heavy metals are reported to cause reproductive disruption in fish, inhibiting induction of vitellogenin, delaying oogenesis, enhancing luteinizing hormone secretion, declining parameters of gonadal somatic index and ovulation in fish.Heavy metal toxicity in fish organs, tissues, and cells have been extensively researched. Accumulation of heavy metals in fishes also have toxic effects on consumers. Fish are one of the most widely spread species in the aquatic environment, and they are more vulnerable to heavy metal contamination. Heavy metal exposure leads to disruption in fish reproduction and hormonal homeostasis. In the present talk, I will be dealing with the study conducted in catfish *Heteropneustes fossilis* under metal exposure conditions. Estrogens are C-18 female hormones involved in various aspects of sexual differentiation, gonadal growth and development, reproductive behaviour and hepatic synthesis of yolk proteins.Endocrine disrupting chemicals (EDCs) can alter normal patterns of gene expression either by direct (steroid hormone receptor-mediated pathways) or compensatory effects.One mechanism for disrupting the steroidogenic pathway is to alter activity or expression of genes encoding for specific enzymes as the gene encoding for aromatase (Cyp19 or P450arom). Up-regulation of aromatase expression by EDCs (Heavy metals) in brain could be correlated to its actions in neuroprotection, repair of neurons, induction of neurogenesis and regulation of behaviour by increased synthesis of neuroestrogens in teleost brain. Down-regulation in brain may be correlated to neurotoxicity by EDC.Down-regulation of aromatase expression by EDCs (heavy metals) in the gonads could be correlated with the impairment of steroidogenesis pathway and steroid hormone levels and induction of histopathological changes. Up regulation in gonad may be correlated to estrogenic effect of EDC.

Acknowledgement: Partial funding of BHU-IOE to RC is acknowledged.

DEGRADATION OF OFLOXACIN BY MICRO DISCHARGE PLASMA

N. Thirumurugan[1], S.R. Varshaa[1], S. Yugeswaran[2], and K. Suresh[1]*

[1]Surface & Environmental Control Plasma Lab, Department of Physics,
Bharathiar University,Coimbatore–641046, India
[2]Applied Thermal Plasma Laboratory, Department of Physics,
Pondicherry University, Puducherry-605014, India

Corresponding author: ksureshphy@buc.edu.in

Abstract

Pharmaceutical compounds aredetected in water bodies throughout the world, mainly due to the discharge of untreated waste water from pharmaceutical manufacturers, hospitals and laboratories. Conventional waste water treatment procedures are not efficient enough to degrade pharmaceutical compounds, especially antibiotics like Ofloxacin ($C_{18}H_{20}FN_3O_4$). Persistence of theseantibiotics in water sourcesleads to emergence of drug-resistant microbial strains causing health risks. Degradation of Ofloxacin in solution at different concentrations (20, 30 ppm etc) was carried out by micro discharge plasma (MDP) method.Air was used as the plasma forming gasand was passed through capillary needles placed just above the surface of antibiotic solution.The optical emission spectrum revealed the formation of OH radicals during the interaction of plasma with liquid.UV-Vis spectroscopy was used to determine the concentration of dye in solution.The percentage of degradation increased as the plasma treatment time was increased.Reactive oxygen and nitrogen species (ROS& RNS) formed during MDP degraded Ofloxacin in solution. Complete degradation was attained within 13 mins of treatment for20-ppm Ofloxacin using air MDP.Total organic carbon analysis revealed a high percentage (48%) of mineralization. The findings show that MDP is an effective method for degrading complex pharmaceutical compounds.

Keywords: Non-thermal Plasma, Microplasma, Ofloxacin, Degradation, Reactive species

Acknowledgement: This work was supported by TANSCHE-RGP (File No. RGP/2019-20/BU/HECP-0019) from Tamilnadu State Council for Higher Education, India.

CHARACTERIZATION OF RHIZOSPHERIC AND ENDOPHYTIC BACTERIA FROM WASTEWATER IRRIGATED TOMATO PLANTS

Vijay Tripathi

Department of Molecular and Cellular Engineering
Jacob Institute of Biotechnology and Bioengineering
Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj
Email: vijay.tripathi@shiats.edu.in

Abstract

The aim of this study was to distinguish culturable rhizosphere and endophytic bacterial isolates isolated from rhizosphere soil and roots of tomato plant irrigated with industrial and municipal wastewater in terms of resistance to heavy metals and their plant growth promoting (PGP) traits. Results illustrated that both rhizosphere isolates and endophytic ones had various PGP characteristics in terms of both the number and the production amount of these characteristics. A substantial number of the bacterial isolates (both endophytic isolates and rhizosphere isolates) were tolerant to multi heavy metals bacteria. Compared to endophytic isolates, rhizosphere isolates had greater resistance to heavy metals. Based on comparison of 16S rRNA sequences and biochemical tests, the effective isolates, based on having multiple PGP characteristics and higher resistance to heavy metals, were identified. Isolates EN1, EN2, EN3 and RM1, RM2, RN3, RN4, RS5, RN6 and R7N were closely related to *Bacillus* and ***proteus mirabilis***, respectively. In addition, the ability of rhizosphere strain RN4, as a high range of PGPR activity Therefore, it can be concluded that tomato plant irrigated with industrial and municipal wastewater harbors heavy metals-resistant bacteria and may be potential reservoirs for isolating bacteria effective at alleviating heavy metal stress in the plant, reducing accumulation of heavy metals in crops (bioremediation of heavy metal-contaminated soil).

HYDROGEN: THE ULTIMATE CLEAN AND SUSTAINABLE ENERGY

T.P. Yadav[1,2]

[1]Department of Physics, Faculty of Science, University of Allahabad, Prayagraj- 211 002, India
[2]Hydrogen Energy Centre, Department of Physics, Banaras Hindu University, Varanasi- 221 005, India
*Corresponding Author Email: yadavtp@gmail.com

Abstract

Energy is an important part of human life; however, the world is facing an energy crisis due to exponential population growth and limited availability of fossil fuels. It needs essential attention about its availability, therefore, solving this energy demand using more efficient or clean alternative energy sources will not only save the planet from harmful effects caused by pollution but could also reduce disparity and create a more peaceful world. For India, increase in population is another reason for increasing the fast required quantity of energy. Nanomaterials, one of the most important materials nowadays such as nanoparticles, nanotubes and 2D materials have been proposed as catalysts for energy generation and storage because of their extraordinary properties and ease of production. Quasicrystals are complex in nature having transition metal elements and it has been difficult to gain atomic scale understanding of catalytic activity of the quasicrystals. In order to achieve this information, we have attempted to create a simple model catalyst of two-dimensional layers of nanoparticles on quasicrystalline surfaces by leaching well defined surfaces of single grain quasicrystals. As the first step of these studies, we present here the effect of leaching treatments on surface morphology and chemical composition of different Al-based quasicrystals studied by scanning electron microscopy (SEM), energy dispersive x-ray (EDX) analysis and x-ray photoelectron spectroscopy (XPS). The high symmetry surfaces of single grain icosahedral (i)-Al-Cu-Fe and decagonal (d-) Al-Ni-Co, (d)Al-Cu-Co quasicrystals and a polygrain (i)-Al-Pd-Re, (i)-Al-Cu-Fe, (i)-Al-Pd-Mn quasicrystal with random surface orientation were leached with NaOH solution at varying times and the resulting surfaces were characterized by scanning electron microscopy, energy dispersive x-ray analysis and x-ray photoelectron spectroscopy. The leaching treatments preferentially remove All producing nanoparticles of the transition metals and their oxides. The leached fivefold surface of i-Al-Cu-Fe exhibits micron sized dodecahedral cavities on which the nano-particles are precipitated. However, no specific microstructure has been observed on the tenfold surface of d-Al-Ni-Co and the polygrain i-Al-Pd-Re. Quasicrystalline surface can be regained after polishing the leached layer, indicating that leaching occurs only in a limited depth from the surface. The use of such 2-D nanomaterials for hydrogen production will be discussed and presented in detail, explaining how their remarkable properties can enhance the efficiency of hydrogen production and storage. The 2-hour leach as grown and mechanically activated Al-Cu-Fe layer materials was subjected for catalyst application in hydrogen storage materials for MgH_2. The catalytic effect of leached alloy on the de/rehydrogenenation characteristics has been studied. The hydrogenation behaviour including absorption kinetics will be discussed and presented in detail.

Keywords: 2-D nano-materials; quasicrystal; hydrogen production; hydrogen storage.

INDIAN PEARL CULTURE IS DESIGN PEARL CULTURE

Ashok Manwani
indianpearlculture@yahoo.com
Kulanjan Dubey Manwani 9860661174 loinkrd@yahoo.com

Abstract

Indian Pearl Culture - The farmer progressing towards Pearl farming along with fish farming - benefit of simple innovative tools - the effects of more than 20 years of awareness - double income from Pearl farming - using the dead mussels available in the villages to make innovative handicraft items and the farmer/innovator progressing towards revolutionary triple income source.

Target Natural Pearl Farming till 2030.




SECTORAL APPROACH FOR SOLID WASTE MANAGEMENT AND WATER MANAGEMENT

Shyamli Singh and Anugya Singh

Indian Institute of Public Administration (IIPA), I.P. Estate, New Delhi, India

Abstract

Rapid urbanization, poor solid waste management and inadequate maintenance of water can lead to flooding, water scarcity, water pollution, adverse health effects and rehabilitation costs that may overwhelm the resilience of cities. Cities face significant difficulties as a result of these megatrends, as the cost of inactivity is considerable. A capacity building programme was conducted with a purpose to be a strategic step in building the capacity of Urban Local Bodies (ULBs). The objective of the study was to assess the impact of the capacity building programme conducted for urban local body officials on solid waste and water management. The study focuses on the practices being followed by the urban local bodies in Ganga basin states in terms of solid waste and water management. It further highlights the gaps which must be addressed in relation to the aforementioned topics.

Key Words: Impact Assessment, Urban Local Body, Solid Waste Management, Water Management, Ganga Basin

EFFECTS OF AIR POLLUTION AND FOLIAR DUST DEPOSITION ON TREES AROUND JHARIA COALFIELD, INDIA

Bhanu Pandey*, Siddharth Singh, Sameer Sekhar, Lal Babu Roy, Reddy Ganesh

CSIR-Central Institute of Mining and Fuel Research, Barwa Road, Dhanbad-826001, Jharkhand

*bhanubot@gmail.com

Abstract

Jharia Coal Field (JCF) in Jharkhand has large quantities of high-grade coking coal. The conventional coal fuel cycle threatens health, pollutes air and water, degrades land, and contributes to climate change. Ambient concentrations of SO2, NO2, and PM levels were determined around JCF. Heavy metal concentrations (in PM10) varied temporally and spatially around coal mines. Cluster analysis explained pollutant distribution and spatial changes. Principal component analysis was used to identify major air pollution sources in the area. Coal mining and active mine fires were the primary contributors to air pollution in Jharia, followed by vehicle emissions and wind-blown dust from unpaved roads. The current study also assessed the responses of tree species to air pollution in the Jharia coalfield. Sensitive species were more vulnerable due to foliar dust deposition and foliar sulphate content, which altered stomatal conductance, superoxide dismutase activity, and ascorbic acid. Maximum dust deposition was seen for *Ficus benghalensis* and *Butea monosperma*, and minimal deposition was observed for Adina cordifolia. Leaf extract pH showed minimal fluctuation because maximum dust accumulation in *Ficus benghalensis* reduced stomatal conductance, which in turn reduced the flux of other acidic gaseous pollutants. However, increased stomatal conductance in *Adina cordifolia* and *Aegle marmelos* let acidic pollutants into the plants, which in turn altered photosynthesis and caused membrane damage, among other detrimental effects. *Ficus religiosa*, *Ficus benghalensis*, and *Butea monosperma* show less fluctuation in their physiological and morphological characteristics across sites and seasons, indicating that they have adapted well to the heavy pollution levels found in areas around coal mines. Increases in chlorophyll content and relative water content were observed in more adaptable tree species, which also showed greater resistance to changes in leaf extract pH due to efficient sulphate metabolism.

Keywords: Jharia Coal Field, Atmospheric pollution, Heavy metals, Dust deposition, Stomatal conductance

PROTECTIVE ACTIONS OF MELATONIN AGAINST BPS INDUCED TESTICULAR DYSFUNCTIONS

Rakesh Verma*, Jitendra Kumar and Chandana Haldar

Department of Zoology, Banaras Hindu University, Varanasi-221005, India
(*presenting and corresponding author email: rakeshverma2527@bhu.ac.in)

Abstract

BPS has a potential risk to human reproductive health and emerged as an environmental contaminant worldwide. In the present study, we investigated the ameliorative efficacy of melatonin from BPS-induced testicular oxidative stress and associated damages. The adult male golden hamsters were randomly selected and divided into four groups. Group I-Control (Vehicle treated), Group II-Melatonin treated, Group III-BPS treated and Group IV-Melatonin plus BPS treated. We documented that melatonin treatment to BPS exposed hamsters normalized testicular histoarchitecture, sperm parameters (sperm number and viability). Melatonin administration increased serum testosterone along with its respective receptor (AR) and normalizes the spermatogenesis. Melatonin treatments eliminate testicular oxidative load by improving testicular antioxidant status and thereby, decrease in lipid peroxidation as confirmed by the reduction in the MDA concentration. Further, melatonin also stimulated the testicular antioxidant markers (Nrf-2/HO-1, SIRT-1/FOXO-1) expression to enhance testicular antioxidant enzymes (SOD and Catalase) activities and hence mitigated BPS induced oxidative load. Melatonin treatments decrease testicular NF-kB/COX-2 expression to alleviate BPS-induced inflammatory load. The protective actions of melatonin were further evidenced by increased germ cell proliferation (PCNA), survival (Bcl-2), gap junction (connexin-43), and decreased apoptosis (caspase-3). Thus, our study documented the detrimental effects of BPS on testes that compromised male reproductive health and melatonin was found to be a potent molecule that rescued the BPS induced testicular damages.

Keywords: Environmental toxin, testes, redox/ inflammation homeostasis, melatonin, reproductive health

TOXICITY ASSESSMENT OF ORDINARY PORTLAND CEMENT (OPC) SOLIDIFIEDCHEMICAL SLUDGE GENERATEDFROM TEXTILE WASTEWATER TREATMENT PLANTS

Hema Patel[1*], Suneel Pandey[2], Davendra Pratap Mathuria[3]

[1]Project Officer (Technical), National Mission for Clean Ganga, Ist Floor, Major Dhyan Chand National Stadium, India Gate, New Delhi -110002

[2]Dr Suneel Pandey, Director, Environment & Waste Management, The Energy and Resources Institute (TERI), India Habitat Centre, New Delhi, India

[3]Executive Director (Technical), National Mission for Clean Ganga, Ist Floor, Major Dhyan Chand National Stadium, India Gate, New Delhi -110002

***Corresponding author**

Present address: National Mission for Clean Ganga, Ist Floor Major Dhyan Chand National Stadium, India Gate, New Delhi -110002, INDIA

Abstract

The management of chemical sludge generated from physicochemical treatment of textile dyeing wastewater is a major challenge. The stabilization/solidification of chemical sludge was carried out to explore its reuse potential in the construction materials. Ordinary Portland Cement (OPC)was selected as the binder system. In this paper, a short term, static, acute toxicity bioassay method recommended by Central Pollution Control Board (CPCB) was used to assess the toxicity in the Toxicity Characteristics Leachate Procedure (TCLP) leachate of untreated and treated sludge samples. The dilution factor of the test solution with the highest concentration of effluent in which all fish survive was recorded in rounded numbers as T_F. The analytical results show that the Toxicity factor for untreated sludge was found to be 4 and after treatment, Toxicity factor ranged between 1-2. Therefore, the treated samples were meeting the leachate quality criteria as prescribed by CPCB.

Keywords: Textile, chemical sludge, toxicity, fish bioassay, solidification

QUALITATIVE ASSESSMENT OF DUST DEPOSITION AND RESPONSES OF PLANTS AGAINST DUST POLLUTION IN KISHAGARH REGION OF RAJASTHAN

Nivedita Chaudhary*, Shailesh Kumar, Ashok Natwadiya, Naziya Tarannum

[1]Department of Environmental Science, School of Earth Sciences, Central University of Rajasthan, Ajmer, Rajasthan

*Corresponding author: nivedita@curaj.ac.in

Abstract

Urbanization, industrialisation, mining activities, desert dust, and inefficient waste management during building activities are all some of factors that contribute to dust pollution. Bio-physiological changes in plants may indicate the quantity of pollution in a specific region and plants are used as bioindicators. Evaluation of the dust pollution suspended particulate matter (SPM) and residential suspended particulate matter (RSPM) suggest the quantitative assessment of air at different locations around the Kishangarh region. Study sites were university campus, Bandar seendri highway area, marble mining site and residential site of Kishangarh. The four plant species *Calotropis gigantica*, *Azadirachta indica*, *Prosopis juliflora*, and *Vachellia nilotica*, which are typically found in all the selected study sites. APTI (Air Pollution Tolerance Index) showed *Azadirachta indica* had the highest 15.23 value on the CURAJ campus, whereas *Calotropis gigantica* had the lowest 10.44 in the mining site. Monitoring of dust pollution SPM and RSPM showed highest values at the highway site (254 and 245 µg/m³) followed by Kishangarh residential (144 and 155 µg/m³), mining (154 and 152 µg/m³) and least in the University campus (94 and 90 µg/m³). This research suggests that for abatement of air pollution certain trees can be planted based on their APTI value since trees that are exposed to polluted environments tend to develop high APTI values, which can be utilised as sinks. However, more robust and in-depth study is needed to reach a conclusion as the tolerance behaviour of trees to air pollution also fluctuates with the climatic conditions.

Keywords: Dust deposition, Air Pollution Tolerance Index, Particulate matter, Marble mine

THE CASE STUDY OF *NOSTOC* AND *NOSTOC*-LIKE TAXA FROM THE TROPICAL AND SUB-TROPICAL REGIONS

Prashant Singh

Laboratory of Cyanobacterial Systematics and Stress Biology, Department of Botany, Banaras Hindu University, Varanasi, 221005, India
sps.bhu@gmail.com; prashantsingh.bot@bhu.ac.in

Abstract

With the establishment of the *Nostocsensustricto* clade, many other morphologically similar taxa have come into existence with a lot of novel generic entities, new to science being described in the past few decades. They include *Mojavia*, *Desmonostoc*, *Halotia*, *Aliinostoc*, *Komarekiella*, *Compactonostoc*, *Desikacharya*, *Violetonostoc*, *Purpureonostoc*, *Parakomarekiella*, *Pseudoaliinostoc*, *Amazonocrinis, Atlanticothrix* and *Dendronalium*. Many of these new genera have been results of the usage of a polyphasic approach with a heavy focus on phylogenetic interpretations of the 16S rRNA gene and the folded secondary structures of the 16S-23S ITS region. Thus, the polyphasic approach has indeed helped to solve the taxonomy of these morphologically similar taxa. While phylogenetic interpretations based on the 16S rRNA gene have usually been consistent and convincing, recent times have also seen the emergence of issues related to limited taxon sampling and single taxa descriptions. These issues need to be thought out prudently and must be reviewed with utmost care, especially when considering taxa from the tropical and sub-tropical regions which have been underexplored. It must always be taken care to establish the monophyly of taxonomic units and ensure that they are adequately sampled. We discuss here the various issues that influence the taxonomy of *Nostoc*and its related morphotypes, with an emphasis on certain case studies.

Keywords: *Nostoc,* Polyphasic approach, Phylogeny, 16S rRNA gene, 16S-23S ITS

References

1. Naresh Kumar, Aniket Saraf, Sagarika Pal, Deeksha Mishra, **Prashant Singh* (2022)** Insights into the phylogenetic inconsistencies of the genus *Amazonocrinis* and description of epilithic *Amazonocrinis malviyae* sp. nov. (Cyanobacteria, Nostocales) from Jammu and Kashmir, India. International Journal of Systematic and Evolutionary Microbiology 72:005658; DOI 10.1099/ijsem.0.005658

2. Deeksha Mishra, Aniket Saraf, Naresh Kumar, Sagarika Pal, **Prashant Singh*(2021)** Issues in cyanobacterial taxonomy: comprehensive case study of unbranched, false branched and true branched heterocytous cyanobacteria. FEMS Microbiology Letters. 3;368(4):fnab005; DOI 10.1093/femsle/fnab005

BIO-INSPIRED SUPRAMOLECULAR SOFT MATERIALS

Subhasish Roy

Department of Chemistry, Birla Institute of Technology & Science-Pilani, K. K. BirlaGoa Campus,NH 17B, Zuarinagar, Sancoale, Goa 403726, India

Abstract

Amino acid derivatives and peptides are well known for their aggregation behaviour by using various non-covalent interactions including pi-pi stacking interactions; hydrogen bonding interactions, electrostatic interactions, van der wall interaction etc.1-4 Current research is completely dedicated for the development of smart supramolecular smart materials following green, sustainable and circular economy.Amino acid-based mechanosensitive hydrogel has been synthesized and identified one of the smart important soft materials. This hydrogel is thixotropic in nature. Moreover, the hydrogel's thermal and mechanical behaviour has been tuned by one of the often neglected stimuli mechanical shaking. This study holds promise for mecchanochemical functional groups transformation reactions following green and sustainable pathways.

REFERENCES

[1] A. Banerjee, I. W. Hamley, Soft Matter.2020, 16, 9998–10000.

[2] K. Gayen, N. Nandi, K. S. Das, D. Hermida-Merino, I. W. Hamley, A. Banerjee, Soft Matter2020, 16,10106–10114.

[3] S. Roy, A. Banerjee, Soft Matter2011, 7, 5300–5308.

[4] S. Roy, A. Baral, A. Banerjee, Chem. - A Eur. J.2013, 19, 14950–14957

NANOTITANIUMDIOXIDECEMENTCOMPOSITESAND THE BENEFITS ARISING THEREOF

Mainak Ghosal[1,3] and Prof. Arun Kumar Chakraborty[2]

1School of Advanced Materials Green Energy &Sensor Systems; 2Deptt of Civil Engineering

Indian Institute of Engineering Science &Technology, Shibpur; 3Hon'ble Secretary, Consulting Engineers Association of India (Kolkata Region)

Abstract

Nano scale developments are reported in various minor to medium-scale sectors like agriculture, energy, computers, mobiles, paints, cement, medicines, and textiles due to their unique beneficial behavior in the 10─9 meters range. The day-to-day commercialization of Nanotechnology is leading to a greater need for nano materials in our everyday life sciences. NanoTitanium Dioxide is the most used nanomaterial in the construction market. Our Paper relates to a high-strength water-saving cement composition consisting of cement clinker in the range of 95% to 100%, gypsum in the range of 0 to 5%, optionally a grinding aid in the range of 0.01 to 0.10%, Ordinary Portland Cement of 1 part by weight, Fine Aggregate as natural river sand of 3 parts by weight, Gross Potable water as per Indian Standards IS:031,Water soluble Admixture as super plasticizer Poly Carboxy late Ether of 1% by weight of cement.Net Potable water after effecting % deduction due to Super plasticizer effects, with a fixed water/cement ratio of 0.4 comprising; untreated NanoTitanium Dioxide in the range of 1.0% to 2.5% by weight of cement, wherein nucleation of the inner nanoparticles gives greater area for cement hydrations and larger volume of cement hydrated products. The Test results also reported that the durability properties of Nano-enabled cementitious composites are also enhanced when compared to the ordinary cementitious composites keeping the water/cement ratio fixed at 0.4.

Keywords: Cement, Composites, Nano, Water

PHYTOSTABILIZATION OF COAL MINE WASTE USING LEMONGRASS WITH DIFFERENT AMOUNTS OF COW DUNG MANURE

Shubham Abhishek[a,b], Bhanu Pandey[a]

[a]CSIR-Central Institute of Mining and Fuel Research, Dhanbad, 826001, India
[b]Academy of Scientific and Innovative Research (AcSIR), Ghaziabad, 201002, India

Abstract

In order to assess the phytoremedial potential of Cymbopogon citratus (D.C.) Staf. for restoring coal mine overburden dump wastes, a pot study was conducted, focusing on the effects of amendment techniques using garden soil mixtures and cow dung manure (CM) on the revegetation of overburden wastes (OB).The amendment of wastes with garden soil and cow dung manure significantly improved the health and nutrient status of the soil and increased the phytoavailability of Zn and Cu, which are typically regarded as micronutrients and crucial for plant growth. In contrast to OB (100% waste), the total biomass of lemongrass significantly increased by 38.6% under CM20 (OB: CM 80:20), and the growth characteristics have also been improved. Additionally, with the manure application rates, corresponding increases in the assimilative rate, water consumption efficiency, and chlorophyll fluorescence have been seen. Due to its high metal-tolerance index (>100%), lemongrass has proven to be an effective metal-tolerant herb species. Lemongrass also effectively phytostabilized Pb and Ni in the roots. In light of the strong plant performances, the current study strongly recommends cow dung manure application (20% w/w) along with lemongrass cultivation for phytostabilization in coal mining dumpsites.

Keywords: Mine waste, Cow manure, Lemongrass, Phytostabilization, Photosynthesis.

FABRICATION OF MULTIPURPOSE SELF-SANDING HYBRID SCAFFOLDS FROM LABORATORY WASTE SILICA HAZARDS

Anup Kumar Singh[1,2,*] and V. Sudhakar[1]

[1]Physical & Material Chemistry Division, CSIR-National Chemical Laboratory, Pune-India-411008

[2]Udai Pratap (Autonomous) College, Bhojubeer, Varanasi-221003

Abstract

Silica gels are the significant commodity solid waste produced by organic laboratories and pharmaceutical industries. Although use of silica gels is continuously growing, the proper methods of re-utilizing silica waste are yet limited. Hence, it demands a non-traditional approach to transform these silica wastes into some other useful products apart from using them as a well-known road construction material. Hereby, we report the fabrication and applications of monolithic polymer silica composites by ice-templating technique from laboratory waste silica-gels, using green approach. To the best of our knowledge, the fabrication of organic-inorganic hybrid sponges from the particles of hundreds of microns is not reported to date. Scaffolds S60, S120, S180, and S300, were prepared from laboratory discarded silica gels. The morphological, physicochemical, flame-retardant, and liquid absorbent properties of these self-standing scaffolds were analyzed. Results showed that the incorporation of silica particles in the scaffolds turned them into a flame-retardant sponge. These properties make the sponges ideal for making non-flammable cushions, applicable in automobiles, aircrafts, chemical laboratories, hospitals, and other areas of applications. Due to the large porous structures, these scaffolds possess excellent absorption properties and may absorb almost every kind
of liquid ranging from oils to acids. Therefore, these scaffolds are also a remarkable absorber for oils and hazardous liquids spillage, such as acids, and can be used as foam for chemical packing applications

Keywords: Silica-gels, hazardous waste, ice-templating, scaffolds, fire-retardants.

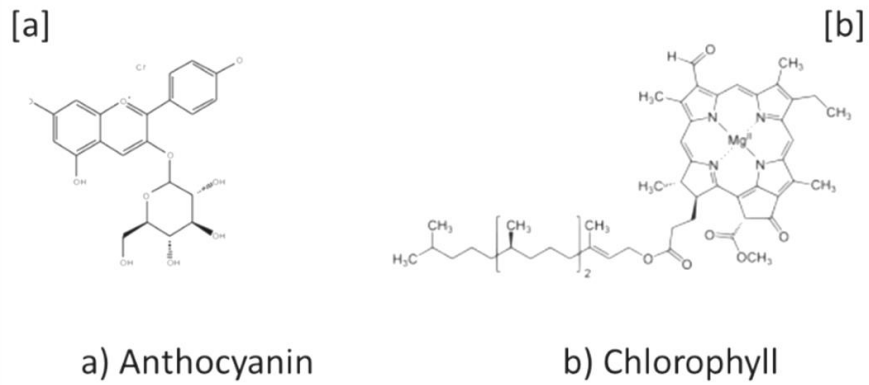
FABRICATION, CHARACTERIZATION AND COMPARATIVE ANALYSIS OF DYE-SENSITIZED SOLAR CELL USING NATURAL DYE EXTRACTS

Suman Kushwaha, Anamika Chaudhari

Department of Chemistry, Institute of science, Banaras Hindu University
Varanasi-221005, INDIA; E-mail: sumankush@bhu.ac.in

Abstract

In this study, natural dye extracted from different sources were used as sensitizers for dyesensitized solar cells (DSSCs) to replace expensive chemical synthetic dyes that use toxic precursors. Natural sensitizers contain plant pigments such as anthocyanin, carotenoid, flavonoid, and chlorophyll etc. that are responsible for chemical reactions such as absorption of light as well as injection of charges to the conduction band of TiO2 by the sensitizer. Natural dyes containing these pigments can easily be extracted from fruits, flowers, leaves, seeds, barks etc and can be employed as sensitizer for DSSC. In the present work, two natural dyes, chlorophyll and anthocyanin dye were extracted from different sources. The absorption spectra of these dyes have been investigated by UV-VIS spectrophotometry. In order to increase spectral response the prepared chlorophyll dye and anthocyanin dye were mixed at different volume ratios to form cocktail dyes. For the preparation of photoelectrode, commercial TiO2 NPs paste was coated on fluorine-doped tin oxide (FTO) conductive glass by doctor blade technique and annealed at 450 0C. The DSSC prepared by the cocktail dye where characterized for photovoltaic parameters such as short circuit current density Jsc, open circuit voltage Voc, fill factor FF, and overall conversion efficiency η under 100 mW/cm2 illumination. In order to investigate the kinetics and energetics of charge transport and recombination in dye sensitized solar cells (DSSCs) electrochemical impedance spectroscopy (EIS) have also been used. Molecular structure of pigments is shown below.



a) Anthocyanin b) Chlorophyll

Reference:

1. K. Kalyanasundaram, M. Graetzel, J. Copbio., 21(2010), pp. 298-310.
2. B. O'Regan, M. Gratzel, Nature,353(1991), pp. 737-739.
3. A.Błaszczyk,K.Joachimiak-Lechman,S.Sady,T.Tański,M.Szindler,A.Drygała,Solar Energy,215(2021),pp. 346-355.
4. A. Hagfeldt,G. Boschloo,L. Sun, L. Kloo and H. Pettersson,Chem. Rev. , 110(2010),pp. 6595-6663

ENHANCING BIOACTIVE PHYTOCHEMICALS AND ANTIOXIDANTS CAPACITY OF SEED SPROUT AND WHEATGRASS (TRITICUMAESTIVUM L.) BY USING SALICYLIC ACID.

Anjali Yadav and Shachi Singh

Department of Botany, MMV, Banaras Hindu University, Varanasi 221005, UP, India.
Email Id: anjaliyadav8909@gmail.com
Email Id: singhshachi@gmail.com

Abstract

Wheat is one of the most significant grains used as a staple food by humans. Around 12 percent of the world's wheat crop, or roughly 70 million tons annually, is produced in India. In addition to having the second-highest population after China, it also has the second-highest consumption of wheat due to a rapidly rising wheat demand.The use of chemical elicitors allows polyphenolic substances to accumulate and boosts antioxidant activity. As a result, investigating the application of chemical elicitors presents a compelling possibility to maximize crop yield.In order to understand how salicylic acid (SA) affects bioactive phytochemicals and antioxidant capacity in extract of germinated wheat seed and wheatgrass, this study was conducted. In a plant development chamber, wheat seeds and wheat grass were allowed to germinate at various salicylic acid concentrations, including 0 (control), 1, 0.1, 0.01, and 0.001 mg/ml.Three separate treatment methods were used; foliar treatment, soil treatment, and seed treatment. In 10 days cultivar the biggest effects on germination rate (100%), wheatgrass length (24.1±6.38 cm), and chlorophyll a(240.45±0.08 mg/g FW) and chlorophyll-b (162.36 mg/g FW)content were seen in the 0.001 mg/ml SA-treated seed. The 0.1 mg/ml SA-treated extract had the highest concentrations of bioactive phytochemicals, primarily phenolic compounds (4369.26±196.61 mg/100g seeds) and flavonoids (169.43±12.41 mg/100g seeds). The SA-treated extract at 0.1 mg/ml had the strongest antioxidant activity such as DPPH (98.05±06.73%) and FRAP (89.63±02.23 mg ascorbic acid/100g seeds). The germinated seed extract with 0.01 mg/ml SA treatment exhibited the highest levels of peroxidase (36.43±6.83 unit/mL) and phenylalanine (16.98±3.65 ug/mL) activity after 72 hours of germination. Therefore, it may be recommended that the proper SA-treatment concentrations to increase the phytochemicals and antioxidant capacity of wheat sprouted seed and wheatgrass were between 0.001 and 0.01 mg/ml.

Abbreviations- DPPH- 2, 2-diphenyl-1-picryl-hydrazyl-hydrate, FRAP- Ferric reducing ability of plasma.

Keywords: Bioactive phytochemicals, antioxidant, salicylic acid, chlorophyll and phenolic compounds.

ACCUMULATION OF HEAVY METALS IN WATER, SEDIMENT AND DIFFERENT FISHES OF RIVER GANGA IN VARANASI AND ITS HEALTH RISK ASSESSMENT

Bhargawi Mishra[1], **Geeta J. Gautam*[2], VijayaNath Mishra*[1]**

[1.]Department of Neurology, Institute of Medical Sciences, Banaras Hindu University, Varanasi,221005

[2.]Department of Zoology, MahilaMahavidyalaya, Banaras Hindu University, Varanasi, 221005

Abstract

Quality of the river water and sediments are deteriorating day by day in Indian rivers due to excessive anthropogenic activities and pollutants entering through various sources. Heavy metal loads in the rivers are one such factor that are adding to human health risks as well. In our study we estimatedthe concentration of the heavy metals (Pb, Mn, Cr and Cd) in river bed and in water at different points of river Ganga as well as at confluence point of Ganga and Varuna rivers. We found that Ganga river in Varanasi is highly loaded with metals (PLI= 6.698) Mean concentration in water follows: Pb 1.29 mg/L,Mn 1.325 mg/L, Cr 0.169 mg/L and Cd 0.161mg/L, which was above than the permissible limits stated by Environment protection agency EPA in drinking water. Randomly seven indigenous species of fishes were collected from the wild and were processed for checking the occurrence of these metals in the tissues such as Gills, Liver and Muscle.In all the seven selected fish species, degree of heavy metal concentration followed liver > gills > muscles. Highest accumulation of Pb was observed in Cyprinuscarpio liver (8.86 µg/g) and lowest in Baikari muscles (0.07 µg/g).Total THQ value i.e. hazard index (HI) of metals was calculated for these fish species that are frequently consumed and the data showed HI values in following sequence: C.carpio> O. nilotus>C.punctatus>J.coitor>M.armatus>M.tengara>Baikari. Average HI value for C. carpio and O. nilotus was found above 1 which indicates that intake of heavy metals through these species may cause health hazard for human. Maximum HI was recorded in Carpio, which is highly consumed fish by human, hence may be harmful to them. These findings pose a threat to human population and hence needs regular monitoring of metals in fishes to prevent entry into food chain and its effect on the human beings.

INTERACTIVE EFFECTS OF ELEVATED OZONE AND NITROGEN AMENDMENTS ON ANTIOXIDANTS ACTIVITIES OF LEMONGRASS

Parvati Madheshiya, Supriya Tiwari

Laboratory of Ecotoxicology,Centre of Advanced Study in Botany, Institute of Science,Banaras Hindu University, Varanasi, Uttar Pradesh, India

E-mail- parvatimaddhesiya@gmail.com, supriyabhu@gmail.com

Abstract

Rising levels of the phytotoxic tropospheric ozone (O3), a phytotoxic air pollutant, is of global concern,particularly intropical countries including India and China due to favorable meteorological conditions for O3 formation. Soil nitrogen amendments are known to assist in the management of deleterious effects of O3toxicity in several crops and vegetables. However, the interactive effect of ambient and elevated O3 stress withsoil nitrogen amendments on medicinal plants is an unexplored area. The present study evaluates the interactive effect of these entities on lemongrass (Cymbopogoncitratus). The experiment had three O3 treatments; ambient (A), ambient +15 ppb (E1) and ambient +30 ppb (E2). Each ozone treatment was further supplemented with four nitrogen doses viz Recommended dose (N1), 1.5times recommended dose (N2) and 2times recommended dose (N3), no nitrogen treatment (No). Although the negative impacts of O3 on various plant characteristics were noticeable, the ameliorative role of nitrogen supplements reduces the adverse consequences of O3 stress. In addition to increasing the plants antioxidant and ROS scavenging capacity, nitrogen dose was able to strengthen the plant's defence system. Since the nitrogen amendmentsincreased the synthesis of secondary metabolites, the resources were channeled toward the increased production of bioactive components and essential oils as evident through the GCMS studies. It has been observed that the antioxidant pool and yield of essential oils also increased upon O3-N interactions, with the highest increments being observed at N2treatment.

Keywords: Ozone, nitrogen amendments, ROS, antioxidants, essential oils

ENVIRONMENTAL RELEVANT CONCENTRATIONS OF ASPIRIN INDUCES STRESS RESPONSE IN THE LIVER OF JUVENILE LABEO ROHITA.

Tuhina Gayen[1], Anchal Tripathi[1], Swati Mittal[2], Usha Kumari[1]*

[1]Fish physiology Laboratory, Zoology Section, Mahila Mahavidyalaya, Banaras Hindu University, usha.kanak@gmail.com; swatimittal73@gmail.com
[2]Skin Physiology Laboratory, Centre of Advance Study, Department of Zoology, Banaras Hindu University, Varanasi-221 005, India

Abstract

Chemical contamination of aquatic ecosystems through pharmaceuticals has become a matter of great concern in recent decades, due to their upsurge production and manifold usage in everyday life. Within the wide range of pharmaceutically active compounds, the non-steroidal anti-inflammatory drug (NSAID), aspirin is amongone of the most frequently used NSAID throughout the globe with a wide range of pharmacological properties.Despite the fact that aspirin concentrations in waterbodies and wastewater treatment plants has reached several micrograms per litre, yet reports on the effect of environmentally relevant concentrations of aspirin in tissues of fish are lacking. The present study investigated the stress response of fish on chronic exposure of environmentally relevant concentrations (1, 10, and 100 µg/L) of aspirin in the liver of juvenile *Labeo rohita*. The results showed significant alterations histopathological analysis and biochemical parameters such as cortisol, cyclooxygenase enzyme, glucose, triglycerides and cholesterol in liver of fish. Further, the study concludes that aspirin possess toxicity to fish even in trace concentrations detected in aquatic environment.

Keywords: Aspirin, Fish, Histopathology, COX, Stress response

ISOLATION AND SCREENING OF MICROORGANISMS FROM FISH GILLS

Vishavjeet Singh and Surabhi Mishra*

Dept. of Zoology and Applied Aquaculture, Barkatullah University Bhopal, vishavjeet1598@gmail.com,

Assistant Professor, Department of Biosciences, Chandigarh University, Gharuan, Mohali, Punjab, India, *Corresponding author: mishra.surabhi021@gmail.com.

Abstract

Aquaculture products can harbour pathogenic bacteria, which are part of the natural micro-flora of the environment. Some fishes are inherently more prone to contamination depending on the species, feeding pattern, age, size, harvest season, habitat characteristics, and geographical location.To accomplish our objective, we have collected adult Mrigal (Cirrhinusmrigala), acarp bottom dweller of freshwater habitat from the 2 local fish market of Ludhiana, Punjab, India and were brought to laboratory in aseptic conditions.Each fish was swabbed from gills and inoculated in Nutrient Broth. And were pour plated on nutrient agar plate and was incubated for 24 hrs at 37°C. Individual colonies were taken with the help of inoculation loop, transferred to subculture in 3 times and quadrant streak in Nutrient Agar for pure culture from single colony. Selective colonies were characterized and identified for their further tests: Morphological, Gram staining and Biochemical tests (IMViC Tests).

Bacterium isolated from the fish gills showed circular, smooth colonies, yellowish green color appearance, rod shaped, gram staining negative and showed positive results for catalase, oxidase and negative for Indole, MRVP and Citrate tests. Thus, from the present study, we may conclude that the fish gills contains microbes such as Pseudomonas (species) in fish. Identification of certain microbial analysis to assess the quality and freshness of raw fish is very important to avoid fish spoilage and diseases.

Key Words: Bacteria, Gram staining, spoilage, gills, fish

References:

Erkmen, O and Bozoglu, T. (2016). Spoilage of fish and other seafoods. FoodMicrobiology: Principles into Practice, 301-306.

Bruijn, I., Liu, Y., Wiegertjes, G. F and Raaijmakers, J. M. (2018). Exploring fishmicrobial communities to mitigate emerging diseases in aquaculture. FEMSmicrobiology ecology, 94(1), 161.

QUALITATIVE ASSESSMENT OF DUST DEPOSITION AND BIOCHEMICAL RESPONSES OF SELECTED TREES AGAINST AIR POLLUTION IN THE MINING AND NON-MINING AREA OF KISHANGARH, RAJASTHAN

Naziya Tarannum, Shailesh, Ashok Natwadiya, Nivedita Chaudhary

Department of Environmental Science, School of Earth Sciences, Central University of Rajasthan
*Corresponding author: nivedita@curaj.ac.in

Abstract

Air pollution, which impedes economic development, exacerbates poverty, and impairs human, plant, and animal health, is one of the major problems in both urban and rural areas. Both coarse and fine dust particles have a substantial detrimental effect on the ecology and plants because they obstruct the natural operation of plants. Therefore, plants are employed as bioindicators and biomonitors for air pollution because physiological changes in plants may indicate the level of pollution in a particular location. By selecting and screening pollution -sensitive and tolerant plant species, it is necessary to assess the pollution state of urban and rural areas. In order to effectively plan urban greening and reduce dust pollution while also improving aesthetic value.

With the help of this study, it would be possible to quantify the amount of dust present in various areas of the Rajasthani city of Kishangarh. The sites are marble mining site, Kishangarh residential site, highway area (Bandar seendri bus stand) and CURAJ campus (control). The four plant species Calotropis gigantica, Azadirachta indica, Prosopis juliflora, and Vachellianilotica, which are typically found in all the relevant areas, were also examined for their APTI (Air Pollution Tolerance Index). By calculating the total chlorophyll, pH, relative water content, and ascorbic acid content. Azadirachta indica had the highest APTI (15.23) on the CURAJ campus, whereas Calotropis gigantica had the lowest (10.44) on the mining site. This research suggests that for abatement of air pollution certain trees can be planted based on their APTI value since trees that are exposed to polluted environments tend to develop high APTI values, which can be utilised as sinks. Though there are some trees whose APTI score is declining that can be used as a marker. To draw a conclusion, a more thorough investigation is necessary because trees' responses to air pollution vary depending on the climate.

Keywords: Dust deposition, Air Pollution Tolerance Index, Bioindicators, Particulate matter, Marble mine

SUBLETHAL CONCENTRATIONS OF TRICLOSAN INDUCE OXIDATIVE STRESS AND NEUROTOXICITY IN THE FISH CYPRINUS CARPIO

Anchal Tripathi[1], Tuhina Gayen[1], Usha Kumari[1]*, Swati Mittal[2]

[1]Fish Physiology Laboratory1Zoology Section, MahilaMahavidyalaya, Banaras Hindu University, usha.kanak@gmail.com

[2]Skin Physiology Laboratory, Centre of Advance Study, Department of Zoology, Banaras Hindu University, Varanasi-221 005, India

Abstract

Triclosan is widely used as an antimicrobial agent in varied personal care products in considerable quantities and then discharged to aquatic environments, resulting in potential risk to aquatic organisms. The present study investigatedmedian lethal concentration (96h-LC50 value) and the impact of sub-lethal exposure of triclosan on activities of acetylcholinesterase and selected antioxidant enzymesin the gills of fish Cyprinus carpio.The median lethal concentration of triclosan in C. carpiowas estimated to be 0.968 mg/L using Finney's probit analysis method. On the basis of the 96h LC50 value, fishes were exposed to three different concentrations i.e.,100 µL-1 (1/10thof LC50),10µL-1 (1/100th of LC50), 1µL-1(1/1000th of LC50) for 28 days. The results showed a significant ($p < 0.05$) decrease in the activity of glutathione-s-transferase, glutathione reductase, glutathione peroxidase and acetylcholinesterase at 7th, 14th, 21th and 28th day of exposure. The study shows that long-term sublethalexposure of triclosan to fish can lead to several physiological alterations such as enzymatic scavenging ofoxygen radicals and the normal neurological functions mediated by the enzyme acetylcholinesterase.With increasinganthropogenic activity, the study provides convincingevidence for the necessity of a regulated useand safer disposal of triclosan to the environment.

Keywords: Triclosan, 96h LC50, oxidative stress, neurotoxicity, Cyprinus carpio

DIOECIOUS PLANT DIVERSITY: ECOLOGICAL TRAITS AND THEIR CONSERVATION STATUS OF ALLAHABAD DISTRICT, UTTAR-PRADESH, INDIA

Ankita Verma, Rupendra Kumar Yadav and Deepak Kumar Gond

Department of Botany, CMP Degree College Allahabad -211002, Uttar Pradesh, India
ankita2596ver@gmail.com

Abstract

The paper deals with an account of dioecious plant diversity of the Allahabad district, based on extensive fieldwork and herbarium studies as well as their conservation status according to IUCN red list. We observed that these dioecious plants were commonly associated with multiple ecological traits such as herbs or woody habits, fleshy fruits, and small, inconspicuous flowers. About 52 species belonging to 20 families and 41genera are reported in this field survey. Out of 52 species 24 trees, 18 climbers, 7 herbs and 3 shrubs are reported. Menispermaceae is the largest family (9 species) followed by Euphorbiaceae (7 species) and Moraceae (4 species). Diospyros (3 species), Morus (4 species)and Tinospora (2 species)aredominating genera of dioecious flora of this district. The result indicates that dioecy is more common among woody plants and fleshy fruits in comparison to herbs and shrubs, and is not equally distributed among the plant communities of the district. Dioecy consist only 7.2% of flora of district Allahabad. According to the IUCN data the dioecious flora of Allahabad district categories in different threatened criteria. Out of 52 species 16 species (30.7%) Least Concern (LC), 35 species (67.3%) Not Evaluated (NE), and 1 species (1.9%) is Data Deficient (DD).

Key words: Dioecious, Allahabad, diversity, flora, Not Evaluated (NE), Least Concern (LC), Data Deficient (DD)

A NOVEL STRAIN OF PERONEUTYPA (XYLARIALES, ASCOMYCOTA) ON DALBERGIA SISSO BASED ON MORPHO-MOLECULAR STUDIES

Anupriya Kumari & Raghvendra Singh

Centre of Advanced Study in botany, Institute Of Science, Banaras Hindu University, Varanasi, U.P., 221005
*kumari.anupriya96@gmail.com

Abstract

During the survey of phytopathogenic fungi at agriculture field of Banaras Hindu University, Varanasi, India in the year 2021, an infected dry stick of Dalbergia sisso Roxb. ex DC. was collected. Based on polyphasic approaches, it was found that a novel species of Peroneutypa, was involved. Multigene phylogenetical analysis based on Internal Transcribed Spacer (ITS), 28S Larger Subunit (LSU) and DNA- directed RNA polymerase II (rpb2), this collected strain is drastically different from closely related strains. The holotype and Ex-type living culture of this novel strain has been deposited at AMH and NFCCI respectively at ARI, Pune.

Poster Presentation

CHARACTERIZATION OF TWO CYANOBACTERIAL STRAINS FROM THE BIODIVERSITY-RICH NORTHEAST REGION OF INDIA BY USING POLYPHASIC APPROACH.

Sagarika Pal and Prashant Singh

Laboratory of Cyanobacterial Systematics and Stress Biology,Department of Botany, Institute of Science, Banaras Hindu University, Varanasi-221005, India

Abstract

Two soil-dwelling cyanobacterial strains, KLS-BP-3A-PS and URH-6-PS have been isolated from the northeast region of India. The region is biologically diverse and comes under the Indo-Burma biodiversity hotspot. With limited studies of cyanobacteria, the region is unexplored and thus makes a perfect place to explore cyanobacterial diversity. Both the strains have been studied by using the polyphasic approach to understand and provide the correct taxonomic position. Initial microscopic studies indicated the strain KLS-BP-3A-PS to be a *Nostoc* or *Nostoc*-like taxa whereas URH-6-PS showed morphological similarity with *Cylindrospermum* or *Cylindrospermum*-like genera. Further, the 16S rRNA gene phylogenetic analysis of both strains was inferred by using, Maximum-likelihood, Neighbor-joining, and Bayesian inference, showed the distinct phylogenetic position of both the strains. KLS-BP-3A-PS clustered strongly at a well-supported, distinct, and stable position within the *Desikacharya* clade, whereas URH-6-PS was found to be within a distinct clade supported with strong bootstrap values, outside the *Cylindrospermum sensu stricto*. The position of the URH-6-PS clade suggested the clade to be a putative new generic entity in the family Nostocaceae. Subsequently, recovery of the full-length 16S-23S ITS region, with both tRNA ($tRNA^{Ile}$ and$tRNA^{Ala}$), in case of KLS-BP-3A-PS and without tRNA in URH-6-PS, helped to evaluate the folded structures of D1-D1', BoxB and V3 helices in both the strains with additional V2 region in KLS-BP-3A-PS with the phylogenetically related strains. All the evidence indicates that the strain KLS-BP-3A-PS under investigation is a new species of the genus *Desikacharya* and we have described the strain according to the International Code of Nomenclature for Algae, Fungi and Plants and named it as *Desikacharya kailashaharensis*. With respect to URH-6-PS, the evidences indicated towards the creation of a new *Cylindrospermum*-like genus and, therefore, we describe URH-6-PS as a new genus *Johanseniella* and the corresponding species as *Johanseniella tripurensis* according to International Code of Nomenclature for Algae, Fungi and Plants. This study comes out as the first polyphasic investigation of cyanobacteria from the biodiversity-rich Northeast Region of India in which taxa new to science have been described.

Keywords: Cyanobacteria, Polyphasic approach, 16S rRNA gene, 16S-23S ITS region, secondary structure

References:

Sagarika Pal, Aniket Saraf, Naresh Kumar, Arush Singh, Utkarsh Talukdar, Niraj Kohar, and Prashant Singh (2022). "Digging deeper into the taxonomy of *Cylindrospermum* and description of *Johanseniellatripurensis* gen. et sp. nov. from India." FEMS Microbiology Letters 369, 1: fnac074.

THEME: BIODIVERSITY AND ITS CONSERVATION

Ashish Mishra*, Dr. Hema Singh

Ecosystem Analysis Laboratory, Department of Botany, Institute of Science, Banaras Hindu University, Varanasi-221005, India
*Corresponding author Email- ashish.mishra771@gmail.com

Abstract

Title: Effect of altered soil properties on the plant growth attribute of leucaena leucocephala seedlings.

Increment in Globalisation, Industrial flourishment, Carbon emission and Deforestation are major concern for loss in biodiversity via altering soil properties. Change in Soil properties not only disturb to native community but also favour growth of few invasive Species i.e. *Leucaena leucocephala*, which are cultivated in India for economic causes. To assess the role of soil properties on growth and development of *Leucaena leucocephala,* an invasive plant*;* a small experiment was performed with *Leucaena leucocephala* seedlings. In this communication, we transplanted 10 *Leucaena leucocephala* (15 Days Old) seedlings in triplet at 4 different sites (Site A, Site B, Site C, Site D) with different soil properties i.e. Soil Moisture, pH, Water Holding Capacity, Bulk density and Organic matter. These sites were located in the field of Banaras Hindu University, Varanasi; Uttar Pradesh, India. Plant growth attributes (Stem Height, Root length, Biomass, Leaf Area) were analyzed in months of December to February. Result of the study revealed that seedlings from site A (very less soil moisture content) exhibited highest growth in Root length. Seedlings from Site B (Loamy soil mixed with stone and maximum soil moisture witnessed the maximum growth in all taken parameters. Seedlings from Site C and Site D exhibited minimum growth in stem height and root length. Biomass was found maximum from seedlings of Site B. Findings from our study suggest that, Soil moisture play great role in the development of plant and its part as it control the microbial process inside soil. Our finding also suggests that Lack of soil moisture favour root while surplus moisture favour shoot development.

Key Words: Soil properties, Invasive species, *Leucaena leucocephala,* Plant growth attribute, Stem height, Root length.

INVASIVE ALIENPROSOPIS JULIFLORA AND CLIMATE CHANGE:

THE IMPACTS OF INVASIVE MESQUITE (PROSOPIS JULIFLORA) ON THE ENVIRONMENT AND HUMAN AND ANIMAL HEALTH

Prakash Rajaka, Hema Singh

Ecosystems Analysis Laboratory, Department of Botany, Institute of Science, Banaras Hindu University, Varanasi 221005, India
*Corresponding author email: hema.bhu@gmail.com
Tel: +91-0542-2368399

Abstract

Prosopis juliflora (Sw.) DC, (Family Mimosoideae, subfamily Leguminosae)is an evergreen subtropical legume woody plant and dominates the local plant species. This tree is native to Northern South America, Central America, and the Caribbean and is extremely drought-tolerant. It has become a major invasive species in India and has also invaded other regions throughout the world, where it appears to strongly suppress native species. It has proven to be one of the most problematic trees in the world, particularly in croplands, rangelands, and forests, posing a threat to ecosystems. The IUCN has considered Prosopis as one of the worst 100 invasive alien species globally. It is a nocuous invasive species in Africa, Asia, and the Arabian Peninsula. Plants' ability to adopt a wide range of climatic and soil conditions, high coppicing ability, effective dispersal mechanism, and production of allelochemicals accelerated the invasion rate of Prosopis and a source of highly allergenic pollen. However, P. juliflora also play important role in human well-being by securing livelihoods, health, food, forage, and shelter. Prosopis invasions have a number of negative effects on human and animal health, impacting well-being and local livelihoods. In addition, there is a lack of knowledge concerning P. juliflora, such as its economic importance, human health risk assessments, and livelihood. In the present article, we attempted to review the Prosopis and its role in modulating the ecosystem, climate change, and adverse allergic effects of P. juliflora pollen on human and animal health. Furthermore, we document other human and animal health problems caused by invasive Prosopis trees. This review summarizes and enhances the existing knowledge about Prosopis pollen allergy and other human and animal health risks associated with this noxious plant.

Keywords: Climate change, Prosopis juliflora, Human health, pollens, Invasion Biology, invasive species, Livelihood, Ecosystem

PHENOLIC AND FLAVONOID CONTENTS IN THE SEEDS EXTRACT OF MOST COMMONLY CONSUMED FRUITS IN INDIA AND THEIR ANTIOXIDANT PROPERTIES

Rashmi Singh and Alok Kumar Khare

Department of Botany, Bareilly collage Bareilly. Mahatma Jyotiba Phule Rohilkhand University, Bareilly, Uttar Pradesh. India
Emails: rashmisinghum86@gmail.com, dralokkhare@gmail.com

Abstract

Fruits seeds can be an important source of numerous secondary metabolites and antioxidants that can be utilized on commercial basis pharmaceutical sectors can serve as one of the options for agricultural management. The present study was conducted to assess the secondary metabolites (total phenolic and flavonoid contents) and antioxidant properties in the seeds of commonly consumed fruits in India. The fruits were procured from the fruit shops of the local market and the seeds were separated manually. The total phenolic and flavonoid content in the methanol extract of seeds of test plants was quantified using standardized protocols. The DPPH scavenging potential of the extract was further evaluated. The results of the present study showed that the extract of the seeds contained significant amounts of total phenolics (153.72- 344.20 µg GAE/g), and flavonoids (118.70- 168.30 µg OE/g). The results further showed that the seed extract possesses DPPH inhibition potential (78.86%-87.39) and their IC50 ranged between 102.60 µg/ml-45.69 µg/ml. The DPPH activity also showed a strong positive relationship with the concentration of extracts, total phenolic and flavonoid content. The present study suggests that the seed extract of the tested plant has a significant amount of total phenolics and flavonoids compound and possesses higher antioxidant activity. The secondary metabolite compounds should be identified for their commercial utilization and promotion.

Key words: Antioxidant, Phenolics, Flavonoid, DPPH, Fruit seeds

EVALUATION OF WITHANIA SOMNIFERA L. DUNAL SEED GERMINATION AT VARIOUS PHYTOHORMONE CONCENTRATIONS AND ITS IMPACT ON ENZYMATIC ACTIVITY AMONG THE VARIETIES

Sarika Sharma and Shachi Singh

Department of Botany, MMV, Banaras Hindu University, Varanasi 221005, UP, India

Abstract

In the present study, germination test was used to analyse which variety has good germination quality by determination of germination percentage. To enhance the germination of seeds, different phytohormones (salicylic acid and Gibberellic acid) were used at different concentrations individually as well as in combination (1, 0.1, 0.01, 0.001mg ml-1). Higher germination percentage was found in the combination of phytohormones of 'Chetak' variety (100%) at 1mg ml-1. Because of the phytohormones treatment at different concentrations, various enzymatic activity affected such as catalase and peroxidase activity.

FIELD STUDY RESPONSES OF PEARL MILLET (PENNISETUM GLAUCUM L.) CULTIVARS HHB-272 AND HHB-67 UNDER ELEVATED UV-B RADIATION

Pooja Singh and Krishna Kumar Choudhary

1Department of botany, MMV, Banaras Hindu University, Varanasi-221005, India
Email Id- poojasngh7579@gmail.com, kkc@bhu.ac.in

Abstract

Ultraviolet (UV-B) radiation is a well-known potent stress factor on this earth's surface resulted due to stratospheric ozone depletion, which permutates morphological, physiological, cytological, and biochemical traits in plants. However, its impact on underutilized plant species such as pearl millet is less exploredand further the question of global food security under climate changing scenarios can be ascertained. This prompted the present study to investigate the effects of elevated UV-B(eUV-B) radiation (ambient+7.2KJm-2d-1) on various growth and biochemical characteristics at panicle development stage of twopearl millet (Pennisetum glaucum) cultivarsduring June to September, 2022 under ambient conditions. Plants being sessile protect themselves from the detrimental effects of UV-B radiation by synthesizing UV-B screening compounds and also by stimulation of antioxidative defense system.Visible injury symptoms and reductions in growth parameters such as no. of leaves, no. of panicles, and no. of tillers in HHB-67 depicted sensitivity against eUV-B.Significant reductions in chlorophyll (40.8%) and carotenoid (30%) contents were observed in HHB-67, while an increment was noticed forHHB-272. Similar trend was also noticed for anthocyanin contentwith maximum reduction of 6.67%in HHB-67.The oxidative damage measured in terms of malondialdehyde content was reported highest in HHB-67(48%) while it was 15.1% in HHB-272. To counter this oxidative stress, antioxidative defense system of HHB-272 was induced. However, on the other hand significant reduction insuperoxide dismutase (SOD) and ascorbate peroxidase (APX) enzyme activity in HHB-67 confirmed the failure of antioxidative defense mechanism. Reduction in phenol content was observed for HHB-67, whileincreased significantly in HHB-272. Further, reduction of protein content in HHB-67(3.5%) reflected UV-B-induced oxidation of proteins. Results of the present study clearly demonstrated that eUV-B during panicle development stage exhibited sensitivity in HHB-67, whereas HHB-272 showed less sensitivity for most of the measured parameters. Thus, further investigations are required to trace the consequences of eUV-B on yield parameters of pearl millet seeds that will be helpful to implicate productivity.

Keywords: UV-B radiation, pearl millet, oxidative damage, antioxidants, panicle development stage

CHARACTERIZATION OF PERONEUTYPA INDICA SP. NOV. (XYLARIALES, ASCOMYCOTA) ON HOST PLANT DALBERGIA SISSO BASED ON POLYPHASIC APPORACH

Anupriya Kumari and Raghvendra Singh

Centre of Advanced Study in botany, Institute Of Science, Banaras Hindu University, Varanasi, U.P., 221005

*kumari.anupriya96@gmail.com

Abstract

During the survey of phytopathogenic fungi at agriculture field of Banaras Hindu University, Varanasi, India in the year 2021, an infected dry stick of *Dalbergia sisso* Roxb. ex DC. was collected. Based on polyphasic approaches, it was found that a novel species of *Peroneutypa*, was involved. Multigene phylogenetical analysis based on Internal Transcribed Spacer (ITS), 28S Larger Subunit (LSU) and DNA- directed RNA polymerase II (*rpb2*), this collected strain is drastically different from closely related strains. The holotype and *Ex-type* living culture of this novel strain has been deposited at AMH and NFCCI respectively at ARI, Pune.

EVOLUTION OF PHYTOCHEMICALS AND ANTIOXIDANT ACTIVITY OF FINGER MILLET (ELEUSINE CORACANA) LANDRACES.

Madan Mohan, Aadil Mansoori, Anirudh Kumar#

#Correspondence email: anirudh.kumar@igntu.ac.in
Department of Botany, Indira Gandhi National Tribal University, Amarkantak-484887, Madhya Pradesh

Abstract

Millions of people around the world are experiencing malnutrition, hunger, and food insecurity. Finger millet [Eleusine coracana (L.) Gaertn.] belongs to family poaceae is one of the most nutritionally important millet grown in India and Africa and their landraces are quite diverse which have adapted to a variety of environmental conditions (Maharajan et al, 2021). Landraces keep huge nutritional and antioxidant potential based on their phytochemicals constituents and hence, their exploration are essential to find out potential landraces on the backdrop of malnutrition in tribal pockets and nutrient deficiency urban region (Luitel et al, 2022; Chandrasekara et al, 2022). Further, finger millet low water requirements and early maturation, help them escape drought and grow to repair the ecosystem and boost biodiversity (Gupta et al, 2017). In this context, landraces of finger millet were gathered from 12 tribal area of Madhya Pradesh and Chhattisgarh, India, to study the enrichment of phytochemicals such as total phenol, flavonoids, and tannin content in methanol and aqueous crude extract. Additionally, its total antioxidant capacity and radical scavenging activity for synthetic oxidants (DPPH and ABTS) were tested in order to confirm its antioxidant potential particularly in methanol extract. The obtained findings indicated the regional variations in phytochemicals and their antioxidant activity, which could be useful in the selection of superior finger millets with improved antioxidant nutritional traits.

Keyword: Finger millet, landraces, phytochemicals, antioxidant, nutrition

MODULATION OF GROWTH AND BIOCHEMICAL CHARACTERISTICS OF BETA VULGARIS L.UNDER SIMULATED ACID RAIN

Jigyasa Prakash and Madhoolika Agrawal

Laboratory of Air pollution and Global Climate Change, Department of Botany, Institute of Science, Banaras Hindu University, Varanasi-221005
* Presenting author: jigyasaprakashbhu@gmail.com

Abstract

Acid rain (AR) is a major environmental issue that has emerged in the last century. AR refers to any type of precipitation that causes a pH decrease to less than 5.6 as a result of higher-than-normal concentrations of sulphuric and nitric acids.AR's negative effects include chlorosis, necrosis, and a reduction in plant growth, physiology, and overall metabolism.The present study reports the results of a field-based experiment conducted to assess the effect of simulated acid rain (SAR) of different pHon the morphological and biochemical characteristics of palak (Beta vulgaris L.) at two growth stages. The resultsrevealed thatexposure ofSAR leads to visible injury in the form of yellow coloration of leaves that become more severe with the increasing age of plants and decreasing pH of SAR. It was observed that,asthe acidity of SAR increases, the plant height and root length decreased at 90days after germination (DAG). However, a significant reduction in thenumber of leaves was only observed at the later growth stage (90 DAG).Furthermore, total chlorophyll and carotenoidcontent showeda significant reduction at 45 and 90 DAG. Non-enzymaticantioxidantssuch asflavonoids, phenols and anthocyaninsthat are involved in the antioxidative defensesystem were found to be decreased,while thiol and ascorbic acid content increased at both stages under SAR of low pH. The reduction in non-enzymatic antioxidants (flavonoids, phenols and anthocyanins) correlated with increasedMDA content which leads to membrane damage intest plants at both growth stages. Our results indicated that long-term exposure to SAR of low pH leads to oxidative stressthat consequentlyalters the development and growth of B. vulgaris.

Keywords: Simulated acid rain (SAR), Beta vulgaris, oxidative stress, non-enzymatic antioxidants.

COMPARATIVE EFFECT OF AN ENVIRONMENTAL XENOESTROGEN 4-NONYLPHENOL ON TWO SPECIES OF CATFISH AND FRESH WATER MURREL

Suman[1], Radha Chaube[2], and Gautam Geeta Jiwatram* [1]

[1]Zoology department, Mahila Mahavidyalaya, Banaras Hindu University,
suman.archana29@gmail.com
[2]Department of Zoology, Institute of Science, Banaras Hindu University,
chauberadha@rediffmail.com
geeta2713@gmail.com*

Abstract

4-Nonyl phenol (4-NP) is widely used as non-ionic surfactants pervasive in industrial effluents and aquatic environment where it disturbs many physiological processes of aquatic species and acts as xenoestrogen (Endocrine disrupting chemical). The study was aimed to investigate the effects of 4-NP (low dose: 64µgL-1; high dose: 160 µgL-1;
duration: 30, 45, and 60 days) on the biochemical parameters, micronucleus test, level of testosterone and 17β Estradiol in catfish and murrel. There was a significant dose and duration dependent decrease in the GSI, significant increase in AST and ALT enzymes, triglycerides and creatinine. The decrease in the level of RBCs, Hb, and WBC's revealed the hematotoxic effects of 4-NP. Altered RBC's and micronucleus containing RBC's were scored both in control and experimental fish and was found significantly high as compared to their respective control. In Channa punctatus, there was a significant decrease in the GSI, total protein, AST, ALT enzymes and triglycerides when compared to control due to genotoxicity. In testes of H. fossilis and C. batrachus, there was a significant decrease in testosterone level, increased Estradiol 17β (E2) level low dose for 30 days but significantly decreased at 45 and 60 days. At high dose, significant decrease in all durations was observed. These results substantiate that exposure to 4-NP can modulate the normal physiology as well as reproductive aspect of fishes. Thus, the parameters studied in this study, can be used as biomarkers for assessing fish health and risks associated with the pollutants in the natural ecosystem.

ASSESSMENTOF MORPHOLOGICAL AND BIOCHEMICAL ASPECTS OF VIGNA RADIATA L.CULTIVARS (HUM 1 AND HUM 16) FOR AGRONOMICAL YIELDUNDERTHE DIFFERENT LEVELS OF SALINITY

Amantika Singh and Krishna Kumar Choudhary

Department of Botany MMV, Banaras Hindu University, Varanasi 221005, Uttar Pradesh, India

Abstract

Ensuring global food security is one of the most challenging issues in the current as well as the futuristic global climate change scenario.Climate change enhances the rate of salinization, a significant abiotic threat that reduces crop growth, biomass, and yield.A pot experiment was conductedunder ambient conditions to assess the changes in morphological,and biochemical parameters of two mung bean (Vigna radiata L.) cultivars (Hum 1 andHum 16) under different salinity levels (0, 50, and 100 mM). Observed results reflected a significant decrease in the number of leaves by 11 % and 30% at 100mM salinity in HUM 1 and HUM16 cultivars, respectively. Similarly, other growth parameters like the number of branches, plant height,number of flowers,number of pods, and fresh weight were also reduced.Salinizationcauses osmotic and ionic stress, which enhanced theproduction of H2O2 by 6% and 29%, which is responsible for a significant increase inlipid peroxidation by 31 % and 51% which leads to chlorophyll degradation by 7% and 42%,in both cultivars.Plants encounter oxidative stress witha significant increase in ascorbic acid concentration by 31% and 11%, along with increased superoxide dismutase by 63% and 17%, at 100 mM salinity levels in HUM1 and HUM 16 respectively. On the other hand,significantly increased phenol and protein concentrations also help tomitigate salinity's effecton both cultivars. At 100 mM salinity, the biomass of HUM 1 and HUM 16 cultivars significantly decreased by 53 % and 73%, respectively, along with a significant reduction in yield (weight of pods) by 45% and 58%, respectively. Overall, the observed results showed that both cultivars' growth and yield were significantly reduced by high salinity (50 and 100 mM), with the HUM1 cultivar showing greater tolerance to salinity levels of 50 and 100 mM.

Keywords: Food security; climate change; salinity; Vigna radiata; yield

EFFECTS OF RICE RHIZOSPHERE MICROBIOME ON SOME COMMON CEREAL, LEGUME, AND OIL SEED CROPS

Preeti Maiti*, Akansha Jain, B. K. Sarma

Department of Mycology and Plant Pathology, Institute of Agricultural Science,
Banaras Hindu University, Varanasi, 221005
***Correspondence:** preetimaitibhu@gmail.com

Abstract

The rhizosphere is a dynamic region where countless biochemical interactions and symbiosis occurs. The rhizospheric environment is suitable for a wide range of microbes including bacteria and fungi. Though rhizospheric microbiome of one plant is known to be beneficial for that plant, it may or may not be the case for the other plant species. In crop fields, after harvest of one crop sowing of another crop is done. Once the crop is harvested, its rhizospheric microbiome remains in the soil while the second crop is sowed or planted. Therefore, the present study was done to understand whether rice rhizospheric microbiome remains beneficial to other subsequent crops. Rhizospheric soil samples for rice were used for the isolation of rice rhizobiome. A total of 10 fungi and 23 bacteria were isolated on potato dextrose agar and nutrient agar medium, respectively. These microbes were used as a consortium of only bacteria, only fungi, and combination of both bacteria and fungi. The consortia were then used to treat seeds of some Rabi crops that are cultivated after rice. Seeds of pea, mustard, chickpea, and wheat were treated with the consortium of fungi, bacteria or both and then sowed. This was done to evaluate the impact of rice rhizospheric microbiome on germination and growth of the Rabi crops. The germination percentage, biomass, plant height, and chlorophyll content of wheat and chickpea were higher in the treated condition than in the control compared to the other two crops pea and mustard. The overall physiological traits of wheat and chickpea showed that the rice rhizosphere microbiome supports germination and development of the wheat and chickpea crops better compared to pea and mustard.

ELICITATION OF*PLUMBAGO ZEYLANICA* L. BY EXOGENOUS PHYTOHORMONE TO IMPROVE SEED GERMINATION AND PLANT GROWTH

Seema Dwivedi and Shachi Singh

Department of Botany,MahilaMahavidyalaya, Banaras Hindu University, Varanasi, India.
(email: singhshachi@gmail.com)

Abstract

Plumbago zeylanica(Chitrak) is a medicinal herb belonging to the family Plumbaginaceae. It is grown in most parts of India. Plumbagin, a naphthoquinone, is a major bioactive component present in P.zeylanica, that possessantibacterial, anti-cancerous, hepato-protective and wound healing activity. Elicitation is a cheaper and socially acceptable methodology for improving plant functionality. Our objective is to optimize the concentration of elicitors: salicylic acid, gibberellic acid and auxin,in order to increase seed germination and growth frequency of P. zeylanica. Seeds were treated with different concentrations of elicitors. After 10 days of treatment, maximum germination of 61 % and 65% was observed in seeds treated with 0.01mgml^{-1}salicylic acid and 0.001mgml^{-1} combination of salicylic acid and gibberellic acid, respectively. After 40 days of treatment, maximum plant height of 14.34cmand 14.89 cm, whereas maximum biomass of 12.45gand 13.01±0.7g was recorded in seeds treated with 0.01mgml^{-1}salicylic acid and 0.01 mgml^{-1}combination of salicylic acid and gibberellic acid respectively, as compared with the control.

CHARACTERIZATION OF GREEN MUSSEL SHELL POWDER AS A POTENTIAL ADSORBENTOF HEAVY METALS

Sreedevi. P.R and K.Suresh

Surface and Environmental Control Plasma Laboratory, Department of Physics,
Bharathiar University, Coimbatore, Tamilnadu-641046

Abstract

Excessive quantity of heavy metals is a main agent of environmental pollution and surface/ground water contamination, leading to acute and chronic health effects. Shell powder of Green mussel (Perna viridis), has been illustrated to adsorb heavy metals efficiently. Characterization studies were done to reveal the potential of green mussel shell powder (< 40µm particle size) as heavy metal (Cu, Pb and Zn) adsorbent. X-ray diffraction delineated that the shell powder is an orthorhombic crystal of CaCO3, i.e., Aragonite. Heavy metal adsorption didn't interfered the crystalline structure of shell powder, rather new peaks of low intensity denoting the carbonates and hydroxides of heavy metals appeared after adsorption. Fourier transform infrared spectra depicted that, carbonate and hydroxyl groups in shell particles are responsible for heavy metal adsorption. Raman spectra affirmed the same. Shift in peaks were observed after heavy metal adsorption. Atomic force microscopic imaging portrayed the spatial distribution of functional groups (CO3 & OH) over shell powder surface. Thermogravimetric and differential scanning calorimetry analysis confirmed the formation of metal alloys over shell powder after adsorption. Bound water in the crystal lattice of aragonite was found to contribute OH groups for adsorption process. The organic content in mussel shell powder was negligible and is completely displaced on heavy metal adsorption. The study delineated that physisorption and ion exchange were the principle mechanisms behind adsorption process and ascertained green mussel shell powder could be used as an adsorbent for heavy metal bioremediation.

Keywords: Green mussel, Shell powder, Bioremediation, Heavy metal, Adsorption.
Acknowledgement: This work was supported by DST-Women Scientist Scheme A, No.SR/WOS-A/EA-28/2017 (G), Ministry of Science & Technology, Government of India.

SYNTHESIS OF AMBIENT PRESSURE DRIED POROUS CARBON AEROGEL VIA SOL-GEL POLYMERIZATION TECHNIQUES

Suman Kumari and Sweta Singh*

1 Department of Physics, Mahatma Gandhi Central University, Motihari, Bihar 845401
*E-mail: swetaphysics@mgcub.ac.in, mgcu2020phys6004@mgcub.ac.in

Abstract

Here we report the synthesis of carbon aerogel (CA) via sol-gel polymerization techniques. Resorcinol (R) and formaldehyde (F) are used as initial precursor for the synthesis of CA and sodium carbonate (C) is used as a catalyst. Initially in optimized molar ratio of resorcinol, formaldehyde and catalyst are taken and kept at the temperature of 85oC in an oven for gelation process for three days. The as synthesized RF wet gel is then dried in acetone atmosphere at 60oC and ambient pressure for 3 days, followed by acetone exchange after 24 hours of regular interval to get RF aerogel. RF aerogels are further carbonized at 900oC temperature in nitrogen atmosphere to get the final product carbon aerogel. The synthesis parameters adapted here for carbon aerogel led to the formation of preponderance of micropores and high specific surface area. Structural and microstructural characteristics of these carbon aerogels (CA) have been investigated through XRD, SEM, TEM, nitrogen adsorption and Raman spectroscopic techniques. This research paves a way towards the synthesis of lightweight, high performance and low-cost materials for its application in energy storage devices

Keywords: Carbon aerogel, Ultralight, micro-porous, low density, ambient pressure

EFFECT OF HARDNESS AND MICROSTRUCTURE ON ANNEALING THE BCC PHASE BASED TI16.67V16.67MN33.32CO16.67NI16.67 HEA

Abhishek Kumar[1], Thakur Prasad Yadav[1, 2], M. A. Shaz[1], and N.K. Mukhopadhyay[3]

[1]Hydrogen Energy Centre, Department of Physics, Institute of Science
Banaras Hindu University, Varanasi-221005, India
[2]Department of Physics, faculty of Science, University of Allahabad,
Prayagraj-211002, India
[3]Department of Metallurgical Engineering, Indian Institute of Technology (Banaras Hindu University), Varanasi-221005, India

Abstract

Multi-component High Entropy Alloys (HEAs) [1] have been an exciting research area in theoretical and experimental studies in recent years. In contrast to conventional alloys based on one main element, Multi-component HEAs offer superior mechanical and functional qualities, and as a result, they have emerged as a new class of innovative materials that is opening up a new area. [2]. Multi-component HEAs contain five or more principal elements, each at a concentration ranging from 5 to 35 atomic percent [3]. The synthesis, microstructure, and effect of annealing of Ti16.67V16.67Mn33.32Co16.67Ni16.67 high entropy alloys (HEAs) have been studied. Meidma's model has been used to calculate thermodynamic parameters such as mixing enthalpy. The mixing enthalpy of this Ti16.67V16.67Mn33.32Co16.67Ni16.67 is -15.6 kJ/mol, while the atomic radius mismatch is 10.03%. This HEA was synthesized in a 35 kW radio frequency induction furnace under an argon atmosphere. With the help of JANA 2006, we confirm that the BCC phase with lattice parameter a= b = c =2.9500Å α = β = γ =90˚. After annealing at 1000◦C for 24 hours, we get that some other intermetallic phases are evaluated. Due to intrusting secondary phase evolution, we performed the hardness test at 200 grams load, and we got no large changement occur in hardness on annealing; the as-cast sample have hardness is 806 HV, and the annealed sample had 795 HV. SEM and EDX were used to validate the elemental composition and surface morphology of these as-cast HEAs and annealed HEAs. This HEA is synthesized with hydride and non-hydride forming elements, which is also favorable for hydrogen storage material. So that the future scope of this work is using this HEA can testing for advanced hydrogen storage materials.

Keywords: High Entropy Alloys, C14 Laves phase, BCC phase, Vickers hardness, Phase transformation.

References:

1. Yadav TP, Kumar A, Verma SK, Mukhopadhyay NK (2022) High-Entropy Alloys for Solid Hydrogen Storage: Potentials and Prospects. Transactions of the Indian National Academy of Engineering 7: 147-156.
2. Kumar A, Yadav TP, Mukhopadhyay NK (2022) Notable hydrogen storage in Ti–Zr–V–Cr–Ni high entropy alloy. International Journal of Hydrogen Energy 47: 22893-22900.
3. Sharma P, Dwivedi VK, Dwivedi SP (2021) Development of high entropy alloys: A review. Materialstoday Review 43: 502-509.

SYNTHESIS AND ELECTROCHEMICAL PERFORMANCES OF NIFE2O4/RGO HIERARCHICAL NANOSTRUCTURE-BASED ELECTRODES FOR HYBRID SUPERCAPACITORS

Gopal K Gupta[1]*, Sudesh Kumar Singh[1], Monika Srivastava[2], Sanjay Kumar Srivastava[3], and Amit Srivastava[1]*

[1]Department of Physics, TDPG College, VBS Purvanchal University, Jaunpur-222001, India
[2]School of Materials Science, Indian Institute of Technology (BHU), Varanasi-221001, India
[3]Department of Physics, Institute of Science, Banaras Hindu University, Varanasi-221005, India
* amitrac@gmail.com,

Abstract

In the present study, we have successfully used an integrative approach to fabricate a three-dimensional hierarchical electrode material constructed by NiFe2O4/rGO nanostructure via a facile hydrothermal method and subsequently studied its electrocapacitive performances. The structural and morphological characteristics of as-synthesized NiFe2O4/rGO nanostructure have been characterized by X-ray diffraction (XRD), Raman spectroscopy, Transmission electron microscopy (TEM), Scanning electron microscopy (SEM) and X-ray photospectrometer (XPS). The electrocapacitive performances of the as-synthesized sample have been evaluated by galvanostatic charge-discharge (GCD), cyclic voltammetry (CV) and electrochemical impedance spectroscopy(EIS) using a three electrode system with 3 M KOH electrolyte solution. As-prepared hierarchical electrode material exhibits specific capacity ~ 362.46 Fg-1 at a current density of 0.65 Ag-1, suggesting good rate capability. NiFe2O4/rGO nanostructure electrode material exhibits a significant high energy energy density of 36.37 Wh/kg and the power density of 276.22 W/kg, respectively. Furthermore, the as-synthesized nanocomposite harvests a superior cycling stability over 2000 cycles without obvious capacitance attenuation. The NiFe2O4/rGO provides rapid pathways for electron transfer and diminish the ion diffusion routes due to NiFe2O4 over rGO sheets, which ultimately results in exceptional electrochemical properties. Henceforth, the unique morphological features, outstanding conductivity & favourable cyclic stability render NiFe2O4/rGO nanocomposite as a promising and prospective advanced electrode material for supercapacitor in the field of energy storage-conversion application.

A FACILE SYNTHESIS OF GRAPHENE QUANTUM DOTS FROM MARIGOLD FLOWER FOR POTENTIAL SUPERCAPACITOR APPLICATIONS

Gopal K Gupta[1], Sudesh Kumar Singh[1], Monika Srivastava[2], Sanjay Kumar Srivastava[3], and Amit Srivastava[1]*

1Department of Physics, TDPG College, VBS Purvanchal University, Jaunpur-222001, India
2School of Materials Science, Indian Institute of Technology (BHU), Varanasi-221001, India

3Department of Physics, Institute of Science, Banaras Hindu University, Varanasi-221005, India
amitrac@gmail.com,

Abstract

In the present study, bio-waste Marigold flower (MG; Tagetes Erecta) has been used as a new raw material for the synthesis of highly capacitive grapheme quantum dots (GQDs) as an electrode material for super capacitor energy storage. Various analytical techniques particularly X-ray diffraction (XRD), Raman spectroscopy, high resolution transmission electron microscopy (HRTEM) and Fourier transform infrared (FTIR), have been employed to characterize the as- synthesized GQDs. The Microscopic images obtained using HRTEM analysis clearly reveal the formation of lattice fringe pattern (lattice spacing as ~ 0.22 nm) for GQDs with an average crystallite size ~ 5.7 nm. The super- capacitive performance of the as-synthesized electrode material have been accessed through an electrochemical work station comprising of 3-electrode system. The working electrode made up of GQDs (Active material) on Ni foil (working electrode) with the help of PVDF (binder), has shown specific capacitance of 210 F g−1 at 0.01 V s−1 with cyclic voltammeter (CV), and 200 F g−1 at current density of 2 A g−1 with Galvan static charging/discharging (GCD) technique. It has also shown remarkable cyclic stability with capacitance retention of 92% after 3000 cycles. The high magnitude of columbic efficiency (160.08) and energy density (17.78 Wh/kg) signifies the good electrochemical double-layer capacitor (EDLC) behavior of the as-synthesized super capacitor electrode material and in-turn offers the practical usage of GQDs synthesized through green eco-friendly approach in charge storage applications.

AN EXPERIMENTAL INVESTIGATION OF NOVEL COMPONENT MATERIALS OF A SINGLE-SBASIN SOLAR STILL

Deeksha Kumawat and Sunita Mahavar

Solar Energy Research Laboratory (SERL), Department of Physics, University of Rajasthan, Jaipur 302004, India, smjpr1986@gmail.com

Abstract

Water availability is related to the economic development of a nation i.e. fulfill the personal consumption and industrial needs. But the current threats posed by the global warming has increased the water scarcity and impurity problems. Various technologies have been adopted for the water purification/desalination purposes but those based on the renewable energy put forth the best and sustainable alternative for it. Among these renewable alternatives, solar still has been found to be one of the simplest device mimicking the natural hydrological cycle process thus purifying the brackish water into pure one using solar energy. In the present study a single basin solar still has been developed using the locally available materials.The testing of novel glaze (cover) material poly (methyl methacrylate) (PMMA) was carried out and its comparison with conventional glass cover was also studied.Novel absorber material and low-cost insulation materials have also been tested for the system.For the development of the present system, a thin aluminium (black painted) metal tray having the dimensions as 0.72m × 0.37m attached on insulation board of 2mm thickness was used as an absorber platepainted black with an added insulation of glasswool sideways inside the system which was in turn placed in plywood casing.A single PMMA sheet of thickness 2 mm was selected as cover due to its light weight and high transmissivity which has been tested successfully for solar cooker by Mahavar et al.[1]. This PMMA sheet was placed upon basin at an inclination of 25.5º (nearby latitude angle) with horizontal surface and the same study was also carried out for glass cover of thickness 3mm with same apparatus and inclinaton. The side walls were also made of transparent PMMA material for better capture of solar radiations.The initial on-field testing of the system was performed at University of Rajasthan, Jaipur (26.92º N, 75.87º) on a poor winter insolation day (about 418 W/m2) for 1.4 litres water load in the month of November 2022. The created temperature difference gave the Distillate Output (DO) of the designed system with PMMA and glass coveras 220 ml and 200 ml respectively. Thus, the present work proposes that a solar still was fabricated using some novel component materials for casing, absorber, insulation and glaze and has been found capable for water distillation process with transportation ease. Further study will be carried out on the system for checking out its productivity with extended comparisons between both the condensing covers and detailed results will be presented in the full length paper.

Key words: Solar Still, insolation, glaze cover, PMMA , Distillate output.

References :[1] Mahavar ,S. , Sengar , N., Rajawat, P., Verma , M., &Dashora P.(2012). Design development and performance studies of a novel Single Family Solar Cooker. Renewable Energy, 47, 67-76.

ONSET AND WITHDRAWAL OF THE INDIAN MONSOON

Vivek Kumar Pandey and Nishtha Agrawal

K. Banerjee Centre of Atmospheric and Ocean Studies, IIDS, Nehru Science Centre, University of Allahabad, Prayagraj-211002
Email: vivekbhuoa@gmail.com

Abstract

Indian economy is based on the agriculture area as well as on the industrial area. Indian land mass is bounded by ocean in its three sides and has vast impact of ocean and Indian Monsoon. It is highly vulnerable to coastal activity due to tropical convection and storm surges than any other country in the South Asian region. Global warming, heatwaves, and flood/drought are major issues in all parts of our country. Thus to control the situation, we need a highly accurate system that can predict extreme events in advance. The utility of General Circulation Models (GCMs) limits the predictability of these events due to coarse resolution of the models, disabled subgrid-scale processes, and high computation cost. The regional models (RCMs) add value in describing mesoscale variability compared to the driving global reanalysis. RCMs are very sensitive to the employed physical parameterizations as they influence their ability. There are three basic methodologies for regional climate modeling: empirical, semi-empirical, and modeling approaches. The Empirical approach makes use of information obtained from past climate analogs; the semi-empirical approach is based on statistical downscaling GCM fields; and modeling approaches of utilizing physical models such as nested regional models and variable resolution global models. The present work is aims at adopting the modeling approach to simulate the dynamic and thermodynamic features associated with deep convection at the mesoscale and synoptic scale. The major rain-bearing systems over India appear in the form of synoptic-scale tropical storms and large-scale monsoon flow. We analyzed the large-scale monsoon flow at the climate scale with the help of a hydrostatic regional climate model. It is used to analyze the inter-annual and intra-seasonal variability of monsoon transition and rainfall extremes. In our study we find that the South Asian High (SAH) have important role in the onset and withdrawal of the Indian Monsoon.

Keywords: South Asian High, Mesoscale, RCMs, GCMs, Monsoon, Heat wave

FABRICATION, CHARACTERIZATION AND COMPARATIVE ANALYSIS OF DYE-SENSITIZED SOLAR CELL USING NATURAL DYE EXTRACTS

Suman Kushwaha, Aman Kumar*

Department of Chemistry, Institute of science, Banaras Hindu University
Varanasi-221005, INDIA; E-mail: sumankush@bhu.ac.in

Abstract

Dye -sensitized solar cells (DSSCs) as a third-generation and alternative of conventional solar cells have been immensely investigated, due to the easy fabrication, low-cost, and eco-friendly operation. In DSSCs the entire sunlight conversion into electricity occurs by four main components of DSSC, such as semiconductor (wide band-gap TiO_2, ZnO), natural or synthetic dye as a sensitizer and light harvesting element, electrolyte (redox couple) as hole transport, and platinum counter electrode. The working principle of DSSC is shown in Fig. 1, Ruthenium based inorganic dyes were recognized as the most efficient dye for the DSSCs. But inorganic dyes are quite expensive, toxic nature, and difficult in their purification. Recently, natural dyes have extensively investigated due to their large absorption in the visible spectrum, abundance in nature, easy dye extraction and eco-friendliness. In this work the potential of dye extracted from different native plants were evaluated and their effectiveness on the fabricated DSSCs were studied. Characterization techniques;UV–visible spectroscopy and cyclic voltammetry were used to study the absorption and electrochemical properties of extracted dyes respectively. Further, to evaluate the effectiveness of each dye, the extracted dyes were utilized as sensitizers for DSSCs fabrication. The photovoltaic performance, such as short circuit current density J_{sc}, open circuit voltage V_{oc}, fill factor FF, and overall conversion efficiency η under 100 mW/cm^2 illumination were investigated along with the kinetic and energetics of charge transport and recombination studies with electrochemical impedance spectroscopy (EIS).

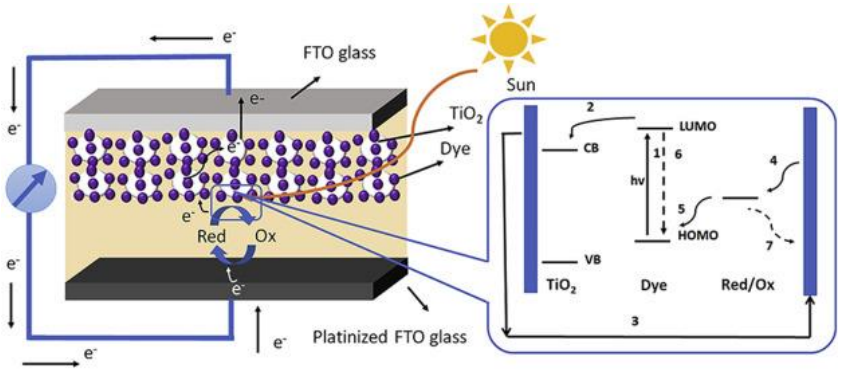


Fig. 1 The working principle of DSSC

Reference

1. B. O'regan, M. Gratzel, A low cast, high efficiency solar cell based on dye sensitized colloidal TiO_2 film, nature ,353(1991) 737-740.
2. M.K. Nazeeruddin, F. de Angelis, S. Fantacci, A.Selloni, G. Viscordi, P. Liska ,S. Ito B. Takeru ,M. Gratzel,
J. Am. Chem. Soc 2005,127,16835

HARVESTING RENEWABLE POLYMERS FOR ENERGY STORAGE MATERIALS

Dipti Yadav, Rakesh Kumar, Kanak Agarwal, Sanjeet, Neelam Srivastava*

Department of Physics (MMV), Banaras Hindu University, Varanasi-221005
*Email of corresponding author: neel@bhu.ac.in

Abstract

Energy devices are inseparable part of today's life style and hence it is of immense importance to use environment sustainable materials. Worldwide efforts are being made to explore renewable materials for electrode/ electrolyte synthesis and other for other parts of materials. Our lab is especially dedicated to synthesis of polymer electrolyte material and its use. The future requirement of electrolyte materials is i) high flexibility; ii) polymer decoupled ion motion and iii) improved cation transport. Polymer-In-Salt-Electrolytes fulfill second and third parameters but their brittleness and low conductivity remain major problems. Hence present target of polymer electrochemists is to get low cost, environment benign, flexible all-solid-state-polymer-in-salt-electrolytes. Our group has developed a novel protocol to synthesize starch-based electrolyte material whose conductivity is >0.01S/cm and electrochemical stability window is >2.5V. These materials have an excellent flexible morphology. The study is being carried out with different starch and salts and success has been achieved without a single failure. Hofmeister series has its effect on electrochemical and mechanical properties. A supercapacitor has been designed using a laboratory prepared activated carbon from corn starch. The 1cm x1cm supercapacitor has capacity ~F, which can be further improved by changing the sample dimensions and improving the electrode material.

Keywords*:* Polymer-in-salt electrolytes, Starch, sustainable, eco-friendly, economical

SYNTHESIS OF NANOCRYSTALLINE HIGH ENTROPY ALLOY (HEA) IN AL-CU-FE-NI-TI SYSTEM THROUGH HIGH ENERGY BALL MILLING

Yogesh Kumar Yadav[1], T. P. Yadav[1,2], M. A. Shaz[1]

[1]Department of Physics, Institute of Science, Banaras Hindu University Varanasi, Uttar Pradesh-221005

[2]Department of Physics, University of Allahabad, Prayagraj, Uttar Pradesh-211002

Email: yogesh.yadav@bhu.ac.in (YKY);yadavtp@gmail.com (TPY);mashaaz@gmail.com (MAS),

Abstract

High entropy alloys (HEAs) have five or more major components in them. The concentration of each fundamental component should range from 5 to 35 at.%. Because of the higher mixing entropies in their liquid or solid solution forms, these alloys are known as HEAs. The Hume-Rothery rule, which is governed by similar atomic sizes, electronegativity and valence, and similar structure, is the fundamental principle to obtain the solid solution. They are more desired and have a greater strength-to-weight ratio. Alloys with a high entropy have good structural stability, high temperature characteristics, and hardness. Alloys with high entropy can be used to create thermoelectric, superconducting, and hydrogen storage materials.The main goal of my research is to mechanically alloy equiatomic high entropy alloy (HEA) AlCuFeNiTi. X-ray diffraction (XRD), transmission electron microscopy (TEM) using the method energy dispersive X-ray spectroscopy (EDS), scanning electron microscopy (SEM), and X-ray photoelectron microscopy (XPS) were used to characterise and study the structural and morphological properties of the high entropy alloy AlCuFeNiTi. The investigation of the hydrogen storage properties of high entropy alloys and improving the hydrogen storage properties of MgH2 by high entropy alloy AlCuFeNiTi catalysts are the second and third goals of my research.

References

1. Murty, Bhagevatula Satyanarayana, Jien-Wei Yeh, Srinivasa Ranganathan, and P. P. Bhattacharjee. High-entropy alloys. Elsevier, 2019.
2. A. Kumar, T.P. Yadav, N. K. Mukhopadhyay, International Journal of Hydrogen Energy 47 (2022) 22893-22900
3. TP Yadav, S Mukhopadhyay, SS Mishra, NK Mukhopadhyay, O.N. Srivastava, Philosophical Magazine Letters 97 (12) (2017), 494-503

TREND ANALYSIS OF ENERGY RELATED EMISSION IN INDIA (1990-2020)

Satrajit Dutta

Assistant Professor in Economics,
Department of Economics, Gorubathan Government College,
Dt. - Kalimpong, West Bengal
Pin - 735231, INDIA

Abstract

Background– In the updated Nationally Determined Contributions (NDC) (2021-2030) under the Paris Agreement, India hascommitted to reduce Emissions Intensity of Gross Domestic Product (GDP) by 45 percent and achieve 50 percent cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030. The article is based on the concepts of the Environmental Kuznets Curve (EKC) Theory, where the economic composition effect was considered an important factor for downward transition of emission in spite of economic growth. Importance of technology in emission reduction was found place in both the EKC and also in other theories.

Purpose – To make forecasting analysis by examining the relationship among environmental pollution, economic structure and energy structure and technological improvement in India.

Design/methodology/approach – The investigation is made on the basis of time series data for the period of 1990 to 2020, by applying different econometric methods like ARIMA univariate forecasting method and multiple regression method. The per capita carbon di-oxide (CO2) emission is used as environmental indicator, share of service sector in (GDP) as indicator of GDP composition, share of fossil fuel in non-electricity fuel consumption and share of electricity generated from non-fossil fuels are used as indicators for energy usecompositionand share of research and development(R&D) expenditure in GDP is used as a proxy variable for technological improvement.

Findings –Initial results of multiple regression show that electricity generation from non-fossil fuel and research and development have negative effects on CO2 emissions.

Practical implications – In order to keep its commitment to sustainability, India needs more energy efficient use of primary fuels in sectors other than electricity generation like industry and transport sectors and more spending on R&D.

Keywords: Carbondi-oxide emissions, economic growth, electricity, research and development, non-fossil fuels

RESPONSES OF ECLIPTA ALBAL. A MEDICINAL HERB UNDER CD STRESS

Akanksha Dwivedi and Rajesh Kumar Sharma

Ecotoxicology Research Laboratory, Department of Botany, Institute of Science, Banaras Hindu University Varanasi 221005, India

Email: akanksha.dwivedi428@gmail.com, rajeshbhu78@gmail.com

Abstract

Eclipta alba L. (Bhringaraja, family: Asteraceae), a medicinal herbis a potential sources of natural antioxidants and provides pharmacological credibility to the ethnobotanical uses in traditional health systemas well as therapeutic application in oxidative damage induces disease such as cancer, diabetes and neurological disorder. The plantsarefound in both tropical and subtropical regions of the world lands, ascending up to 2000 m amslon the hills. However, no data is available in literature on the performance of E. albaplants under Cd stress. Therefore, present study was designed to investigate the Cd accumulation and growth performance of E. alba plants grown on soil amended with Cd @ of 0, 5, 10 and 20 mg/kg dw under tropical field conditions. Bioaccumulation of Cd in root, stem and leaf tissues of E. alba plants and their growth performance in terms of numbers of leaves, leaf area, height and biomass were assessed. The results of the present study showed that bioaccumulation of Cd in leaf, stem and root tissues of E. alba plants significantly increased with increasing concentration of Cd application ($p \leq 0.05$) with a maximum accumulation in leaf followed by stem and least in roots. The results further showed that reduction in all the tested growth parameters in E. alba plants due to Cd application was statistically significant as compared to control plants ($p \leq 0.05$). From the present study, it can be recommended that cultivation of E. alba plants in Cd contaminated areasshould not be promoted as Cd accumulation can pose a risk to the quality and safety of medicinally important leaf.

Keywords: Eclipta alba, Cadmium, Growth, Bioaccumulation, Safety

CLIMATE CHANGE IMPACT ON SOIL MOISTURE AND GROUNDWATER IN INDIA: LOCAL VERSUS REMOTE FEEDBACKS AND IMPLICATIONS

Shreya Bhowmick, Dheeraj Kr. Singh, Swarnendu Bhattacharya and Subhadeep Halder

Department of Geophysics, Institute of Science, Banaras Hindu University, Varanasi 221005;
E-Mail: bhowmickshreya@gmail.com

Abstract

Global warming and associated climate change have resulted in a significant decrease in summer monsoon precipitation over the Indian region ,and increased propensity for droughts. In addition, anthropogenic extraction and irrigation practices have lead to a rapid decrease in its groundwater resources. As the country receives about 70% of its annual rainfall during the summer monsoon season, such depletion in precipitation has manifold consequences for the country's water resources and agricultural sector. In addition, the GDP of the nation is also adversely affected due to increased prevalence of droughts. This study explores the observed changes in climatic and anthropogenic factors, both local and remote, that lead to the reduction of soil moisture and groundwater over the Indian region in the previous century and the last two decades. As precipitation and large-scale circulation are convectively-coupled through ocean-atmosphere as well as land-atmosphere feedbacks, process level investigations are done to unravel the various mechanisms. It is noted that reduction in precipitation due to a decreased land-ocean temperature contrast, weakened tropospheric temperature gradient and enhanced groundwater extraction together have amplified the depletion of soil moisture over the Indian region. In addition, remote factors such as Eurasian snow cover and snow melt variations, the Atlantic Multidecadal Oscillation (AMO) and ENSO have also played a significant role in such observed changes. However, the representation of such physical processes in state-of-the-art global climate models is still not adequate and needs much improvement. Overall, this study attempts to propose a new mechanism to explain the rapid reduction of soil moisture and groundwater resources over India and its implications.
The authors gratefully acknowledge the financial support given by the Science and Engineering Research Board, Department of Science and Technology, Government of India to conduct this research.

Keywords: Precipitation, Soil moisture, Groundwater, Drought, Climate change

FOOD SECURITY AND AGROECOSYSTEM

Amritasen Yadav, Kalpna Gupta*

Department of Home Science MMV, BHU, Varanasi-221005.

Abstract

Approximately 7.5 billion people occupied the earth, at present in order to feed every one adequately we need 2800 million tons of cereal against with global production is only 2100 million tons. The deficit in production has left over 868 million people undernourished worldwide out of which 850 million a living in developing countries and children. India ranks poorly in terms of both hunger and malnutrition. One of the country demand or animal portion is increasing day by day due to rapid urbanization. By 2050 consumption of meat and dairy products in projected to increase by 173% and 158% respectively this data is of 2013. To meet this growing demand and to crop with 9 million world population by 2050 agricultural production needs to increase by 60% (compare 2005 to 2007 production) including of increase in animal production and animal products. In addition cropland per capita is one of the biggest challenges to feed the Indian population, who are interact of rapid urbanization. Availability of food grains is a necessary condition for food security. Indian population or more less self Sufficient in cereals, however to achieves self Sufficiency in pulses and oil seeds have become major challenge for it due to changes in consumption pattern the demand for fruits, vegetables, dairy, meat, poultry, and fisheries have been increasing crop diversification in very much required for better production. It may be noted that the slowdown in agriculture production could be attributed to structural factors on the supply cite. Such as public investment, credit technology land and water management, etc. rather than globalization and trade. Such research this paper will try to explore the progress in food supply in national level. What is current progress terms of food and nutrition requirement of the household level. What programme and policy Indian government has achieved in food security. further demand production officially and climatic changes etc.

Key-Word: Nutrition Education, Rural women, Millet, Malting, Bioavailability.

BIOPOLYMER-BASED ADSORBENTS AND THEIR APPLICATION IN WASTEWATER TREATMENT: A REVIEW

Devesh Vishwakarma and Shikha*

[1]Department of Environmental Science, Babasaheb Bhimrao Ambedkar University, Lucknow India, 226025.

Email ID: deveshvishwakarma01@gmail.com and dr_shikha2003@yahoo.co.in

Abstract

Water pollution is the source of many environmental problems, and it is caused by wastewater from a wide variety of industrial sectors, agricultural operations, and other domestic activities. There are a number of natural and synthetic materials that have been used for wastewater treatment, but biopolymers stand out owing to their renewability, biodegradability, economic validity, non-toxicity, and wide range of source availability among other factors. The most often utilised biopolymers in wastewater treatment are alginate, chitin, cellulose, chitin, lignin, gelatin, and various derivatives of starch. Natural polymers are increasingly being used as a replacement for conventional wastewater treatment methods for the removal of dangerous pollutants such toxic metals, dyes, medications, and pesticides due to their distinctive physical and chemical properties. The applications of natural polymers in wastewater treatment are reviewed in this article. Wastewater treatment using biopolymers and the methods for extracting them from their natural environments were the primary focuses of this study. Recent developments in biopolymer extraction methods are covered, as is the potential for further study of these materials across a range of industries.

Keywords: Biopolymer, Wastewater treatment, Pollutants, Adsorbent, Adsorption

MONITORING OF PARTICULATE AND GASEOUS POLLUTANTS AND FUTURE PREDICTIONS FOR MICA, FELDSPAR AND QUARTZ MINING PROJECT USING FUGITIVE DUSTMODEL

Sameer Shekhar, Bhanu Pandey, Siddharth Singh, Lal Babu Roy, Reddi Ganesh, Ranjeet Kumar Singh

CSIR-Central Institute of Mining & Fuel Research, Barwa Road, Dhanbad- 826001

*sameershekhar88@gmail.com

Abstract

The mica, feldspar, and quartz mine located in Nellore district, Andhra Pradesh, India, has both open pit and underground mines. However, the dust emission from the opencast mine is the area of major concern. The different unit operations involved in the opencast mine, such as drilling, blasting, loading, unloading, and transportation, lead to the generation of large quantities of PM_{10} and $PM_{2.5}$. On the other hand, the diesel consumption by different heavy earth moving machines (HEMMs) is responsible for the emission of SO_2 and NO_2 into the environment. It is planned to renew the leasehold area of the mine to achieve a proposed annual production for the 5-year plan period of 1500 T mica, 6000 T feldspar, and 1500 T quartz. With an objective to understand the environmental impact of the lease area renewal, the baseline air quality with respect to PM_{10}, $PM_{2.5}$, SO_2, and NO_2 were monitored at five sites around the lease area, and an air dispersion modeling exercise was carried out for particulate pollutants using the Fugitive Dust Model (FDM) software. The emission rates for PM_{10}, $PM_{2.5}$, SO_2, and NO_2 are determined, and projected concentrations of particulate pollutants are predicted. Baseline concentrations of PM_{10}, $PM_{2.5}$, SO_2, and NO_2 in the lease area of the proposed mine site were found to be 53.1 to 79.5 µg/m^3, 20.2 to 43.2 µg/m^3, 16.6 to 31.2 µg/m^3 and 21.2 to 50.1 µg/m^3, respectively. The respective predicted values of PM_{10}& $PM_{2.5}$ will be 73.9 to 97.1 µg/m^3, 31.9 to 44.2 µg/m^3 without control measures, and 73.5 to 82.5 µg/m^3, 31.8 to 43.8 µg/m^3 with control measures during operation of the mine.

Key Words: $PM_{2.5}$, PM_{10}, Emission factor, Fugitive Dust Model, Control measures

ASSESSING THE EFFICACY BIOCHAR GENERATED FROM BIOMASS ON REDUCING THE PHYTOTOXICITY CAUSED BY EXPOSURE TO TROPOSPHERIC OZONE IN AN INDIAN WHEAT CULTIVAR

Annesha Ghosh and S.B. Agrawal

Laboratory of Air Pollution and Global Climate Change, Department of Botany, Institute of Science, Banaras Hindu University, Varanasi 221005, Uttar Pradesh, India

Abstract

In order to determine how tropospheric ozone (O_3) stress, combined with various biochar treatments, affected a wheat cultivar (HD 2967), pot research was conducted. Plants were exposed to two different levels of O_3 (ambient and elevated, (ambient+20 ppb)) and three different concentrations of biochar (0, 2.5, and 5 percent, respectively). The physiology of the test cultivar was significantly impacted by elevated O_3 levels, which alone lowered major growth metrics. Increased malondialdehyde (MDA) level in the wheat leaves demonstrates that membrane integrity was compromised despite the fact that enhanced O_3 led to an increase in enzymatic antioxidants. Furthermore, reduced phyto-availability of soil nutrients and cation exchange capacity were reported, leading to decreased nutrient absorption under high O_3. Grain yield was reduced because of the trade-off between growth and defense caused by the shortage of assimilates and nutrients. The deleterious effects of O_3 on economic wheat yield were, however, mitigated by using biochar as a soil conditioner. Better plant growth, greater physiological capacity, and increased agricultural output were all the result of biochar alone improving soil characteristics and nutrient phyto-availability. Thus, the study concluded that increased plant physiology and an antioxidative defense system against O_3-induced oxidative stress were transmitted via altered nutrient phyto-availability and its uptake, possibly linked with biochar-induced enhanced soil characteristics.

Keywords: Antioxidants, Plant physiology, Soil amendments, Wheat, Yield

CARBON NANOTUBES INTEGRATED NICKEL DIMETHYLGLYOXIME BASED COMPOSITE FOR GLUCOSE SENSOR

Narvdeshwar, Angesh Kumar Maurya and Piyush Kumar Sonkar

Department of Chemistry, MMV, Banaras Hindu University,
Varanasi-221 005, UP, India
Email: narvadesh786@gmail.com, piyushchem.mmv@bhu.ac.in

Abstract

Carbon nanotubes (CNTs) based modified electrodes have remarkable performance for development of electrochemical sensors due to its high electrical conductivity, large surface area and ease of functionalization [1-3]. The nanocomposites based on Nickel-dimethylglyoxime ($Ni(DMG)_2$) and CNTs based modified electrode has been developed in this work for determination of glucose.The nanocompositematerial CNTs/$Ni(DMG)_2$were characterized by different spectroscopic methods such as FT-IR, UV-vis and powder-X-ray diffraction(p-XRD). In addition, materials were also characterized with transmission electron microscopy (TEM) with selected area electron diffraction (SAED) and energy dispersive X-ray analysis (EDAX). It is expected that the proposed composite material CNTs/$Ni(DMG)_2$would be suitable for the development of cost effective, durable and reliable electrode material for glucose sensing.

References

1. Tominaga, Masato, et al. "Electrocatalytic oxidation of glucose at gold–silver alloy, silver and gold nanoparticles in an alkaline solution." J. Electroanal. Chem. 590.1 (2006): 37-46.
2. Wang, Joseph. "Electrochemical glucose biosensors." Chem. Rev. 108.2 (2008): 814-825.
3. Qu, Fengli, et al. "Amperometric Biosensors for Glucose Based on Layer-by-Layer Assembled Functionalized Carbon Nanotube and Poly (Neutral Red) Multilayer Film." Anal. Lett. 39.9 (2006): 1785-1799.

Acknowledgments: Narvadeshwar acknowledgesUniversity Grant Commission (UGC) for financial support. PKS acknowledges Institute of Eminence, Seed Grant, Banaras Hindu University (Scheme No.-6031), India for financial support.

NEUTRAL CYCLOMETALATED IR(III) COMPLEXES

Mausami and Bani Mahanti

Chemistry Section, Mahila Mahavidyalaya, Banaras Hindu University

Abstract

Cyclometalated Iridium(III) complexes possessing efficient triplet emitter characteristics have brought these class of complexes to the spotlight, in recent years [1-2]. The most projected use of these class of complexes is in OLED devices as emissive dopants wherein it is possible to achieve, in principle, a four-fold higher luminescence efficiency as compared to the conventional fluorescence-based singlet emitters [3,4]. Neutral mononuclear cyclometalated Ir(III) complexes containing diphosphinate ancillary ligands namely tetraphenylimidodiphosphinate, {tetra(4-trifluoro-methyl phenyl) imidodiphosphinate}, phenyl (pyridin-2-yl)phosphinate (ppp) and dipyridinylphosphinate have been reported where a chelating coordination mode has been observed [5-6]. These complexes were found to exhibit green and blue-green phosphorescence. It was of interest to explore if by a meticulous selection of ligand it would be possible to switch the binding mode of the ligand and the impact in the optical and electrochemical properties of the resulting complex.

Keywords: Cyclometalated, OLED, phosphorescence, ancillary, triplet emitters

References:

[1] Ulbricht, C.; Beyer, B.; Friebe, C.; Winter, A.; Schubert, U. S. Adv. Mater. 2009, 21, 4418-4441.

[2] You, Y.; Nam, W. Chem. Soc. Rev. 2012, 41, 7061-7084. [3] Lamansky, S.; Djurovich, P.; Murphy, D.; Abdel-Razzaq, F.; Lee, H. E.; Adachi, C.; Burrows, P. E.; Forrest, S. R.; Thompson, M. E. J. Am. Chem. Soc. 2001, 123, 4304-4312.

[4] Yersin, H. Top. Curr. Chem. 2004, 241, 1-26.

[5] Zhu, Y.-C.; Zhou, L.; Li, H.-Y.; Xu, Q.-L.; Teng, M.-Y.; Zheng, Y.-X.; Zuo, J.-L.; Zhang, H.-J.; You, X.-Z. Adv. Mater. 2011, 23, 4041-4046

[6] Li, H.-Y.; Zhou, L.; Teng, M.-Y.; Xu, Q.-L.; Lin, C.; Zheng, Y.-X.; Zuo, J.-L.; Zhang, H.-J.; You, X.-Z. J. Mat. Chem. C 2013, 1, 560-565

Identification and Characterization of Plant Extract Having Ameliorative Effect on the Effects Caused by Endocrine Disruptor

Pratibha Gaurav, Suman, Gautam Geeta Jiwatram

Zoology Department, MMV, BHU Varanasi, India 221005

Abstract

Endocrine disruptors are exogenous chemical agent that interfere with the pathways of natural hormones by blocking or mimicking their receptors. 4-Nonylphenol is a toxic xenobiotic compound classified as an endocrine disruptor. According to literature survey 4-NP induces oxidative stress which causes reproductive impairment. Phytochemicals present in several plants have antioxidant properties, which provide protection against wide variety of diseases.

We are studying the ameliorative effect of *Premna integrifolia* on the effect of 4- NP, as it is one of the plant having medicinal value, predominantly having anti oxidant property used primarily to treat inflammation, immune related disease. Phyto-chemicals present in *P. integrifolia* - Glycosides, flavonoids, alkaloids, tannins, terpinoids, steroids etc. Some other phytochemicals in P. *integrifolia* with their medicinal effect have been reported such as:- L-Acetylcarnitin for energy product has positive effect on mental fatigue, Kojic acid act as an antioxidant, sorbic acid act as an antimicrobial agent, L-hydroxyproline act as diagnostic marker of liver fibrosis, Pyridoxal as vitamin B6.We can conclude by aforesaid study that this plant has an antioxidant property which can reduce the oxidative stress induced by xenobiotics like 4-Nonylphenol.

EPIDERMAL KERATINIZATION AND MUCOUS SECRETION IN A HILL STREAM FISH HARA HARA

Arunima[1,2], Swati Mittal[1], Usha Kumari[2*]

[1]Zoology Section, Mahila Mahavidyalaya, Banaras Hindu University, Varanasi-221005
Email: mohini.aru@gmail.com
[2]Department of Zoology, Institute of Science, Banaras Hindu University, Varanasi-221005

Abstract

The abundance and diversity among fishes reflect the development of specialized structures and their physiological attributes. Fish skin, unlike terrestrial vertebrates, in general, is metabolically active. The epidermis is mucogenic and is involved in the secretion of mucus; and reported to be keratinized in few fish species. The epidermis in a hill stream fish, *Hara hara* shows significant adaptive modification in relation to its habitat. Light microscopy study shows roughly conical or triangular elevated plaques separated by deep furrows. The study reveals that the triangular elevated plaques are keratinized in nature; provide mechanical protection, protection against pathogens, and hydrodynamic advantage to the fish. The furrow region epidermis, in contrast to the plaque region epidermis, different gland cells - the mucous goblet cells, the club cells and the sacciform cells are present. Mucous goblet cells show presence of different classes of glycoproteins; GPs with oxidizable vicinal diols, GPs with carboxyl groups and GPs with O-sulphate esters. These glycoprotein moieties are considered to be involved in lubrication, protection, inhibition of the invasion and proliferation of pathogenic micro-organisms. The study illustrates that the protective function of the secretory cells of the mucogenic epidermis is taken over by the keratinized cells in the keratinized structures; which are essential for the maintenance of fish against different environmental conditions to which they are exposed.

Keywords: Diversity, Hillstream, *Hara hara*, Keratinization, Glycoprotein

SYNTHESIS, STRUCTURAL AND MAGNETIC CHARACTERIZATION OF ND-DOPED $BIFEO_3$ NANORODS

Sandeep Kumar Chauhan, S. K. S. Patel

Department of Chemistry, MMV, Banaras Hindu University, Varanasi-221005
E mail: sk9598917800@gmail.com, Mobile No: +91-9125679010

Abstract

We fabricated Nd-doped $BiFeO_3$ (BFO) nanorods using a hydrothermal technique. X-ray diffraction (XRD) data and high-resolution transmission electron microscopy (HRTEM) revealed pure single-phase crystalline $Bi_{1-x}Nd_xFeO_3$ (x = 0, 0.05, 0.10) nanorods of 50 - 60 nm diameter and their structural transformation from the rhombohedral *R3c* (for x= 0 and 0.05) to the orthorhombic $Pn2_1a$ crystal structure (for x= 0.10). The addition of Nd^{3+} ions to the pure-phase BFO leads to remarkable changes in the structural and magnetic properties, which effects are caused by differences in the ionic-radii and magnetic moment between the Bi^{3+} and Nd^{3+} ions. According to the observed magnetization-field (M-H) curves, with increasing Nd^{3+} concentration, the saturation magnetization (M_S), and coercivity (H_C) increased markedly, for x = 0.10 relative to the data for x = 0. In such Nd-doped BFO nanorods samples, spin-canted Dzyaloshinskii–Moriya interaction, remarkable enhancements in the magnetocrystalline anisotropy as well as uncompensated surface ferromagnetic spin states in the antiferromagnetic core regions also were found. Such remarkable enhancements in Nd-doped BFO nanorods might offer a variety of spintronic applications.

SEASONAL VARIABILITY OF THE ARABIAN SEA AND ITS IMPACT ON SEASONAL CHANGES OF THE UPPER OCEAN CHARACTERISTICS USING REGIONAL OCEAN MODEL SYSTEM

Prabha Kushwaha and Vivek Kumar Pandey

K. Banerjee Centre of Atmospheric and Ocean Studies, Institute of Interdisciplinary Studies, Nehru Science Centre, University of Allahabad, Prayagraj- 211002, India

E-mail: prabhakushwaha14@gmail.com, vivekbhuoa@gmail.com

Abstract

In this present study, seasonal variability, correlation and bias among were examined for demonstrating the Arabian Sea (AS) variability using the regional ocean model system (ROMS). We are observing the 30 years of simulation follow the climatological run. In this regard, ROMS is integrated over AS covering [40˚E-80˚E; 5˚N-30N˚] at horizontal resolutions 1/4˚(~25km) for 30 years with 5 years spin up. All simulations show a good relation with every variable and define the seasonal variability of AS. The ROMS model simulated the physical factors like sea surface temperature (SST), sea surface salinity (SSS). In model horizontal resolution refinement significantly improves simulations. The results suggest that enhancing physical parameterizations such as the boundary layer process would lead to more advances in Arabian Sea (AS) simulations than with finding grid resolution.

Keywords : Arabian Sea, Sea surface temperature (SST), Sea surface salinity(SSS), Seasonal variability, ROMS model

SYNTHESIS OF NANOCRYSTALLINE HIGH ENTROPY ALLOY (HEA) IN AL-CU-FE-NI-TI SYSTEM THROUGH HIGH ENERGY BALL MILLING

Yogesh Kumar Yadav[1], T. P. Yadav[1,2], M. A. Shaz[1]

[1]Department of Physics, Institute of Science, Banaras Hindu University Varanasi, Uttar Pradesh-221005
[2]Department of Physics, University of Allahabad, Prayagraj, Uttar Pradesh-211002

Email: yogesh.yadav@bhu.ac.in (YKY); yadavtp@gmail.com (TPY); mashaaz@gmail.com (MAS),

ABSTRACT

High entropy alloys (HEAs) have five or more major components in them. The concentration of each fundamental component should range from 5 to 35 at.%. Because of the higher mixing entropies in their liquid or solid solution forms, these alloys are known as HEAs. The Hume-Rothery rule, which is governed by similar atomic sizes, electronegativity and valence, and similar structure, is the fundamental principle to obtain the solid solution. They are more desired and have a greater strength-to-weight ratio. Alloys with a high entropy have good structural stability, high temperature characteristics, and hardness. Alloys with high entropy can be used to create thermoelectric, superconducting, and hydrogen storage materials. The main goal of my research is to mechanically alloy equiatomic high entropy alloy (HEA) AlCuFeNiTi. X-ray diffraction (XRD), transmission electron microscopy (TEM) using the method energy dispersive X-ray spectroscopy (EDS), scanning electron microscopy (SEM), and X-ray photoelectron microscopy (XPS) were used to characterise and study the structural and morphological properties of the high entropy alloy AlCuFeNiTi. The investigation of the hydrogen storage properties of high entropy alloys and improving the hydrogen storage properties of MgH2 by high entropy alloy AlCuFeNiTi catalysts are the second and third goals of my research.

References

1. Murty, Bhagevatula Satyanarayana, Jien-Wei Yeh, Srinivasa Ranganathan, and P. P. Bhattacharjee. High-entropy alloys. Elsevier, 2019.
2. A. Kumar, T.P. Yadav, N. K. Mukhopadhyay, International Journal of Hydrogen Energy
   47 (2022) 22893-22900
3. TP Yadav, S Mukhopadhyay, SS Mishra, NK Mukhopadhyay, O.N. Srivastava, Philosophical Magazine Letters 97 (12) (2017), 494-503

Mahila Mahavidyalaya
Banaras Hindu University, Varanasi 221005
https://nsseca -2023.weebly.com