International Conference
on

Green Energy & Sustainable Environmental Technology (GESET-2023)

A special initiative on "OZONE DAY"

HYBRID MODE

16-17, September, 2023

Jointly Organized by

Raj Kumar Goel Institute of Technology, Ghaziabad, U.P.

SAVE THE ENVIRONMENT
A Society for Research Awareness and Social Development

Abstract Book & Souvenir

Sponsored by

Council of Scientific & Industrial Research
Govt. of India

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सी.एस.आई.आर.- राष्ट्रीय पर्यावरण अभियांत्रिकी अनुसन्धान संस्थान
दिल्ली क्षेत्रीय केंद्र, ए – 93,94, फेज –1
नारायणा ओद्योगिक क्षेत्र, नई दिल्ली – **110 028**, भारत
मुख्यालय: नेहरू मार्ग, नागपुर – 440020, महाराष्ट्र

From:
Dr. S.K. Goyal
Chief Scientist & Head

CSIR-National Environmental Engineering Research Institute, Delhi Zonal Centre, A-93/94, Phase-I, Naraina Industrial Area, **New Delhi – 110 028, India**
Headquarter: Nehru Marg, Nagpur - 440020, Maharashtra

MESSAGE

It is indeed pleasure to know that "SAVE THE ENVIRONMENT", a Society for Research, Awareness and Social Development, Kolkata and Raj Kumar Goel Institute of Technology, Ghaziabad are organizing two days International Conference on "Green Energy and Sustainable Environmental Technology (GESET-2023)" during September 16-17, 2023, to discuss and deliberate various challenges and technological solutions and advancements pertaining to green energy, environment, and conservation of the delicate ozone layer. The theme of 2023 International Day for the preservation of the Ozone Layer is Montreal Protocol: Fixing the ozone layer and reducing climate change. While the problem of ozone layer has been fixed to a large extent by the concerted efforts of participating countries in past three decades, the problem of climate change has created problems worldwide, warranting simple & sustainable solutions.

*At the 2021 UN Climate Change Conference (UNFCCC COP26), Hon'ble Prime Minister of India had announced "**Mission LiFE (Lifestyle***

For Environment)*", to bring individual behaviors at the forefront of the global climate action narrative. LiFE envisions replacing the prevalent 'use-and-dispose' economy - governed by mindless and destructive consumption - with a circular economy, which would be defined by mindful and deliberate utilization. It is the high time that not only the scientists need to continuously develop efficient and simple & sustainable technologies, common people also need to contribute positively by understanding and adopting "Mission LiFE" in daily life to address the ever-threatening problem of the climate change.*

I am sure with the participation and deliberations by various stakeholders including the subject experts, academicians, researchers, students and policy makers in the conference will help in addressing the national as well as global challenges aimed at. I congratulate the Organizers and wish the Conference a Grand Success.

(S.K. Goyal)

13.09.2023.

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MESSAGE

Dr. Neloy Khare
Adviser & Head (Geosciences and Seismology)

भारत सरकार
पृथ्वी विज्ञान मंत्रालय
GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES

Dated: 12th September 2023

It gives me immense pleasure to know that an International Conference on **Green Energy & Sustainable Environmental Technology** [GESET-2023] is being organized jointly by Save The Environment (STE) Kolkata/Gurugram, and Raj Kumar Goel Institute of Technology (RKGIT), Ghaziabad on 17 September, 2023 at RKGIT, Ghaziabad.

The theme of the conference on **Preservation of the Ozone Layer**: fixing the ozone layer and reducing climate change, is concurrent with the current global warming and aimed at latest developments in sustainable technologies and materials for harvesting *'Green Energy'* and conservation of the delicate '*Ozone Layer*'.

With the concern of the globally depleting Ozone layer, I believe that this conference will gather visions towards environmental sustainability by providing a premier interdisciplinary platform for academicians, researchers, practitioners and industry personnels to manifest new ideas for protection of Earth and mitigation of environmental problems and pollution.

I extend my warm wishes towards success of the conference and hope that the outcome of the conference will be helpful in tackling the climate change in a coherent manner.

(Neloy Khare)

Dr. Kshipra Misra
Convener, GESET-2023;
President, Save The Environment & Former Additional Director,
DIPAS (DRDO), Delhi

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MESSAGE

Green technology is the application of the environmental science and technology for the development and application of products, equipment and systems to conserve the natural resources and environment as well as to minimize or mitigate the negative impact on the environment from the human activities.' Green technology' may be also called as 'Clean technology'. Green technology means 'balancing the fulfillment of human needs with the protection of the natural environment and resources so that these needs can be met not only for the present but also for the future'. The field of green technology encompasses a group of environmentally friendly methods and materials, from techniques for generating non-conventional energy source such as solar power to management tools that helps in auditing green house gas emission.

Conventional green technologies have been applied in the field of water and waste water management, solid waste management, air pollution control, environmental remediation and energy conservation. Prolong storage of surface water with slow sand filtration arrangement and simple chlorination can produce drinking water conforming to BIS Standard without using energy. Traditional water purifiers, bio-sand filter, locally made earthen candle etc function as green technology and capable of removing impurities from water. Natural treatment system for municipal waste water in three- pond functional mechanism maintaining symbiotic relationship between algae and bacteria is an example of sustainable green technology for waste water management. Organic solid waste can be converted to compost under aerobic condition through windrow composting process – a green technology. To achieve water conservation, rain water harvesting process for storage and groundwater recharging does not require conventional energy. Thus green

technologies would be appropriate for application in decentralized units to achieve benefit for the society and environment.

In the above context, Save The Environment (STE), Kolkata / Gurugram and Raj Kumar Goel Institute of Technology, Gaziabad, Uttar Pradesh are jointly organizing International Conference on Green Energy & Sustainable Environmental Technology GESET- 2023 on 16th and 17th September 2023. In the two days conference scientists, academicians, research scholars, experts and policy makers will deliberate on various issues and challenges in the field of green technology and sustainable environmental technology and development.

I convey my best wishes to all.

Prof Arunabha Majumder

MESSAGE

Shri Akshat Goel
Vice Chairman
RKG Group of Institutions
Ghaziabad, U.P.

It gives me immense pleasure to know that Department of Applied Sciences & Humanities, Raj Kumar Goel Institute of Technology Ghaziabad, U.P. India jointly with Save The Environment, Kolkata / Gurugram is organizing International Conference on Green Energy & Sustainable Environmental Technology (GESET-23).

I am sure that this conference will provide a forum to National and International students, academicians, researchers and industrialists to interact and involve in Research and Innovation. Such academic events benefit the students, teachers and researchers immensely and widen the horizons of their knowledge and work experience in the field of Sustainable Energy & Green Technology. I sincerely appreciate the humble efforts of the Institute in providing a platform for students, academicians, researchers and industrialists to share their ideas and research outcome through the forum of this Conference.

I give my best wishes to all delegates and organizing committee to make this event a grand success.

MESSAGE

Dr. Laxman Prasad
Advisor,
RKG Group of Institutions
Ghaziabad, U.P.

Innovation has been the backbone for the growth of technology ever since mankind started to live on this earth. Bill Gates observed "*Never before in History has Innovation offered promise of so much to so many in so short a time*".

It gives me immense pleasure to know that Department of Applied Sciences & Humanities, Raj Kumar Goel Institute of Technology Ghaziabad, U.P. India jointly with Save The Environment, Kolkata / Gurugram has chosen "Green Energy & Sustainable Environmental Technology" as the theme for conducting an International conference GESET-23. I am sure the conference will provide adequate opportunity for all participants to share their knowledge and deliberate on various current issues connected with the subject.

I wish the organizers of the international Conference all success.

MESSAGE

Dr. D. K. Chauhan
Director Executive
RKG Group of Institutions
Ghaziabad, U.P.

It is a matter of great pleasure for me to know that Department of Applied Sciences & Humanities, Raj Kumar Goel Institute of Technology Ghaziabad, U.P. India jointly with Save The Environment, Kolkata / Gurugram has chosen "Green Energy & Sustainable Environmental Technology".

Education is always a sign of development and learning. It should be research-oriented helping society to create something new. Thinking in an innovative and new way is significant to cope with technological changes. It is also relevant for exploring and searching various aspects of education through the sustainable materials, manufacturing & energy technologies.

The response of contributors and like minded educational fraternity showing their keen interest in this conference is highly motivating. Presentation of such research papers is extremely beneficial for research scholars and stimulating factor for us to organize such conferences frequently in future. I sincerely offer my earnest gratitude to those who have contributed through their research papers at the conference.

I am sure that the conference would achieve its objective by providing a suitable platform for learning and experiencing the latest advancement in the field of industry. The cohesive efforts of a dedicated and committed team become necessary for organizing such conferences. We are fortunate enough for having such a hardworking team with us.

I wish for the grand success of the conference.

MESSAGE

Prof. (Dr.) B. C. Sharma
Director, RKGIT Ghaziabad

I am indeed happy to know about the effort taken by Department of Applied Sciences & Humanities, Raj Kumar Goel Institute of Technology Ghaziabad, U.P. India jointly with Save The Environment, Kolkata / Gurugram is organizing this International Conference on Green Energy & Sustainable Environmental Technology (GESET-23). I have gone through the list of invited speakers, technical tracks and topics of this two days event, and I am sure that it is going to be an enriching experience for the participants of this conference.

The conference is very topical in today's context when sustainable energy&green technology play an important role in most of our societal, business and research decisions. I am sure this conference will bring people with such skills together. The researchers, scientists, academicians and students working in this area will be deliberating together during this conference on various issues and challenges sustainable energy& green technology.

I thank the Department of Applied Sciences & Humanities, RKGIT, Ghaziabad for managing this important event.

I wish the conference to be a grand success.

MESSAGE

It is a matter of great delight on my part to welcome all to the International Conference on Green Energy & Sustainable Environmental Technology [GESET-2023] being organized by Save The Environment, Kolkata | Gurugram and Raj Kumar Goel Institute of Technology, Ghaziabad at the Auditorium, RKGIT (hybrid mode) from 16th - 17th September, 2023, to celebrate the World Ozone Day.

The theme highlighted by The United Nations for this year's Ozone Day is '***Montreal Protocol: Fixing the Ozone Layer and Reducing Climate Change***. The theme is all-encompassing because it addresses multiple aspects which demand attention to achieve the mega objective of reducing climate change. The steps included are not limited to industrialization, urbanization only *per se* but also pertain to certain changes which we need to incorporate in our day-to-day lifestyle. At this time, we literally need to take the issue of Ozone layer healing personally. Lessening the use of ozone-depleting substances is of prime importance because in this way we will be directly contributing to protecting millions of people from skin cancer and eye cataracts and several other illnesses. Safeguarding ecosystems will take foreground because many ozone-depleting substances are also climate warming gases.

STE continuously strives towards similar principles as aforesaid and to accomplish it, we have to pledge the action together. GESET-2023 is expected to be a wide-versed event where expert academicians, eminent scientists, active researchers and industry personnel will discuss measures to reduce the use of ozone-depleting substances. This is a long and persistent fight of protecting our precious trioxygen layer and we hope that the technical sessions in GESET – 2023 will ponder over steps to reduce depletion, salvage the effects on climate change, and collaborate as a unit for this noble mission.

I am highly indebted to our Chief Patron, **Shri Dinesh Kumar Goel,** Chairman, RKG Group; our Patrons for the event, **Shri Akshat Goel**, Vice Chairman, RKG Group; **Dr. Laxman Prasad**, GP Advisor, RKG Group; **Dr. D.K. Chauhan**, Ex Director, RKG Group; **Dr. B.C. Sharma**, Director, RKGIT and **Prof. Arunabha**

Majumder, Emeritus Professor, Jadavpur University, Ex-Director, AIIHPH, Kolkata & Patron, STE for their valuable time and kind consent to grace GESET-2023. I am grateful to **Dr. Poonam C. Kumar**, Head ASH Dept., RKGIT & Convener, GESET-2023; Co-Conveners **Dr. Mamta Goyal**, Professor, ASH Dept., RKGIT & **Mrs. Chhanda Basu**, General Secretary, STE for their whole-hearted efforts in organizing the conference successfully. I am also thankful to the Organizing Secretaries: **Dr. Reeta Chauhan**, Associate Professor, ASH, RKGIT; **Dr. Pratima Sharma**, Assistant Professor, ASH, RKGIT; **Dr. Sankha Chakrabortty**, Assistant Professor, School of Chemical Technology, KIIT Deemed to be University, Bhubaneswar & E.C. Member, STE; **Dr. Jigni Mishra**, DBT-Research Associate, IARI, New Delhi & E.C. Member, STE and Joint-organizing Secretary **Dr. Gaurav Gautam**, Assistant Professor, IIMT College of Medical Science, IIMT University, Meerut (U.P.) for their praiseworthy efforts. I sincerely thank the entire organizing committee and conference secretariat, especially **Mr. Gian Kashyap** for being there persistently. Special thanks are reserved for all the participants and audience, especially the young researchers who have contributed their innovative ideas and outlook for preserving the Ozone layer which we shall come across in this abstract book. I extend my best regards to everyone on the occasion of World Ozone Day, 2023 and welcome you all to GESET-2023.

(Dr. Kshipra Misra)
Convener, GESET-2023; President, Save The Environment (STE), Kolkata | Gurugram
www.stenvironment.org;
Former Additional Director, Defence Institute of Physiology and Allied Sciences (DIPAS), DRDO, Delhi
Mobile: 9871372350; info@stenvironment.org

MESSAGE

Dr. Poonam C Kumar
Professor
Applied Sciences & Humanities
RKGIT Ghaziabad

With great pride and honour, I take this opportunity to welcome you all to the International Conference on Green Energy & Sustainable Environmental Technology (GESET-23) on 16-17 September 2023 organized by the Department Applied Sciences & Humanities, Raj Kumar Goel Institute of Technology Ghaziabad, U.P. India jointly with Save The Environment Kolkata / Gurugram. GESET-2023 shares insight on various significant topics with upcoming trends & technologies in the field of green energy technology.

The conference seeks to provide a forum with broad blend of high-quality academic papers to promote communication, learning and exchange of ideas amongst researchers, scientists, and engineers in the field of Green Energy & Sustainable Environmental Technology. As the convener of GESET-2023, I firmly believe that the conference will serve as a nodal conjunction between the Researchers, Academicians, Learners & the Industry.

Being the convener of GESET, I take this opportunity to extend my heartiest thanks to the management of RKGIT for their valuable support and also, convey my heartiest congratulations to the Organizing Committee to undertake an arduous task in the most impeccable manner to accomplish the same. On behalf of the entire team, I welcome you all for GESET -2023and hope your stay turns intellectually stimulating and professionally enriching. With long lasting memories and a strong legacy to emulate, I am confident that every individual will be benefitted and feel enriched through this conference. I personally as well as on behalf of Applied Sciences & Humanities Department wish GESET -2023 a grand success.

MESSAGE

Dr. Mamta Goyal
Professor
Applied Sciences & Humanities
RKGIT Ghaziabad

As a co-convener of the Conference on Green Energy & Sustainable Environmental Technology (GESET-23) , it is an honor to extend a warm welcome to all of you. This conference represents a collaborative effort to drive forward the green technology revolution, and your presence here is crucial to its success.

Over the next few days, we will explore ground breaking innovations and strategies for a sustainable future. Our collective commitment to environmental stewardship is evident in your participation. I want to express my deep gratitude to our sponsors, partners, and organizing team for their unwavering dedication.

Together, let's inspire change, foster innovation, and propel the world toward a greener , more sustainable future. Thank you for being a vital part of this journey.

MESSAGE

Dr. Reeta Chauhan
Associate Professor
Applied Sciences & Humanities
RKGIT Ghaziabad

It is an honor to welcome you to the conference on Green Energy & Sustainable Environmental Technology (GESET-23). As the conference secretary, I am thrilled to be a part of this vital gathering focused on sustainability and innovation. In this conference, we will delve into cutting-edge insights and ideas that hold the power to shape a greener, more sustainable world.

I want to extend our heartfelt appreciation to our sponsors and partners for their unwavering support in making this event a reality. Your commitment to environmental progress is truly commendable.

Together, let's cultivate collaboration and inspiration to drive positive change. This conference will serve as a milestone in our collective journey towards a brighter future.

Thank you for your participation, and I hope you find this experience both enlightening and transformative.

MESSAGE

Dr. Pratima Sharma
Assistant Professor,
Applied Sciences & Humanities
RKGIT Ghaziabad

It is with great pleasure that I welcome you to the conference on Green Energy & Sustainable Environmental Technology (GESET-23). As the conference secretary, I am honored to be part of this significant event dedicated to sustainability and innovation. In this conference, we have diverse range of experts who will share their insights and experiences, paving the way for a greener future.

I extend my heartfelt gratitude to our sponsors and partners whose unwavering support has made this conference possible. May the knowledge shared here inspire you to make a lasting impact in the world of green technology.

Thank you for your participation, and let's work together to create a sustainable and eco-conscious future.

MESSAGE

I extend my best wishes to the conference and hope that it will play a pivotal role in facilitating crucial discussions on sustainable strategies for clean energy production and the protection of the ozone layer. This event will bring together academics, scientists, researchers, business leaders, and policymakers, all converging at the 2nd International Conference on Green Energy and Sustainable Environmental Technology (GESET 2023) to deliberate on the latest advancements in sustainable technologies and materials for harnessing "Green Energy" while safeguarding the delicate ecosystem of the OZONE LAYER.

Furthermore, this conference will offer a premier interdisciplinary platform for researchers, practitioners, and educators to present and discuss the most recent developments in the field of sustainable technology. It is my hope that such scientific gatherings will be organized regularly, ensuring the continual transfer of knowledge from experts to students and decision-makers, with the overarching goal of protecting the Earth by mitigating various environmental problems, including air pollution, water pollution, and other forms of pollution.

I want to express my commendation and deep appreciation to the organizing committees for their dedicated efforts in making this conference a reality. I am confident that the participants will derive significant benefits from the proceedings, and I reiterate my sincere wishes for the conference's resounding success.

(Dr. Sankha Chakrabortty)
Organizing Secretary, GESET-2023

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Raj Kumar Goel Institute of Technology (RKGIT)

Raj Kumar Goel Institute of Technology (RKGIT), is a self-financed institute located in Ghaziabad, India. It is affiliated to Dr. A.P.J. Abdul Kalam Technical University, Lucknow. Raj Kumar Goel Institute of Technology was established in 2000 by late Sri Raj Kumar Goel, a well known industrialist. The institute is recognized by All India Council for Technical Education (AICTE) and Pharmacy Council of India (PCI). The Institute provides education to the students of Engineering, Pharmacy and Management at under graduate and post graduate level. The Institute is well known for its quality of education in the BTech, Management and Pharmacy. The ECE, IT and Pharmacy programmes of the Institute are accredited by NBA of India.

SAVE THE ENVIRONMENT

SAVE THE ENVIRONMENT (STE), Kolkata was registered on 29th November 1990 under the West Bengal Societies Registration Act. Since then, STE has been involved in various projects related to solving the long standing issue of arsenic contamination in groundwater in India. Some of the major activities undertaken by the society are given below.

- In 1992, with the collaboration of WWF (India), STE started actively working for resolving groundwater arsenic poisoning in several arsenic prone districts of West Bengal.
- In 1994, STE began working in close association with All India Institute of Hygiene & Public Health, Kolkata which led to installation of STE's first arsenic removal plant in 1997. The plant was inaugurated by the Minister of PHED (West Bengal) on 23rd January, 1997.
- In the year 2000, in collaboration with AIIH&PH and Indo-Canada Environment Facility, STE started a community based program to mitigate arsenic pollution in West Bengal.
- In June 2001, STE had an opportunity to start a special clinic, which is first of its kind to provide free treatment to patients of arsenic poisoning. A vocational training centre was inaugurated for the arsenic patients in 2003 and setting up of a special hospital for arsenic patients is under process.
- STE is working very actively with DRDO, Ministry of Defence, India to promote and implement a patented, low cost arsenic removal technology developed by DRDO.
- STE has successfully completed three projects from Department of Science & Technology, Government of India to propagate and implement arsenic and iron removal technologies in the affected areas.

International Conference on

Green Energy & Sustainable Environmental Technology (GESET-2023)

16 to 17 September, 2023

Raj Kumar Goel Institute of Technology, Ghaziabad, Uttar Pradesh, India

Jointly Organized by

Raj Kumar Goel Institute of Technology, Ghaziabad, U.P.

SAVE THE ENVIRONMENT
A Society for Research Awareness and Social Development

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- STE, with the help of Indian Institute of management (IIM), Ahmedabad has developed a model for sustainability of arsenic mitigation programs in rural setups of India
- Projects on an extensive scale have been eventuated to mitigate arsenic / iron problem in 24 Parganas (N) & Nadia districts in West Bengal, Ballia district in Uttar Pradesh, Bhagalpur District in Bihar and Agartala in Tripura. Since 1997 till date, STE has had the privilege of supplying arsenic-free drinking water to more than 1, 00, 000 people in India.
- About 60 community type arsenic removal plants have been installed and more than 5,000 domestic filters have been distributed so far.
- Also, STE regularly conducts health camps along with doctor volunteers in rural areas of West Bengal with the aim to eradicate arsenic poisoning in India.
- Apart from these, STE proactively organizes conferences, workshops, seminars, sit and draw competitions and science fairs, with the noble objective of propagating awareness among the general public, regarding environmental protection.

Tree Plantation & Cleanliness Drive at North Avenue City Centre – Durgapur | Environment Day Celebrated at Hrishikesh Park – Kolkata | Earth Day Celebrated at GIS, Durgapur | Workshop on Arsenic Contamination and Sustainable Technological Solutions in India Held at NSHM, Durgapur | Rashtriya Swachhta Divas Awareness, Motivation and Providing Safe Drinking Water Program through Savior Technology Solar Power in Tripura | Implementation of Cost Effective Household Arsenic Removal Technology in West Bengal, Bihar & U.P. | Decentralized Community based Iron & Arsenic Mitigation Project in Tripura | Demonstration of Cost Effective and Indigenous Domestic Arsenic Remediation Technology for Arsenic Mitigation in Arsenic Affected Community Based Projects to Mitigate Arsenic Pollution in West Bengal | Arsenic Removal Plant In West Bengal | HIV/AIDS Program | Arsenic Mitigation Program.

Snippets of general public operating the simple, cost effective DART filter in West Bengal. Various workshops and awareness programs on arsenic contamination issue organized by STE in (below) Shiv Nadar University, Greater NOIDA, Uttar Pradesh and (overleaf) Goenka International School, Durgapur & NSHM, Durgapur, West Bengal.

International Conference on

Green Energy & Sustainable Environmental Technology (GESET-2023)

16 to 17 September, 2023

Raj Kumar Goel Institute of Technolog y, Ghaziabad, Uttar Pradesh, India

STE Annual Awards 2023

(NOMINATION AND APPLICATIONS ARE INVITED)

LAST DATE 31st October, 2023

Annual Awards of STE are the tangible symbol to signify eminence of contributions made by a person or institution. This boosts the enthusiasm of the contributors who have contributed in different fields of science and social service with their excellence, expertise and approach towards achieving certain goals for the society. Recognition of such extraordinary activities is eventually very important to boost their confidence and to honour them for what they have done for the science and society. STE confers following categories of awards and honours to such eminent personalities.:

STE Dr. APJ Abdul Kalam Award

STE Dr. Praloy O Basu Life Time Achievement Award

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Raj Kumar Goel Institute of Technology, Ghaziabad, U.P.

SAVE THE ENVIRONMENT
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STE International Achiever Award
STE Fellowship Award
STE Green Excellence Award
STE Meritorious Award For Excellence in Academics and Research
STE Water Award
STE Women Excellence Award
STE Best Ideas/Innovations/Technology for Environment Award
STE Young Researcher (Faculty) Award
STE Young Researcher Award
STE Best School Principal Award
STE Best Teacher Award
STE Humanitarian Award for NGOs

For more information, please log on to our website
www.stenvironment.org/ste-awards/

INTERNATIONAL JOURNAL OF ENVIRONMENT AND HEALTH SCIENCES

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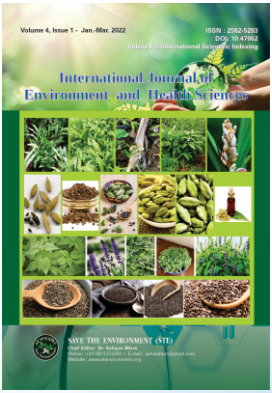

We are pleased to announce that the DOI prefix for International Journal of Environment and Health Sciences is now available from Crossref, the official Digital Object Identifier (DOI). **The journal is now indexed in International Scientific Indexing (ISI).**

For further details, please contact Chief Editor at: **ijehseditor@gmail.com** or visit our website: **www.stenvironment.org**


Abstracts

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Plenary Talks

WATER CRISIS IN INDIA AND CURRENT CHALLENGES FOR SUSTAINABLE DEVELOPMENT

Dr. K. Ranganathan

Additional Director
Central Pollution Control Board, Delhi-110023

ABSTRACT

Water, one of the essential components for survival of life has nowadays become a limited resource. Because, demand of water requirement raises due to over population and other developmental activities. Oceans hold 97.2% and merely less than 0.3% is available as usable fresh water. Rain/precipitation is the source of fresh water. India receives 4000 billion cubic meter (BCM) of rain/precipitation water and only 1122 BCM is utilizable (690 from surface resources and 432 from ground resources). Average availability of fresh water has become very low (about 1460 m3 per annum (2019) and India has become 'water stress' country. Large spatial and temporal variations in the water availability across the country increased the stress. Spatial and temporal variations are likely to further increase due to global warming/climate change. Infrastructure of large storage reservoirs and canals is required to evenly distribute water resources in space and time to ensure supply of water, where and when required. Global warming is caused by various activities Industrial emissions (CO2, methane, nitrous oxides, HCFCs), Coal Plant Emissions, Crop Burning, Forest Burning, Oil burning, Air transportation, Land Transportation, Coal mining methane, Landfills emissions etc., Climate change exists and we have to learn to adapt and save water all the time. Water resources have to be protected from all kinds of pollution. Wetlands have to be reclaimed to protect the water table and aquifers. Ground water drilling have to be properly regulated. Rain water harvesting at community level is required. Grey water can be used for flushing of toilets and irrigation of trees. Water requirement of urban areas have to be taken care to meet increased growth of population. Desalination of sea water/wastewater for supply of fresh water has to be explored. Economical water utilization in agricultural sectors by following irrigation technologies and change of cropping pattern is needed.

CLIMATE CHANGE AND INDIAN PERSPECTIVES

Rajendra Mohan Bhardwaj

Former Additional Director (Scientist E)
Central Pollution Control Board

ABSTRACT

The Climate change has been identified as one of the factors impacting overall ecosystem of living beings at global scale. The foremost requirement of ecosystem survival including human beings is the agricultural sector's vulnerability, as sufficient production and food supplies are threatened due to irreversible weather fluctuations. The prime parameter for ozone depletion was identified as chlorofluorocarbons during early phases of global warming. Another parameter of concern was CO2 and later on Methane has been added to the list. What we have achieved in last 35 years of launch of Montreal Protocol at global and local levels in reduction of green house gases have been documented widely. There are inventions by enforcement of suggested measures internationally and the concerns of developing economies such as India at global level or at local level require introspection. Various measures are implemented in India and the recent notification of Ministry of Power on the scheme of carbon credit 2023 by clause (w) of section 14 of the Energy Conservation Act, 2001 (52 of 2001) of Govt. of India is another landmark. The pathway of the carbon credit scheme would be reviewed in this presentation besides the statistical number published by global watchdogs.

Keywords: Climate change, Montreal Protocol, carbon credit.

DECARBONIZATION AND MITIGATING GHG EMISSIONS IN WASTEWATER TREATMENT: NEED FOR ADVANCED OXIDATION TREATMENT

Dr. Nupur Bahadur

NTCOE, TERI, Delhi

ABSTRACT

The use of conventional treatment approaches and high dependence on biological treatment technologies for both municipal and Industrial wastewater has led to inadequate treatment with highly resource and energy-intensive and costlier treatment making regulatory requirements non-compliant, together with high GHG Emissions in the wastewater sector. Hence there is an urgent need to understand the requirements of different streams and integrate and retrofit in current systems, advanced oxidation technologies which oxidize and remove dissolved organics and color, which in turn will enhance biodegradability and reduce load on subsequent secondary and tertiary treatment systems. TERI has developed one such Advanced Oxidation technology called TADOX® to address these issues. It has been tested for various highly polluting industrial sectors across many geographies in the country and selected for piloting and upscale in Namami Gange National Mission of the Ministry of Jal Shakti, GoI. Highly resource and energy-efficient technology with reduced treatment times to 4-5 h, reduces the footprint and has the potential to augment capacities together with reduced CAPEX by 15-20% and reduced OPEX by 30-40% as compared to current costs involved in adequate treatment and meeting regulatory compliances. Also, such interventions are expected to reduce substantially the GHG Emissions in the wastewater sector.

PERSISTENT ORGANIC POLLUTANTS-THE SILENT KILLERS

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ABSTRACT

POPs are refractory to environmental degradation and can therefore circulate in the environment for long time following emissions to air, water or soils. While the environment can serve as a reservoir of POPs emitted in the past, and as a secondary source to the environment, chemical management toward the implementation of the Stockholm Convention has internationally focused on inventorying and eliminating/limiting primary sources of regulated substances. Successful reduction of primary sources has been reflected in monitoring results that indicate globally declining atmospheric levels for some POPs (especially polychlorinated biphenyls (PCBs), hexachlorobenzene (HCB), and dichloro-diphenyl trichloroethanes (DDTs) that are steadily declining in Europe, North America, and the Arctic. New groups of substances are added to the SC over time. Between 2009 and 2022 several industrial substances such as a range of polybrominated diphenyl ethers (PBDEs) flame retardants, some perfluoroalkyl substance (such as PFOA and PFOS) used as coating agents and surfactant in several industrial applications, several polychlorinated naphthalenes and paraffins (used as insulation and thermal control oils) and some new organochlorine pesticides, have been added to the SC list.

Heterotrophic organisms accumulate POPs primarily from the diet through bioaccumulation and biomagnification. Some contaminants pass in fact along the food chain and can be accumulated at exponentially increasing concentrations in the higher trophic levels. Intake of contaminated food can be the major source of contaminants for animals (and humans) at the top of predatory chain, e.g., sea-birds and marine mammals. The highest concentrations of POPs are thus found in organisms at the top of the food chain. Even at low levels of POPs can lead to many health effects including increased cancer risk, reproductive disorders, alteration of the immune system, neuro-behavioural impairment, endocrine disruption, genotoxicity and increased birth defects.

GREEN HYDROGEN: SAFETY MANAGEMENT

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ABSTRACT

National hydrogen strategy is designed to construct a high-tech and low-carbon India brand. Addressing the nation on the 75th Independence Day, Prime Minister Narendra Modi announced the National Hydrogen Mission with an aim of making India a hub for the production and export of green hydrogen This is geared to make India energy independent before the country completes 100 years of its independence in 2047. The thrust on green hydrogen has been reemphasized in the recently concluded G20 summit too. Hydrogen is characterized by low molar mass (which indicates low gas density), Lack of odor and color (which increases difficulty of detection), Possibility of flaming (when air is mixed with a hydrogen volume fraction of only 4%).The minimum ignition energy, ignition limit range, and energy density of hydrogen indicate that H2 can be ignited easily and will release a large amount of thermal energy. Compared to natural gas, hydrogen is characterized by lower ignition temperature and faster burning velocity, which indicate that spontaneous ignition may occur if hydrogen encounters sparks or hot surfaces. Hence Ensuring safety is the highest priority for hydrogen utilization. This talk covers the various risks and hazards associated with green hydrogen handling systems and recommends ways to address them for effective safety management.

Keywords: Green hydrogen, risk and hazard.

Invited Talks

NARDOSTACHYS JATAMANSI DC. IN CARDIOPROTECTION: A NATURAL BOON FOR THERAPEUTIC REGIMENS

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ABSTRACT

Nardostachys jatamansi DC., a medicinal herb known for its diverse pharmacological properties, has garnered increasing attention in the field of cardioprotection. This abstract provides a concise overview of the therapeutic potential of Nardostachys jatamansi DC. in safeguarding the cardiovascular system and its significance as a natural boon in therapeutic regimens.

Nardostachys jatamansi DC., commonly referred to as "Jatamansi" or "Spikenard," has a rich history of use in traditional medicine systems. Recent research has shed light on its profound cardioprotective effects, making it a promising candidate for the prevention and management of cardiovascular diseases (CVDs). Studies have revealed that Nardostachys jatamansi DC. exhibits a multifaceted approach to cardioprotection. It demonstrates potent antioxidant properties, effectively scavenging free radicals and reducing oxidative stress within the cardiovascular system. Additionally, it possesses anti-inflammatory capabilities, mitigating the chronic low-grade inflammation that contributes to the development of CVDs. Furthermore, Nardostachys jatamansi DC. has shown the ability to modulate apoptotic pathways, preventing excessive cell death and preserving cardiac function. These findings underscore its potential in reducing myocardial injury and improving overall heart health.

This study underscores the growing body of evidence supporting Nardostachys jatamansi DC. as a valuable natural resource for cardioprotection. Its unique combination of antioxidant, anti-inflammatory, and anti-apoptotic properties makes it a versatile component in therapeutic regimens aimed at preventing and managing cardiovascular diseases. Nardostachys jatamansi DC. holds promise as a natural boon in the pursuit of cardiovascular health and underscores the importance of exploring the potential of traditional medicinal herbs in modern medicine.

Keywords: Nardostachys jatamansi DC., Cardioprotection, Therapeutic Regimens, Cardiovascular Diseases, Antioxidant, Anti-inflammatory, Apoptotic Pathways, Natural Medicine, Oxidative Stress, Traditional Medicine.

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MITIGATING ENVIRONMENTAL POLLUTION-INDUCED CARDIOTOXICITY: HARNESSING NATURAL PRODUCTS FOR CARDIOVASCULAR PROTECTION

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ABSTRACT

Environmental pollution has become an escalating global concern, posing a substantial threat to public health, including cardiovascular well-being. Prolonged exposure to pollutants such as air particulates, heavy metals, and chemical toxins has been associated with an increased risk of cardiovascular diseases (CVD), particularly cardiotoxicity. This study explores the potential of natural products, with a particular focus on Swerchirin, as potent cardioprotective agents against the adverse effects of environmental pollution. Swerchirin, a bioactive compound derived from *Swertia chirata*, has demonstrated remarkable potential in safeguarding the cardiovascular system. Its multifaceted pharmacological properties, including antioxidant, anti-inflammatory, and anti-apoptotic activities, make it an attractive candidate for mitigating the cardiotoxic effects of environmental pollutants. This study highlights key findings from recent studies investigating the cardioprotective mechanisms of Swerchirin such as antioxidant defenses, anti-inflammatory properties help attenuate the inflammatory response triggered by pollutant exposure, mitigating the progression of cardiotoxicity. Furthermore, Swerchirin has shown potential in preserving mitochondrial function and preventing apoptosis, crucial processes in maintaining cardiac health. By modulating mitochondrial pathways and apoptotic signaling, Swerchirin contributes to the preservation of cardiac function and structural integrity. The abstract also discusses the importance of developing natural product-based therapies to combat environmental pollution-induced cardiotoxicity, emphasizing the need for further research and clinical investigations. Harnessing the potential of Swerchirin and similar natural compounds offers a promising avenue for protecting individuals from the cardiovascular risks associated with environmental pollution. In conclusion, this study underscores the urgent need to address the burgeoning issue of environmental pollution-induced cardiotoxicity. It introduces Swerchirin as a natural product with significant cardioprotective potential, shedding light on its mechanisms of action and advocating for continued research in this vital area. By harnessing the therapeutic properties of Swerchirin and similar natural products, we can pave the way for innovative strategies to safeguard public health and protect against the cardiovascular consequences of environmental pollution.

Keywords: Environmental Pollution, Cardiotoxicity, Natural Products, Swerchirin, Cardiovascular Protection, Oxidative Stress, Inflammation

QUALITY EDUCATION FOR SUSTAINABLE DEVELOPMENT: A NEED FOR OUR BETTER FUTURE

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ABSTRACT

Today, World has more knowledge than ever before, but not everyone can benefit from it. Globally, countries have made major strides in increasing access to education at all levels and increasing enrolment rates in schools, and basic literacy skills have improved tremendously. Among youth, the literacy rate improved globally between 1990 and 2015, increasing from 83 per cent to 91 per cent. Completion rates in primary school had also exceeded 90 per cent by 2013. Despite these successes, several gaps remain. Few countries have achieved gender equality at all levels of education. In addition, 57 million children remain out of school and half of them live in some countries. A quality education is the foundation of sustainable development, and therefore of the Sustainable Development Goals. As a policy intervention, education is a force multiplier which enables self-reliance, boosts economic growth by enhancing skills, and improves people's lives by opening up opportunities for better livelihoods. The Sustainable Development targets for 2030 call for ensuring the completion of primary and secondary education by all boys and girls, and guaranteeing equal access to opportunities for access to quality technical and vocational education for everyone. Policy interventions will require improving access and improving quality, as well addressing relevant obstacles which include gender inequalities, food insecurity, and armed conflict. The present paper deals with aspects of quality education for Sustainable development.

DEVELOPMENT V. ENVIRONMENT; SUSTAINABLE DEVELOPMENT THROUGH INDIAN ENVIRONMENT LEGISLATIONS

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ABSTRACT

The term "environment" encompasses the realms of water, air, and land, including the intricate relationships between these elements and their impact on human beings, other living organisms, plants, micro-organisms, and property. India's constitutional mandate obligates the protection and enhancement of the environment, leading to the enactment of several post-independence legislations. Among these, the most significant include the Water (Prevention and Control of Pollution) Act, 1974 (Water Act), the Air (Prevention and Control of Pollution) Act, 1981 (Air Act), and the Environment (Protection) Act, 1986 (Environment Act). Under the Water Act, the Central Government is empowered to establish the Central Pollution Control Board, while State Governments are authorized to constitute State Pollution Control Boards. These boards operate under the respective government's jurisdiction and enforce regulations prohibiting the pollution of rivers and wells, imposing restrictions on effluent discharge without obtaining board consent, and prescribing penalties, including imprisonment. The Air Act extends the responsibilities of the Central Pollution Control Board and State Pollution Control Boards established under the Water Act to address air quality improvement and combat air pollution at the national level.

This piece of information also touches upon some key principles of "Sustainable Development," as derived from documents like the Brundtland Report and other international agreements. These principles include inter-generational equity, natural resource utilization and conservation, environmental protection, the precautionary principle, the polluter pays principle, obligations to assist and cooperate, eradication of poverty, and financial assistance to developing countries. However, it emphasizes that "The Precautionary Principle" and "The Polluter Pays Principle" are essential components of "Sustainable Development. The Precautionary Principle and the Polluter Pays Principle have been accepted as part of the law of the land. Article 21 of the Constitution of India guarantees protection of life and personal liberty. The public trust doctrine is a legal principle that asserts that certain natural resources, such as navigable waters and the lands beneath them, are held in trust by the government for the benefit of the public. Another doctrine, Public Trust Doctrine places a responsibility on the government to protect and manage these resources for the common good and ensures that they are not exploited or privatized in a way that harms public interests.

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WHOPPING PARTICULATE MATTERS AND NOXIOUS GASES IN THE AEROSOL ARE THE CARDINAL CAUSES OF IMMEASURABLE DEATHS IN INDIA

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ABSTRACT

Rapid, uncontrolled urban growth in Africa, Latin America and Asia has contributed to ecosystem degradation and increased pollution, with consequent serious health impacts such as carcinogenesis, myocardium infarction, damage to the immune system, as well as neurological, reproductive (e.g., reduced fertility), developmental, respiratory and other health problems. According to WHO, Yale University and World Bank, air in Delhi is most foul in the world. India is one of the countries encumbered with highest particulate matter (PM10 and PM2.5). A report of the year 2010 from Central Pollution Control Board (CPCB), New Delhi says that PM10 in Delhi touches value of 748 µg/m3. Small and mid-sized towns, above and below one million population size, in the country are equally polluted now. It was recorded that several towns are having PM10 in the range of 523 µg/m3 against the Ambient Air Quality Standards 60 µg/m3 which is alarmingly 10 times higher than the standard value. Its vexatious that heart related disorders will kill almost 20 million people by 2015, exceptionally prevalent in the Indian sub-continent. According to Global Burden of Diseases air pollution is the fifth largest cause of death in India.

Indian government has enacted several laws for protection of environment and fragile ecosystem, viz. Environment (Protection) Act, 1986, Environment (Protection) Rule, 1986, The Air (Prevention and Control of Pollution) Act, 1981and Rule 1982, Ozone Depleting Substances (Regulation and Control) Rules, 2000, Municipal Solid Wastes (Management and Handling) Rules 2000. If country does not get alert and pro-active it would lead to inevitable threat to its denizens and even to developing countries in its neighborhood.

Keywords: Air Pollution, Industrial Pollution, Lung Cancer, Particulate Matters, Heart diseases.

AN APPROACH TOWARDS GREEN ENERGY

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ABSTRACT

Green energy is a sustainable way of producing energy that has zero or minimal impact on the environment and is more sustainable due to being produced from renewable sources such as solar, geothermal, biomass, and wind. The transition to green energy has become a global challenge to combat climate change and ensure a sustainable future. The international community has witnessed a growth in renewable energy installations, technological advancements, and policy initiatives to promote clean energy sources. Major global powers, including the European Union, China, and the United States, have set ambitious targets for renewable energy adoption and are investing heavily in research, development, and infrastructure. India, as one of the world's largest and fastest-growing economies, faces the challenge of meeting its growing energy demands while simultaneously reducing carbon emissions. In response to the ongoing challenges posed by climate change, India has shifted its focus towards harnessing renewable energy sources for electricity generation. Different sectors, including solar, wind, and geothermal, are already producing a decent amount of energy to meet the energy demand. This resulted in a decrease in per capita CO_2 emissions by 3.45% from 2017 to 2020, despite the huge increase in energy demand. The government has introduced new policies and announced investments to reduce carbon emissions by 1 billion tonnes by 2030 and achieve net zero emissions by 2070. The current status of global and Indian scenario with respect to green energy and different government policies promoting the green energy transition are discussed here in this article.

Keywords: Green energy, Sustainability, CO_2 emission, Net zero

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ASSESSING THE COMPATIBILITY OF PRE AND POST EMERGENCE HERBICIDES WITH PGPRS ON PERFORMANCE OF SOYBEAN (*GLYCINE MAX* L. MERRILL)

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ABSTRACT

The study was conducted to know the compatibility of different herbicides recommended for soybean with plant growth promoting rhizobacteria (PGPR) including the native strain of *Rhizobium* so that the tolerant microbes could be used as a potential herbicide tolerant microbial culture to support the soybean crop nutritionally and on the growth performance of the soybean (*Glycine max* L. Merill) . In this study the soybean crop was inoculated by cultures of *Bradyrhizobium daqingense*, *Paenibacillus polymyxa* and *Bradyrhizobium japonicum*. As recommended herbicides for soybean pre emergence herbicides diclosulam and pendimethalin were sprayed to the soybean plant @ 52ppm/ha and @ 6ppm/ha, respectively at 5 days after sowing. Post emergence herbicides propaquizafop and imazethapyre were sprayed to the soybean plant @ 1.2ppm/ha and @ 2ppm/ha, respectively and their cocktail mix @ 4ppm/ha at 18 days after sowing . The experiment was laid out in a completely randomized design with eighteen treatments repeated three times on a soybean crop (cv: JS-9560). The results of the investigation revealed that pendimethalin was comparatively more compitable with PGPRs than diclosulam under pre emergence herbicide category. In case of post emergence herbicides propaquizafop was comparatively more compitable with PGPRs, than imzethapyre & cocktail mix of propaquizafop + imazethapyre. The propaquizafop was found safe herbicide to produce maximum biomass yield of soybean at 50 days after herbicide application (DAHA). The nodulation behavior was found significantly less affected by all the herbicidal application in presence of *Bradyrhizobium daqingense*.

Keywords: *Bradyrhizobium*, Diclosulam, Imazethapyre, *Paenibacillus polymyxa*, Pendimethalin, Propaquizafop, Soybean.

FUNCTIONALIZED MATERIALS FOR WATER PURIFICATION

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ABSTRACT

The new decade has witnessed severity in water-related problems around the globe. According to a report by UNICEF, nearly 1.2 billion people lacks access to clean drinking water, even in the modern era of science and technology. Amongst this, most of the population thrives in an area which have menace to groundwater pollutants. Some of the organic pollutants are biodegradable and hence can be removed by specific classes of bacteria, which consumes such pollutants and run its metabolic cycle. However, different class of inorganic pollutants form soluble complexes in water and continue their hazardous persistence. Some of these pollutants causes severe health implications upon consumption. Typical examples are fluoride, arsenic and heavy metals, such as, cadmium, copper, zinc and nickel.

Different methodologies such as adsorption, coagulation, ion exchange and membrane separation have been involved in the treatment of infected water streams. Some of these processes requires costly and complex materials in addition to frequent regeneration. Thus, in order to devise a frugal and relatively simple method, naturally abundant materials such as laterite (rocky soil and a rich source of iron and aluminium, especially found in the "Rarh" region of Eastern India and Plateau of Southern and Western India) and bone meal (mixture of bones of different domestic animals used in the preparation of phosphate fertilizer) was chemically treated to uptake lead and fluoride from drinking water, respectively. Intensive characterizations, followed by batch and column run was performed using these adsorbents, followed by scale up studies. Finally, a gravity-based purification filter, comprising of different layers of adsorbents, was designed and installed in an actual fluoride affected area for pilot scale monitoring.

In a different research arena, functionalized membranes, named as mixed matrix membranes, were prepared by impregnating specific inorganic in a polymer solution. The polymer-inorganic solutions were later casted to form a flat sheet membrane or extruded through an indigenous spinneret for making hollow fibers. These membranes can exploit both filtration capability of a membrane and adsorptive property of the impregnated inorganic to remove contaminants and

microorganism from polluted water stream. Natural materials and waste products, such as laterite and iron ore slime were treated and used as an inorganic dope in polyacrylonitrile and polysulfone based membrane, respectively and they showed significant results for arsenic removal. Similar results were obtained when activated alumina and treated carbonized bone meal were impregnated in cellulose acetate phthalate and polysulfone based membranes, respectively. Such membranes have high potential for scalability and treatment of real-life feed solution.

Keywords: Adsorption; Laterite; Bone meal; mixed matrix membrane; Iron ore slime; fluoride; arsenic; heavy metals; microorganisms.

PHYCOREMEDIATION OF POTENTIALLY TOXIC HEAVY METALS USING MICROALGAE: A SUSTAINABLE SOLUTION FOR ENVIRONMENTAL CLEANUP

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ABSTRACT

Water resources around the world are at risk of contamination from industrial effluents that are highly concentrated in potentially hazardous heavy metals. Heavy metals are known to be potentially harmful contaminants that pose ecotoxicity and health risks to living things; as a result, it is urgently necessary to remove them from contaminated environments to safeguard both the environment and human health. During investigation, a potential metal-remediating microalgae were isolated from aquatic ecosystems for the current study to demonstrate their potential to remove heavy metals from aquatic environments. *Chlorella pyrenoidosa* 2378 was found to remove >99.5% of the total Pb2+ during phycoremediation through biosorption. The biomass analysis by FTIR, which verified the presence of many groups, including hydroxyl, alkane, and C=C groups, revealed the biosorption of Pb2+. The ability of algae to accumulate lead was demonstrated by the intracellular location of Pb2+ by Scanning Electron Microscopy-Coupled Energy Dispersive Spectroscopy (SEM-EDS). The presence of carbonyl, carboxyl, amide, and phosphate groups in FTIR spectra suggested that they might be utilized as adsorption sites at cell surfaces in this novel Chlorella pyrenoidosa 2378, which also proved the efficiency for arsenic removal, i.e., 65.145%. Lead (Pb(II)) and arsenic (As(III)) concentrations were measured using an inductively coupled plasma-optical emission spectrophotometer (ICP-OES), and photosynthetic pigments were estimated both before and after exposure to target heavy metals. Overall, this study demonstrated the amazing potential of microalgae for phytoremediation of potentially harmful heavy metals, which is urgently necessary to safeguard the environment and the general public's health.

Keywords: Microalgae, Heavy metals, Pollution, Ecotoxicity, Phycoremediation, Environmental safety.

SUSTAINABLE DEVELOPMENT THROUGH ADVANCEMENTS IN NUCLEAR ENERGY GENERATION AND WASTE MANAGEMENT

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ABSTRACT

To meet the current population's energy demands sustainably, we need to generate a substantial amount of energy without harming the environment. This challenge is not only before developing nations but developed ones also face it. We need to balance the need for abundant energy to maintain the development with eco-friendly methods. These methods also need to promote economic growth without disturbing the ecological balance of planet earth. If we continue with current energy production practices, pollution on earth will rise significantly, leading to dire consequences. As such, there is a need that the global energy landscape should undergo a transformation. Despite certain drawbacks, nuclear energy still holds a promise due to its ability to extract large amount of energy from handful of nuclear fuel. Nuclear energy is often regarded as nature's gift to clean energy for economic and sustainable development. Ensuring the safe disposal of radioactive waste and the operation of nuclear reactors still remains a challenge. It may be noted that a foolproof method for nuclear waste disposal has not yet been established. Keeping in view the above challenges, a novel concept has emerged involving the combination of a particle accelerator and a nuclear reactor. This is commonly referred to as the accelerator-driven subcritical (ADS) reactor system popularly called as the "energy amplifier." Additionally, the energy amplifier can be used to harness military Plutonium for peaceful energy production. The details of the energy amplifier system, which not only can dispose the nuclear waste but also generates energy for the betterment of humanity will be discussed.

Participants Abstracts

5-Arylidene-2,4-thiazolidinediones as Cysteine Protease Inhibitors against *Leishmania Donovani*

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ABSTRACT

A series of 5-arylidene-2,4-thiazolidinediones were synthesized using Knoevenagel condensation and evaluated for their anti-leishmanial activity against L. donovani promastigotes and axenic amastigotes. Among the compounds tested, three were the most active, with IC50 values of 0.82-1.42 µM against L. donovani promastigotes and 0.69-1.19 µM against L. donovani amastigote. Compound 3g was the most prominent among all the tested compounds and demonstrated better anti-leishmanial properties when compared to the standard drug miltefosine (1.26 µM against L. donovani promastigotes and 1.17 µM against L. donovani amastigotes). It was insignificantly toxic compared to the standard miltefosine in THP-1 human monocytic cells. It was further evaluated for its in vitro cysteine protease (papain) inhibitory activity using Z-RR-AMC fluorogenic peptide substrate. It demonstrated promising inhibitory activity with the IC50 value of 3.42 µM. In silico docking studies also supported that the 3g is bound to cysteine protease proteins' catalytic active binding site. Anti-leishmanial properties of this class of compounds have been evaluated for the first time, and it emerged as a lead molecule from the library of compounds tested. This may serve as a template for further drug discovery in Leishmania.

Keywords: 5-arylidene-2,4-thiazolidinediones, Anti-leishmanial, Cysteine protease inhibitors, Leishmania, Michael acceptors.

Adsorption of Fluoride using agricultural waste derived biochar

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ABSTRACT

In this study, for the first time, Cajanus cajan leaf derived activated carbon was used as an adsorbent for removal of fluoride from water. Activated carbon was prepared by treating it with the FeCl3 and subsequent pyrolysis at 500 °C. The fluoride sorption experiments were carried out under batch mode to optimize the various influencing parameters such as contact time (0–5 h), dosage of adsorbent (1–6 g), initial fluoride concentration (5–20 mg/l), and pH (2–12). The best dose for adsorbent was found to 4g/l. The concentration study had shown the maximum % removal of 95.20, 92.40, 89.33, and 84.50% for 5, 10, 15, and 20 ppm fluoride concentration at 4g/l adsorbent dose. The contact time of 2 hr was observed to be the best for adsorption study. The pH study had shown that the maximum fluoride uptake by adsorbent takes place at 4.

Keywords: *Fluoride, adsorption, biochar, and wastewater.*

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An Economical and Eco-Efficient Ammonium Chloride Promoted Friedländer Condensation: A Study of Microwave-Assisted Versus Conventional Heating

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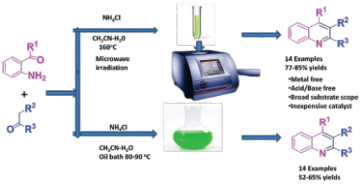
ABSTRACT

The Friedländer condensation is a common synthetic route in organic chemistry for the synthesis of polysubstituted quinolines and polycyclic quinolines, which often requires harsh reaction conditions and environmentally hazardous reagents [1]. We present an innovative approach to the Friedländer condensation in this study, focusing on both economic viability and eco-efficiency. We compare traditional heating methods with microwave-assisted techniques in order to develop a more sustainable and efficient synthetic process [2]. To facilitate the Friedländer condensation, Ammonium chloride, a cheap and readily available reagent, is used as a promoter. The use of this safe promoter not only lowers reagent costs but also follows to green chemistry principles [3], by minimising waste and environmental impact .The two heating methods reaction progress and product yields are extensively characterised and compared, revealing the advantages of microwave-assisted heating in terms of reaction speed and efficiency [4].



Furthermore, we investigate the energy consumption and carbon footprint associated with both heating methods in order to evaluate their environmental impact comprehensively [5]. Our findings show that microwave-assisted heating not only accelerates Friedländer condensation but also reduces energy consumption, making it a more environmentally friendly alternative to traditional heating [6].

This study points out the significance of environmentally conscious and sustainable approaches to organic synthesis. The use of microwave-assisted heating and the incorporation of ammonium chloride as a promoter offer an exciting prospect for the development of more eco-efficient and economical synthetic processes, contributing to the advancement of green chemistry principles in the field of organic synthesis.

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Applications of membrane integrated photocatalytic reactor for the effective separation of antibiotics: a review-based approach

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ABSTRACT

To ensure the well-being of both humans and the environment, it is crucial to effectively manage and eliminate pharmaceutical wastewater. This need arises from the presence of a wide range of harmful substances found in this wastewater. These substances include solvents, Active Pharmaceutical Ingredients (APIs), antibiotics, and elevated levels of organic matter, which pose challenges during the process of biodegradation. The accumulation of these substances in tissues can lead to both immediate and long-term adverse effects on human health, including harm to reproductive systems. Additionally, the contamination of soil and the concentration of toxins in food crops have detrimental impacts on plants. Antibiotics present in the wastewater contribute to issues such as antibiotic resistance, allergic reactions (such as penicillin allergies), and even severe conditions like cancer. Advanced methodologies like activated carbon adsorption, oxidation, Fenton reactions, ozonation, membrane filtration, and biological treatment play a crucial role in effectively neutralizing these harmful chemicals. The combined application of photo-catalysis and membrane technology holds the potential to significantly enhance the efficiency of degradation while minimizing pollution of the membranes. This collaborative approach relies heavily on membrane technology, which is well-known for its user-friendliness, small spatial requirements, and efficient product recovery. Upon implementation, photocatalytic membrane reactors not only enhance the control and efficiency of the treatment process but also ensure stability throughout the entirety of the operation.

Keywords: Active Pharmaceutical Ingredients; Separation process; Sustainable process; Photo-catalysis

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Assessment of the impact of various concentrations of crude saturated hydrocarbons on *Trichogramma brasilienses*

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ABSTRACT

In an agroecosystem, the interaction of plants, pests, and natural enemies is influenced by a blend of volatile chemical cues that work as potential signalling molecules. These signalling molecules are combinations of alkanes, alkaloids, alkenes, etc. In the present study, the trophic level of the potato crop ecosystem is targeted to observe the impact of selected straight-chain hydrocarbons. *Trichogramma brasilienses* was selected as a targeted natural enemy to assess the impact of three concentrations (25,000 mg/l, 50,000 mg/l, and 1,00,000 mg/l) of seven hydrocarbons (Hexadecane, Heptadecane, Octadecane, Nonadecane, Tricosane, Tetracosane, and Pentacosane). For this Y-tube olfactometer bioassay, studies were conducted. 1 l of selected concentration targeted pure hydrocarbons was applied on Whattman filter paper (0.2cm x 0.4 cm), which served as the source, while filter paper applied with 1 l hexane served as a control. Ten such replicas were maintained. Nonadecane elicited significant responses at 25,000 mg/l, 50,000 mg/l, and 1,00,000 mg/l concentrations of T. brasiliensis, respectively (1.300.12, p-value: 0.057, t-value: 0.286; 1.500.62, p-value: 0.454, t-value: 0.765; 1.200.61, p-value: 0.666, t-value: 0.446). *T. brasiliensis* orientation response was noticed by all hydrocarbons except Pentacosane, but a significant increase in behaviour was noticed due to Nonadecane only. Therefore, this study's focus is to develop an eco-friendly, economically sustainable, and commercially viable plan for the efficient management of *Meloidogyne* species by utilising various hydrocarbons.

Keywords: *Trichogramma brasilienses*, *Meloidogyne*, hydrocarbons.

Biotechnological Implications in the Treatment of Contaminated Soil

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ABSTRACT

The contamination of soil with total petroleum hydrocarbons (TPH) results in dramatic consequences and needs great attention as soil rehabilitation needs more effort from a sustainability perspective. Even knowing the best techniques, there is no known method which can revive the original fertility of the TPH rich soil. However, adaptive biological system dynamics can play a key role in the understanding and addressing the potential of site specific biological combinations for the removal of soil pollutants. The worst cases of TPH contamination reflect soil affected by the heavy industrial activities, such as oil refineries. Therefore, the research is being carried out for example, Zuzolo in North Italy, conducted a trail in contaminated zone near a petroleum refinery and evaluated the remediation potential over the time by evaluating phytoremediation efficiency of Poaceae and Fabaceae plant species and by assessing the role of addition of indigenous bacteria flora and endo-Mycorrhizae *consortium* for the promotion of plant growth. As a consequences, the resistance of soil towards contamination was found to be much more increased than original capacity. Moreover, by varying the functional metagenomics, the metabolic capability of hydrocarbon-degrading microorganisms present in the polluted soil was also found to be increased. Other related studies have also found to increase the level of enzymatic activities with reference to the hydrocarbon degradation.

Therefore, the present article highlights the role of biotechnology in reviving the hydrocarbon contaminated soil with the application of specific plant species. With extensive root system technology also, the soil can become more susceptible to petroleum-hydrocarbon induced stress by inhibiting the fungal infection.

Keywords: Total petroleum hydrocarbons (THP), Soil contamination, Sustainable remediation, Poaceae, Fabaceae and Mycorrhizae.

Botanical efficacy of Tagetes erecta against plant parasitic nematodes

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ABSTRACT

Soil-borne plant parasitic nematodes represent a formidable menace to agriculture globally, precipitating substantial reductions in crop yield and compromised produce quality. Through their affinity for host plants, these organisms evoke deleterious outcomes, including the development of root galls, necrosis, and chlorosis, ultimately culminating in arrested growth or, in severer instances, the fatality of the plant. At a national scale, the prevalence of plant parasitic nematode infections contributes to a notable 21.3% reduction in crop output, translating to an annual economic impact of Rs. 102,039.79 million (1.58 billion USD). Numerous agriculturists have employed chemical and synthetic pesticide applications to mitigate the adverse impacts of nematode infestations on their crops. However, the cost-intensive nature of this approach renders it inaccessible to a wide spectrum of farmers and raises concerns regarding its ecological sustainability. In response to these challenges, the effects of botanicals with inherent nematocidal properties are being extensively explored, of which various *Tagetes* species emerge as noteworthy constituents. Thus, in this present study, marigold flowers *(Tagetes erecta)* were harnessed to assess their nematicidal properties through in-vitro analysis on *Meloidogyne incognita*. The aqueous extract of dry marigold flowers was prepared across 3 concentrations: 25000 ppm, 50000 ppm, 1 lakh ppm, and 2 lakh ppm. The experiment involved the utilisation of tissue cultures, each accommodating 1 ml of nematode inoculum, constituting an approximate aggregate of 50 nematodes per well. A total of five distinct replicas for each concentration were harnessed, to which 100 microliters of marigold extract were inoculated. Subsequently, live and dead nematode populations were meticulously recorded at three distinct junctures: at 24 hours, 48 hours, and 72 hours. The cumulative results of this study revealed the best outcome at a concentration of 2 lakh ppm after an incubation period of 48 hours, with a mortality rate of 83.05%.

Keywords: *Tagetes erecta*, *Meloidogyne incognita*, Nematicide.

Comparative Analysis of Soil Properties and Soil Carbon Stock in different plantations Raised at Rourkela Steel Plant (RSP), Odisha

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ABSTRACT

Soil properties under six different tree plantations (T*ectona grandis, Cassia siamea, Alstonia scholaris, Eucalyptus* hybrid, *Simarouba glauca*, and mixed plantation) raised at Rourkela Steel Plant (RSP), Odisha were assessed. Soil samples were collected randomly from surface and subsurface layers and their soil physico-chemical parameters were analyzed using standard procedures. The data were statistically analysed using Statistical Package for the Social Sciences (SPSS) Software. Results revealed that significantly higher available nitrogen content was recorded under *Cassia siamea* plantation followed by *Alstonia scholaris*. Available phosphorous and potassium content were recorded maximum under mixed plantation compared to control. Maximum soil carbon stock was reported under *Cassia siamea* (48.29 t C/ha) followed by Mixed plantation (38.77 t C/ha). From the study, it is evident that soil physico-chemical properties are improved under all the tree plantations compared to the control and showed that the studied tree species affect soil physico-chemical parameters differently. The high soil carbon stock and available macronutrients may be related to a greater return of nitrogen and carbon through litter fall in plantation areas.

Key words: Exchangeable cations, Plantation, Soil properties, Tree species.

DES based extraction method employing for value added material synthesis from agro-biomass: A review.

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ABSTRACT

Deep Eutectic Solvents (DES) are altering a variety of industries as a viable green chemistry tool. The uses and considerable impact of DES in the creation of value-added products from agro-biomass are highlighted in this abstract, underscoring its importance and prospective advantages. Agro biomass, which includes agricultural waste and leftovers, is a plentiful resource that is underutilised but has a lot of potential for long-term value creation. Traditional extraction techniques frequently use harmful organic solvents, which not only present a concern to the environment and human health but also result in low product yields. On the other hand, DES provides an environmentally friendly substitute with remarkable qualities like low toxicity, biodegradability, and reusability. In order to isolate valuable bioactive components, such as antioxidants, polyphenols, and essential oils, DES can selectively dissolve target molecules from agro-biomass, such as cellulose, lignin, and hemicellulose. These extracted molecules are used to create high-value goods in a variety of sectors, including biofuels, food, cosmetics, and pharmaceuticals.

Researchers may regulate the characteristics of DES to control reaction conditions by carefully adjusting its composition, which enables the creation of novel materials like bioplastics, bio-based polymers, and functional nanoparticles. These materials have a great deal of potential to address environmental issues and promote sustainability.

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Development and evaluation of fast dissolving tablet containing domperidone for hyperemesis gravidarum or nausea, dysphagia and associated complications

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ABSTRACT

Environmental pollutants, allergens or stimulus impacts the body systems specially on nervous system via generating several transmit signals that cause uneasiness and vomiting, dysphagia and causes several pathphysiological complication in the body. Oral medication conveyance is the most prominent defeat. Dysphagia is a typical issue which needs to look in all times of gatherings in worry to strong dose shapes. The patient needs to improve consistency to take care of the problem of Dysphagia. The tablet which has the ability to dissolve into mouth has risen as an option in contrast to regular oral medication use. Based on present work, Orodispersible tablets of domperidone were structured to expand technique, crospovidone (2-6% w/w) Croscarmellose sodium (2-6% w/w) in the blend as super disintegrates were utilized alongside straightforwardly miniaturized microcrystalline cellulose to improve mouth feel. The tablets for clumps arranged were assessed for stiffness, friability, sedate substance, consistency, wetting time and water assimilation proportion and in vitro dissolution time. In light of in vipro scattering time (Approximately 7-30s), All detailing were tried for in vitro medication discharge design (in phosphate cradle). Check the momentary security (for three months at 40 degree centigrade/75% RH), and medication excipients connection contemplate. Among all the definition, the definition arranged by 4% Croscarmellose was found to have the least scattering time 7.36s. Momentary dependability examines the best detailing showed that not too much change was there in medication data and in vitro scattering time of span. Furthermore, the developed pharmaceuticals provides a substantial contribution via evading the complication of affordability, accessibility, and availability issues and provide the best pharmaceuticals for treating hyperemesis gravidarum or nausea as well as Dysphagia.

Keywords: Crospovidone; Croscarmellose sodium; Hyperemesis gravidarum or Nausea; Domperidone hydro chloride dispersible tablets; Dysphagia.

Eco-friendly Nematicides For Meloidogyne Spp. Management

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ABSTRACT

Plant-parasitic Root-knot nematodes of the genus Meloidogyne are seriously threatening farmers globally. They reduced crop yields significantly. Observations revealed that a variety of crops are affected by their infestation. Management techniques, like the utilisation of chemical nematicides, seem like effective means immediately, but in the long term, they are responsible for creating harmful effects on the environment and human health. Alternative strategies that are effective and environmentally friendly are thus desperately needed. The present study is an initiative towards the development of eco-friendly nematicides. For this, hexadecane and heptadecane, two straight-chain hydrocarbons, were explored for their efficiency testing as potential nematicides, especially for controlling Meloidogyne species. This will increase their acceptance of integrated pest management techniques and environmentally friendly farming methods. Two concentrations (1 ppm and 10 ppm) were chosen to calculate the dose-dependent response of the nematodes to the compounds. An in vitro experiment was designed with five replicas per treatment. Mortality percentages were used to assess the impact of these compounds on *Meloidogyne* species. The time durations of 24, 48, and 72 hours were selected to observe the temporal effects of the treatments on nematode mortality. Hexadecane at 10 ppm concentration showed a maximum mean mortality rate (51.7%) in comparison to the control, which had a mean mortality rate of 0% when observed after 72 hours of inoculation. Results show that nematodes can be effectively controlled, even at low application rates, indicating their potential as affordable and environmentally friendly substitutes for conventional chemical nematicides.

Keywords: plant-parasitic root-knot nematodes, *Meloidogyne*, nematicides.

Efficient Removal of Methyl Violet Using Fe3O4-Coir Pith Composites: Synthesis, Characterization, and Optimization

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ABSTRACT

Dye uses extend far beyond just textile colouring to include things like fertilisers, antifreeze, and detergents. However, when released into the environment, these colourants may pose genotoxic and carcinogenic risks. For this reason, it is essential to completely do away with these toxic dyes in order to foster environmental sustainability. In this research, we show that magnetically separable Fe3O4-coir pith composites can be used to effectively and affordably remove methyl violet (MV) dye without negatively impacting the environment. In a batch system, the adsorption procedure was studied with the following parameters: 308 K temperature, pH 7, contact time of 12 hours, stirring speed of 200 rpm, dye concentration of 100 mg/L, adsorbent weight of 3 g/L. Under these ideal conditions, we were able to achieve a remarkable removal efficiency of over 98% by combining the response surface methodology with core composite design in the Design-Expert software. Fisher's statistical test and analysis of variance (ANOVA) with an adjusted R2 value of 0.9914 confirmed that the experimental equilibrium data were a good fit for the Langmuir isotherm model. We looked into the kinetics (pseudo 2nd order, pseudo 1st order, intra-particle diffusion), thermodynamics, and adsorption isotherms (Langmuir and Freundlich) of the adsorbent material to get a full picture of its properties and sustainability. Overall, the results showed that the synthesised material has remarkable potential for adsorption, reusability, and sustainable application in large-scale industrial wastewater treatment processes.

Keywords: Methyl Violet, Fe3O4-Coir Pith, Adsorption.

Emerging Pollutants and Wastewater Treatment: A Decentralized Approach Post COVID-19 Pandemic.

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ABSTRACT

The COVID-19 pandemic has adversely affected the conventional wastewater treatment regime in India. The stress on the centralized wastewater treatment systems due to huge spikes of phenols, surfactants, and pharmaceutical compounds in wastewater matrix led to poor treatment and hence entry of untreated wastewater into the environment. Wastewater treatment facilities to treat various types of wastewaters are being researched greatly. The most studied areas range from use of biological processes, use of nano technology, advanced chemical, and physical process to using all these technologies in compact modular forms to serve as onsite decentralized wastewater treatment systems. This research studies the efficiency of a modified Membrane bioreactor (MBR) technology combined with novel algal bacterial consortia to treat domestic wastewater spiked with elevated concentrations of phenols and surfactants. Greater than 95% removal of various pollutants such as BOD, COD, ammonia, and nitrate was achieved and an average removal of more than 85% was observed in the case of surfactants and phenols. The effect of membrane fouling was also observed, and routine cleaning was necessitated.

Keywords: Decentralized Wastewater Treatment. Modified Membrane Bioreactors, Algal Bacterial Consortia.

Forensic Geotechanical Investigation of an Old over Head Water Tank

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ABSTRACT

This paper presents a live case study of an existing, over 40-year-old overhead water tank, resting on sandy silt soil, which has a capacity of 40,000 litres. We did a distressing analysis to identify the structural cracks that were found during the overhead tank survey in the main parts of the water tank, like the superstructure, staging, and on the ground of the water tank. This study consists of a structural survey of a water tank; Geophysical tests like the SPT Test were carried out to identify the soil up to 10.0 m near the water tank. Additionally, non-destructive tests and soil physical property tests were carried out to find out the strength of the superstructure, staging, foundation and soil condition. The cracks on the water tank are basically due to aging and prolong exposure to environmental. So a forensic geotechnical investigation helps us understand the distress that was found in the water tank and what went wrong behind the crack development on the tank. Leakage of water from supply lines was also identified, which fluctuates the groundwater table. This study tells about the detailed distress evaluation and repairs to the cracks of the tank to enhance the life span of the water tank.

Keywords: Forensic geotechnical engineering, geophysical test, overhead water tank, non destructive test.

Arsenic in Rice Grain from Groundwater Irrigation: Issues and Challenges

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ABSTRACT

Arsenic is widely distributed and it has gained notoriety for its toxic properties and adverse impact on plants, animals and human health. Arsenic contaminated groundwater (>0.01 mg/l) has been detected in many States in India including West Bengal. Presently arsenic contamination in groundwater is spread over in 104 blocks out of 341 blocks in West Bengal. Arsenic may get ingested in human body through drinking water and food or inhalation of air polluted with arsine. Accumulation of arsenic in human body may cause arsenicosis. Action plan for mitigation of arsenic problem includes supply of river water through piped water supply system after conventional treatment, supply of pond water after appropriate treatment, use of safe water by roof top rain water harvesting, supply of groundwater from arsenic free deeper aquifers by installing bore wells, supply of groundwater after removal of arsenic from contaminated water, use of rainwater and surface water as far as practicable for irrigation, regular water quality monitoring, proper diagnosis and treatment of arsenicosis patients, providing nutritional support to the villagers in arsenic affected areas and to organize awareness and motivation campaign.

Field study conducted in four districts of West Bengal (South 24 Parganas, North 24 Parganas, Nadia and Murshidabad) revealed presence of arsenic in rice grains in the range between 75 and 4270 µg/kg. Prolong consumption of µg/kg rice having arsenic beyond 500 µg/kg may pose risk to the consumers. Arsenic concentration in rice depends on the concentration of arsenic in groundwater used for irrigation as well as in soil. Study was carried out in the laboratory to assess extent of arsenic reduction in rice by the process of soaking of rice in arsenic free water before cooking. It was found that by keeping 100 gms of rice in 400 ml of arsenic free water, reduction of arsenic content in rice could be between 59.58 % and 69.42 % in a period ranging from 2 to 10 hours. Thus certain practice if followed before cooking of rice may reduce risk from arsenic considerably.

Impact of *Calotropis procera* extract on the plant parasitic nematode *Meloidogyne incognita*

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ABSTRACT

Plant-parasitic nematodes (PPNs), inhabitants of host plant peripheral soil, frequently infest the root and cause node formation. Their presence can significantly decrease the plant's food intake, eventually leading to its demise. A variety of economically valuable vegetables, fruits, cereals, and oilseed crops face severe loss due to their infestation. Thus, PPNs are a great challenge for agriculturists. To control this farmer, use harmful chemical pesticides, which are responsible for generating adverse impacts on the environment. In the human population, several ill effects of pesticide residues are also reflected. To overcome this problem, an eco-friendly, sustainable, farmer-friendly solution is required. In the present study, various concentrations of hexane extract from *Calotropis procera* flowers (which is known for its insecticidal activities) were tested on plant-parasitic nematodes, *Meloidogyne incognita* species. For this. In vitro studies were performed. A hexane extract of Calotropis flower was prepared. Different concentrations were prepared (i.e., 100%, 50%, and 25%). Hexane serves as a control. Five replicas were maintained. The observation was taken for 24, 48, and 72 hours. The number of dead and live nematodes in all these concentrations was calculated. The results indicated a high mortality rate amongst them of 18.266% in a 25% concentration for 24 hours when compared to the control, which is 7.42%. This experiment study provides valuable insights into potential organic methods for nematode control, which could be an eco-friendly and sustainable approach to protecting plants from these harmful pests.

Keywords: plant parasitic nematodes (PPNs), *Meloidogyne*, Nematicides, *Calotropis procera*.

Interconnected Health Realities: Exploring the Impact of COVID-19 and Other Health Diseases

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ABSTRACT

The emergence of COVID-19 in late 2019 unveiled a global health crisis of unprecedented magnitude, prompting a renewed examination of the intricate interplay between infectious diseases and broader public health contexts. This article thoroughly explores the multifaceted impacts of COVID-19 alongside other health diseases, delving into their complex interactions and implications for healthcare systems and societies. This paper begins by elucidating the direct and indirect repercussions of the COVID-19 pandemic. Beyond its immediate health impact, COVID-19 has exposed vulnerabilities in healthcare infrastructure, strained medical resources, and generated socioeconomic disparities. Concurrently, non-communicable diseases (NCDs) continue to burden societies, contributing to a dual health crisis that warrants a holistic understanding. In addressing the broader health landscape, the paper assesses the nexus between COVID-19 and NCDs, unravelling the intricate relationships between communicable and non-communicable health challenges. It explores the potential exacerbation of NCDs due to disrupted healthcare access, altered lifestyles, and reduced physical activity during pandemic lockdowns. It also evaluates the collective responses to the pandemic and other health diseases. It examines policy measures, healthcare adaptations and technological innovations that have emerged to manage and mitigate the impact of health crises.

The paper underscores the significance of integrated health systems that address both infectious diseases and NCDs, emphasizing the need for comprehensive and resilient healthcare strategies. Through this comprehensive analysis, the paper aims to foster a nuanced perspective on the interconnectedness of health challenges. It identifies research gaps and recommends avenues for future investigation, advocating for an integrated approach that acknowledges the interplay between communicable and non-communicable diseases in shaping healthcare landscapes. This paper will also contribute to informed decision-making and policy formulation, with the ultimate goal of improving health outcomes and building resilient health systems in the face of evolving health challenges.

Keywords: COVID-19, NCD (NCDs), CD, Interconnected health Issues.

Resilience in Crisis: Oil Spill Impacts and Responses

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ABSTRACT

Oil spills have long been a concerning environmental issue, posing significant threats to aquatic ecosystems, wildlife, human health, and local economies. This article aims to provide a comprehensive review of causes, the environmental and socioeconomic impacts of oil spills, while focussing on innovative strategies and technologies for prevention, mitigation and response. It delves into the biological, chemical, and physical processes that govern the behaviour of spilt oil in different environmental conditions, shedding light on its persistence and long-term effects on marine and coastal environments. The article will also explore the socioeconomic consequences of oil spills, including disruptions to fisheries, tourism, and the livelihoods of coastal communities. A significant portion of the article is to examine the advancements in oil spill prevention and response techniques including the evolution of regulations, policies and international agreements aimed at minimizing the occurrence of oil spills. Moreover, the research highlights technological innovations such as remote sensing, predictive modelling, and autonomous robotic systems, which enhance oil spill detection and monitoring capabilities. The article also investigates the effectiveness of various oil spill response methods, ranging from mechanical containment and recovery to the application of dispersants and bioremediation. It emphasizes the need for improved training and capacity building for responders, as well as community engagement to ensure a coordinated and effective response during emergencies.

Role of Bioaugmentation in Waste Water Treatment

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ABSTRACT

During the past few decades, anthropogenic activities as well as the increased population affected the drinking water quality and its availability and hence, it became the major concern for the sustainability of life. To maintain the continuity of drinking water availability, it is necessary to set up wastewater treatment plants. 70% of the rural population in India was found to have no waste water treatment plant, proper waste disposal systems, good sanitation etc. Such wastewater comes from kitchen, washroom, industries etc. which causes serious damages to the water resources, resulting in degradation of water quality and interns give rise to the various health ailments. Since, the drinking water is the basic need for every individual, it is the need of an hour to invent and establish the wastewater treatment plants for both the rural and the urban areas. In recent years, many parts of the globe have started facing severe water shortage. The wastewater reuse methods needs to be updated as there is not enough clean water supply to meet the requirements of the whole planet. The growing population needs clean water for drinking, sanitation, irrigation etc. According to a study, about 730 megatons of waste is discharged into the natural water bodies each year from sewers and other sources. Therefore, to sustain the water resources, wastewater treatment technologies should be implemented.

Therefore, the present article compares how the domestic sewage and industrial waste can be treated in terms of operating conditions, energy consumption, bioaugmentation in various treatment methods based on different mechanisms, including their recovery and recycling etc.

Keywords: Bioaugmentation, Waste water treatment, Industrial waste, Water resources, Microbes.

Roll of neem *Azadirachta indica as a botanical for Meloidogyne species*

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ABSTRACT

Worldwide, agriculture is regarded as the source of prosperity because it generates employment, contributes to the GDP of a nation (approximately 14% of India's GDP), and provides food resources. Plant parasitic nematodes (PPNs) cause major losses in food production globally. Among these PPNs, Meloidogyne species cause significant damage to economically valuable crops. Its control is a great challenge for agriculturists. Farmers used chemical pesticides unjudicial to control these parasites. Observing the ill effects of un-judicially utilized chemical nematicides, an eco-friendly, highly efficient, and sustainable control measure for Meloidogyne is required. Thus, the proposed study is planned to search for natural compounds that can serve as an eco-friendly nematicide. To achieve this, in vivo studies were conducted to evaluate the efficacious nature of targeted botanicals against *Meloidogyne* spp. The impact of compounds present in the hexane extract of *Azadirachta indica* (neem, a common natural botanical famous for its insecticidal and nematocidal properties) was assessed. Brinjal was utilized as a test plant. In each test plant, around 500 J2 (juvenile 2) were inoculated. Five such replicas were maintained. Three aliquots of hexane extracts were prepared, i.e., 100%, 50%, and 25%. 100µl of each targeted concentration was applied to the test brinjal plant after 5 days of inoculation of the nematode population. Five replicas of the negative and positive controls were also maintained. These assemblies were held for twenty days. After twenty days, the nematode population was collected and mortality was calculated. The highest mortality was noticed at 56.61% at 50% concentration of neem extract as compared to control, which was 9.30%, and hexane, which was 18%. The preliminary investigation's findings suggest that Neem might be an achievable option for the environmentally friendly management of *Meloidogyne* species. This will serve as an aid component in the development of biopesticide formulations for the efficient management of M. *incognita*.

Keywords : Plant-Parasitic Nematodes (PPNs), Meloidogyne, nematicides, Azadirachta indica.

Separation of active pharmaceutical chemicals using novel methodologies: A review

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ABSTRACT

Pharmaceutical wastewater comprises a variety of perilous substances that pose a significant threat to aquatic life. These harmful compounds encompass a wide range of toxic elements, including solvents, metabolites, active pharmaceutical ingredients, as well as plant and animal steroids, along with metals. The introduction of active pharmaceutical ingredients into the environment has a detrimental impact on the ecosystem. These active pharmaceutical ingredients can disrupt the normal physiological processes in plants and lead to chronic harm in humans. Ensuring the health of the ecosystem necessitates the efficient removal of active pharmaceutical ingredients. This article presents state-of-the-art methods such as advanced oxidation technologies, membrane filtration, adsorption, and photocatalysis to effectively break down these active pharmaceutical compounds, considering their intricate composition and resistance to bio-degradation. Among these innovative techniques, the combination of photocatalysis and membrane separation stands out as a promising approach to address active pharmaceutical ingredients present in pharmaceutical wastewater. The integration of photocatalysis with membrane processes holds several advantages. Notably, it's environmentally friendly, enabling the efficient degradation of active chemicals while also allowing for the recovery and reuse of the photocatalyst. This photocatalytic-membrane system proves highly effective in breaking down active pharmaceutical substances, thereby promoting environmental sustainability and mitigating the environmental risks associated with these compounds.

Keywords: Pharmaceutical waste-water; Active pharmaceutical chemicals; novel methodologies; integrated system; photocatalytic-membrane system.

Sterilization Apparatus for Currency Notes

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ABSTRACT

In most places around the world, a paper cash note is traded for work and goods. People living in unsanitary situations/conditions can contaminate paper cash. While in circulation, these currencies are most likely acting as a channel for the organism to infect the accompanying customer. Paper money increases the likelihood of becoming a common vehicle for the transfer of potentially harmful microbes under a variety of individual and environmental situations. Data gathered in recent years on the microbiological condition and persistence of microorganisms on currency notes show that this could address conceivable occasional incidences of food related illness. Several studies have found bacterial contamination ranging from 60% to 100% on paper financial structures. Diverse types of people (a group of numerous people) in distinct type of environmental conditions increase the likelihood of harmful microorganism transmission. According to the study, paper money is frequently contaminated with pathogenic microorganisms, and this contamination may play a significant role in the spread of organisms that can cause serious illnesses like cholera, entrail detachment, skin conditions, and serum poisoning. The topic at hand concerns sterilization equipment in general and sterilization equipment that uses ultraviolet germicidal irradiation to sterilize an object in particular. The process of sterilization involves using different sterilization techniques to get rid of germs, bacteria, and/or other microorganisms from an object. In the current study, an apparatus for sterilization of currency notes has been fabricated and contaminated currency notes have been treated using UVC (germicidal tube light).

Keywords: Contamination; bacteria; Paper Note; Sterlization; Germicidal.

Unlocking the Secrets of Nyctanthes arbor-tristis Seeds: Insights into Maturity, Germination, and Storability for Successful Propagation and Conservation

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ABSTRACT

Nyctanthes arbor-tristis, commonly known as Night-flowering Jasmine or Parijat, holds both medicinal and ecological significance. All the parts of Nyctanthes arbor-tristis, including leaves, flowers, and bark, have been used in traditional medicine systems like Ayurveda, as they are believed to possess anti-inflammatory, analgesic, and antipyretic properties. By luring pollinators like bees, butterflies, and moths with its fragrant blossoms, it also contributes to the pollination and reproductive processes of other plant species, which is another way it plays a significant function in the environment. While research on Nyctanthes arbor-tristis has provided valuable insights, there are still gaps in understanding its propagation and conservation aspects that require further investigation. To address such issues, several projects funded by CAMPA (MoEF&CC) are underway at the ICFRE-Tropical Forest Research Institute in Jabalpur (Madhya Pradesh) for different forestry species. One such project is the All India Coordinated Research Project on Seed Technology of forestry species, which aims to utilize and further develop technology for seed processing, handling, viability, storage physiology, and the development of seed storage protocols and nursery techniques for fourteen tree species, including Nyctanthes arbor-tristis, found naturally in the forests of Central India (Madhya Pradesh, Maharashtra, and Chhattisgarh). The study found that the maturity duration of Nyctanthes arbor-tristis seeds is approximately 6-8 months after successful pollination. The fruits undergo a color change from green to brown, indicating ripeness for seed collection. Scarification followed by water soaking was found to enhance seed germination. Seed viability was assessed through regular monitoring and viability testing under different temperature and moisture conditions. In conclusion, this study provides valuable insights into the seed maturity, germination, viability, and storability of Nyctanthes arbor-tristis. Understanding these aspects is crucial for seed collection, storage, successful propagation and conservation of this culturally significant plant.

Keywords: Propagation, Conservation, Viability, Maturation.

Valorization of agro-biomass towards the processed of value added materials

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ABSTRACT

Valorization of agro-biomass mainly refers to the process where agricultural residues, industrial by-products, and food wastes are recycled and converted into high-value products and fine chemicals. This procedure of retaining products of high value from agricultural waste may substantially decrease consumption and dependence on fossil fuels. While simultaneously promoting sustainable development. Agricultural residues constitute naturally occurring lignocellulosic biomass containing high carbon content. These residues should be disposed of in a timely manner to avoid contamination, or they may be further utilized to produce bioenergy and bio-based products. Numerous methods are engaged in harnessing the potential of agro-biomass valorization, with a particular focus on lignocellulosic biomass. Emerging as environmentally friendly approaches, nanotechnology and biotechnology are currently at the forefront of efforts to enhance the value of agricultural food residues, augmenting their stability and functionalities. Beyond these, a range of supplementary processes including thermochemical conversion, biological conversion, biorefinery procedures, acid and alkaline hydrolysis, enzymatic breakdown, fermentation, anaerobic digestion, and composting, contribute to the comprehensive array of techniques employed for the valorization of lignocellulosic biomass. Lignocellulosic biomass can be transformed into an assortment of high-value-added products which includes biofuels like ethanol, fine chemicals like organic acids and phenolic compounds, nutritional supplements, cosmetics, and animal feed, using the aforementioned procedures. As a result of its unique and environmentally friendly approach, valorizing biomass has become a widely researched and valued study.

Keywords: Agro-biomass; solid waste; biomass; valorization; sustainable process.

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Vermicompost: Creating a Sustainable Earth with Respect to Health and Environment

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ABSTRACT

The need for sustainable solutions which promote both ecological balance and human well-being is critical considering the ongoing increase of both global environmental challenges and health difficulties. Vermicomposting is an innovative and environmentally friendly method of waste management that uses earthworms to break down organic waste and create compost that is rich in nutrients.The possibility of using vermicompost to build a planet that is sustainable in terms of both health and the environment is explored in this abstract. The study investigates the possibilities of vermicomposting in waste management, improving soil fertility, and lowering chemical inputs in agriculture. Vermicompost has several positive effects on human health. The potential risks connected with exposure to pesticides, herbicides, synthetic fertilisers, and food contamination are reduced since vermicompost-based agriculture practises leave no toxic chemical residues. The organic matter and beneficial microbes in vermicompost improve soil health, water retention, and nutrient availability, which enhances yields of crops by naturally suppressing plant diseases and pests and also helps in the promotion of biodiversity that ultimately conserve the ecosystem. Farmers may minimise soil and water pollution while protecting the health of agricultural workers and customers by depending more on vermicompost as a natural fertiliser instead of synthetic chemicals.

This process has various positive environmental effects. Firstly, composting using worms reduces the volume of organic waste that would otherwise be dumped in landfills, where it would contribute to the generation of dangerous greenhouse gases like methane. Emissions of greenhouse gases can be substantially reduced by redirecting organic waste towards vermicomposting. The resultant vermicompost also helps to reduce carbon dioxide emissions by functioning as a carbon sink by retaining carbon in the soil. In conclusion, Vermicomposting, provides a sustainable solution for managing organic waste that proves beneficial for the environment and human health and helps to create a cleaner, greener earth.

Keywords: Vermicomposting, Waste management, Sustainable earth, Health, Environment.

Wastewater Bioremediation using Algal Bacterial Consortia

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ABSTRACT

The increased generation of wastewater in society has led to the development of several innovative treatment solutions to treat domestic wastewater. Owing to the COVID-19 pandemic, wastewater is a hotbed of emerging contaminants such as surfactants, disinfectants and other hazardous substances. Algae-based Moving Bed Biofilm Reactor was operated to address an increasing amount of emerging contaminants. Various parameters including ammonia, carbon, surfactants and phenol were monitored for over 8 months in both batch mode and continuous mode. In the batch mode operation, the removals were at the rate of greater than 90% and 55% for surfactants and phenol, respectively. Further, a continuous mode of operation was also performed on the wastewater and various parameters were evaluated. More than 90% removal was observed for ammonia, chemical oxygen demand (COD), total phenol and non-ionic surfactants. The anionic surfactant removal rate achieved was about 70%. The removal rates have been averaged over 4 consecutive cycles of 3 days each, having an HRT of 8-hours. The study also consisted of a bacterial consortium MBBR reactor, and the ABC reactor outperformed the former. Some other parameters like the pH, DO, salinity, conductivity, TDS, UV 254 were also recorded during the duration of these 4 continuous mode operation cycles.

Keywords—Algal-bacterial consortia, Surfactant, Phenolic compounds

Disinfection of antibiotic resistant bacteria from real water samples using hybrid-Fenton process

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ABSTRACT

Gastrointestinal diseases caused by microbial contamination of water has been one of the enduring public health challenges of the mankind, wherefore demands continual innovation in the contemporary water treatment techniques. Contemporary water filtration techniques have been seen to have many shortcomings. Chances of reactivation of cells post treatment and generation of toxic bi products are some major limitations of conventional techniques. Further, they are not able to eliminate the antibiotics resistant genes of bacteria. To tackle this we have proposed a novel advanced oxidation process by integrating the effects of ultrasonication with conventional Fenton process. Real water systems (e.g. river, pond, lake and municipal tap water) represent the original environment of various microorganisms along with other chemical contaminants and nutrients. Their chemical composition is entirely vary from place to place. Along with the microbial contaminants, they also possess many chemical contaminants. Hence, the physiochemical features like conductivity, salinity, total dissolved solids and pH differs depending on the sample source. It is very important to investigate the potential of any water treatment technique in real water system from an application point of view.

Here, we have investigated the effect of ultrasound assisted Fenton process in disinfecting bacteria from real water samples. Different types of water from various sources were collected. Each of them were subjected to the disinfection process and their pattern was observed.

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Encapsulation of Citronella with solid lipid and surface modified with polysaccharide

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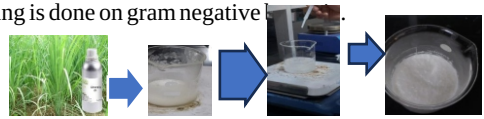
ABSTRACT

Mosquito borne diseases are very harmful for both human and animals. It can cause infection like dengue, malaria, etc. Thus, mosquito prevention is more important for today's world because there is no vaccine or any specific treatment developed for mosquito borne diseases. Several insect repellents are available in market, like spray, gel, lotion etc. but they are based on synthetic repellent like DEET, DEPA, DMP etc. Which are toxic and harmful to both human and environment. To avoid this, herbal materials can be utilized as insect repellent. The essential oils are good choices in this regard. But they have less protection time against insects as compared to synthetic repellent. Using encapsulation technology, the efficiency of essential oil can be enhanced against various insects. Here citronella oil was taken and encapsulated in solid lipid as well as in natural polymers. Encapsulated essential oil can be used in the paints because it can protect from mosquitoes when it is directly mixed in the paint. Repellent additive is safe for human as well as environment because all the ingredients of repellent additive are organic in nature.it is non- toxic for humans as well as animals, MTT assay are done on human cell line to detect the cell viability in human cell line and through viability of cell, toxicity on humans and animals can be detected of the repellent additive. Citronella oil also has antimicrobial properties the antimicrobial testing is done on gram negative b .



Keywords: Citronella, Mosquitoes, repellent, encapsulation, Antimicrobial.

Utilization of sugar mill waste for manufacturing of hollow bricks

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ABSTRACT

The burned clay hollow brick is one of the most important and often-used building components in masonry construction for providing insulation against heat as the air acts as an insulator. Worldwide Burnt clay hollow brick production from waste materials would increase brick performance at cheap production costs, reduce the environmental burden brought on by waste deposition in open landfills, and promote more environment friendly building practices. The purpose of this study is to assess the impact of adding waste from important crops-like sugarcane and other material like lime & cement. In this study, sugarcane Bagasse ash (SBA) is collected from a sugar mill that is situated in Sultanpur, Uttar Pradesh. Bagasse in the proportions of 10%, 20%, and 30%, Lime in the proportions of 5%, 10%, and 15%, and Cement in the proportions of 3%, 6%, and 9% have been used to make Clay hollow bricks in this study. Hollow bricks' Compressive Strength and long-lasting qualities are also investigated.

Keywords: Algal-bacterial consortia, Surfactant, Phenolic compounds.

DEVELOPMENT OF QUALITY STANDARD AND HEPATOPROTECTIVE EVALUATION OF INDIAN MEDICINAL PLANTS

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ABSTRACT

The escalating concerns surrounding environmental pollution have far-reaching implications for public health. The adverse effects of environmental pollutants extend beyond respiratory issues and cardiovascular diseases to encompass hepatic health, necessitating innovative solutions for hepatoprotection. This abstract elucidates the pivotal strides made in the development of quality standards for Indian medicinal plants and their hepatoprotective evaluation in the context of environmental pollution and public health. Indian traditional medicine, known as Ayurveda, has long relied on the therapeutic potential of indigenous medicinal plants. In the wake of mounting environmental pollution, the need for rigorous quality standards for these plants has become imperative. Establishing standardized criteria for the cultivation, harvesting, and processing of medicinal plants ensures the consistency and safety of herbal formulations, safeguarding public health. Moreover, amidst the rising burden of hepatotoxicity induced by environmental pollutants, the hepatoprotective potential of select Indian medicinal plants has been explored. These plants, rich in bioactive compounds, exhibit profound hepatoprotective effects by countering oxidative stress, inflammation, and hepatic damage caused by pollutants. Research endeavors have harnessed modern scientific methodologies to assess the efficacy of these plants in safeguarding hepatic health. Preclinical and clinical studies have yielded promising results, shedding light on the mechanisms by which these plants mitigate hepatotoxicity. This study underscores the convergence of environmental pollution, public health, and traditional medicine. The development of quality standards for Indian medicinal plants and their hepatoprotective evaluation represents a significant step towards ameliorating the impact of environmental pollutants on liver health. By amalgamating traditional knowledge with contemporary research, these efforts contribute to the broader mission of preserving public health in the face of environmental challenges.

Keywords: Environmental Pollution, Public Health, Hepatoprotection, Quality Standards, Indian Medicinal Plants, Ayurveda, Hepatotoxicity.

ENVIRONMENTAL POLLUTION AND PUBLIC HEALTH: PHARMACEUTICALS AS NEUROPROTECTIVE AGENTS IN COMBATING NEUROLOGICAL DISORDERS

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ABSTRACT

Environmental pollution poses a significant threat to public health, with a growing body of evidence linking it to an increased incidence of neurological disorders. This abstract shed light on the pivotal role that pharmaceuticals play in mitigating the adverse impact of environmental pollution on neurological health. Neurological disorders, including Alzheimer's disease, Parkinson's disease, and various neurodegenerative conditions, have shown alarming trends in prevalence and incidence. Many of these disorders have complex etiologies, with environmental factors, including air and water pollutants, heavy metals, and industrial chemicals, implicated as contributing factors.

Pharmaceutical interventions, often at the forefront of medical research, hold promise as neuroprotective agents against the detrimental effects of environmental pollution. This abstract highlight recent advancements in pharmaceutical research aimed at combatting neurodegeneration and preserving cognitive function. Pharmaceuticals, such as antioxidants, anti-inflammatory agents, and neurotrophic factors, have demonstrated neuroprotective properties by mitigating oxidative stress, inflammation, and neuronal damage induced by environmental pollutants. Additionally, drug repurposing and the development of novel compounds offer new avenues for therapeutic interventions. Understanding the interplay between environmental pollution and neurological disorders underscores the urgency of pharmaceutical research in safeguarding public health. This abstract emphasizes the potential of pharmaceuticals as crucial tools in the battle against neurological disorders stemming from environmental pollution, highlighting their role in preserving cognitive function and improving the quality of life for affected individuals.

Keywords: Environmental pollution, Public health, Pharmaceuticals, Neurological disorders, Neuroprotection.

QUALITY ASPECTS AND THERAPEUTIC EXPLORATION OF INDIAN MEDICINAL PLANTS FOR ANTICONVULSANT POTENTIAL

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ABSTRACT

The utilization of Indian medicinal plants for their anticonvulsant potential represents a compelling intersection of traditional knowledge and modern pharmacological research. This abstract provides insights into the quality aspects and therapeutic exploration of Indian medicinal plants, shedding light on their promising role in addressing epilepsy and related neurological disorders. Indian traditional medicine, enriched by centuries of wisdom, has long relied on indigenous plant species to manage various health conditions, including epilepsy. The quality aspects of these medicinal plants, encompassing their botanical identification, authentication, and standardization, are crucial in ensuring the safety and efficacy of herbal formulations. Rigorous quality control measures help maintain consistency in the composition and potency of plant-based remedies. Beyond quality standards, these Indian medicinal plants have attracted significant attention for their therapeutic potential in managing convulsive disorders. Recent pharmacological investigations have unveiled a plethora of bioactive compounds within these plants, such as alkaloids, flavonoids, and terpenoids, which exhibit anticonvulsant properties. These compounds act through diverse mechanisms, including modulation of neurotransmitters, ion channels, and antioxidant pathways. Research endeavors have culminated in the preclinical and clinical evaluation of Indian medicinal plants for their anticonvulsant activity. Promising results have emerged, demonstrating their ability to reduce seizure frequency, duration, and severity. Moreover, their potential to mitigate adverse effects associated with conventional antiepileptic drugs makes them particularly appealing. This study underscores the synergy between traditional knowledge and modern science in the quest for effective anticonvulsant therapies. By unraveling the quality aspects and exploring the therapeutic potential of Indian medicinal plants, this research paves the way for the development of safer and more accessible treatments for epilepsy and related disorders, contributing to improved public health outcomes.

Keywords: Indian Medicinal Plants, Anticonvulsant Potential, Quality Aspects, Therapeutic Exploration, Epilepsy.

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QUALITY CONTROL AND MULTI-TARGETED THERAPEUTIC APPROACH OF NYCTANTHES ARBOR-TRISTRIS F OR MANAGEMENT OF HEPATIC DISEASE AND ASSOCIATED COMPLICATIONS

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[2]Department of Pharmacy, IIMT College of Medical Sciences,
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ABSTRACT

Medicinal plant standardization is more concerning for their regulatory aspects based on safety, quality and efficacy as well as. Nyctanthes arbor-tristris is an Indian-origin medicinal plant that is used for numerous acute and chronic diseases. Due to the lack of an ethnopharmacological perspective based on biomolecular mechanisms, the present study is associated to explore quality-based standardization and biomolecular mechanism of Nyctanthes arbor-tristris phytochemicals as a therapeutic application regimen in liver disease and associated complications. DPPH and iron chelating effect of prepared extract of Nyctanthes arbor-tristris was examined for antioxidant effect. HPTLC and LC-MS qualitative and quantitative analysis was conducted to unravel metabolites of Nyctanthes Arbor-Tristris. Network pharmacology as well as in-silico docking analysis were performed to examine molecular interaction of ligands and targeted genes that regulate liver malfunction. Results: The results revealed that Nyctanthes arbor-tristris significantly ($p < 0.05$) scavenge DPPH free radicals and iron chelating effect and thus exhibited an antioxidant effect. HPTLC and LC-MS analysis showed several major and minor metabolites Nyctanthes arbor-tristris the content of naringenin, ferulic acid and caffeic acid was found as 1.662 ± 0.027, 4.411 ± 0.201 and 4.846 ± 0.154, respectively. Network pharmacology and in-silico docking analysis revealed the multi-targeted therapeutic effect of metabolites identified in Nyctanthes arbor-tristris against liver disease and associated pathophysiology's via regulation in the expression of several genes such as NOS, TNF-α, ILs, TLRs, ALT, etc. The study concludes that Nyctanthes arbor-tristris play a multi-mechanistic and therapeutic action against liver-associated distortion and functional inability against oxidative and inflammatory stress, hepatocytes fibrosis, apoptosis, etc.

Keywords: Hepatoprotective activity, HPTLC, LC-MS, Network Pharmacology, in silico docking analysis.

THERAPEUTIC ASPECTS OF INDIAN MEDICINAL PLANTS: A SUSTAINABLE APPROACH FOR TREATING CHRONIC CARDIAC DISABILITIES OR ASSOCIATED COMPLICATIONS

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ABSTRACT

Cardiovascular diseases (CVDs) represent a global health challenge, with chronic cardiac disabilities accounting for a significant burden of morbidity and mortality. In the pursuit of sustainable and effective therapies, traditional Indian medicinal plants have emerged as promising candidates for addressing these conditions. This abstract provides an overview of the therapeutic potential of Indian medicinal plants in the management of chronic cardiac disabilities, emphasizing the sustainable approach to harnessing their benefits. India's rich tradition of herbal medicine, documented in ancient texts like Ayurveda, has provided a foundation for contemporary research into the therapeutic properties of medicinal plants. The integration of traditional wisdom with modern scientific methodologies has led to the identification of numerous plant species with cardioprotective and anti-atherosclerotic properties. This study highlights key Indian medicinal plants known for their therapeutic potential in managing chronic cardiac disabilities. Notable examples include Gokhru, Pista, Ginger, etc. These plants contain bioactive compounds such as flavonoids, saponins, and polyphenols that exhibit antioxidant, anti-inflammatory, and lipid-lowering properties. The abstract delves into the mechanisms underlying the cardioprotective effects of these plants. They include the reduction of oxidative stress, modulation of lipid profiles, improvement in endothelial function, and anti-inflammatory actions. Additionally, their potential to enhance myocardial contractility and reduce hypertension contributes to their therapeutic efficacy. Ensuring the sustainable use of these medicinal plants is of paramount importance. The abstract underscores the need for ethical cultivation practices, protection of plant diversity, and the preservation of traditional knowledge. Sustainable harvesting, organic farming, and community-based conservation efforts play pivotal roles in this endeavor. As we navigate the complex landscape of chronic cardiac disabilities, Indian medicinal plants offer a sustainable and holistic approach to management. Further research, clinical trials, and collaborative efforts between traditional healers and modern healthcare practitioners hold the promise of innovative and effective therapies. This study underscores the potential of Indian medicinal plants as valuable assets in the pursuit of cardiac wellness and invites further exploration into their therapeutic applications.

Keywords: Medicinal Plants, Chronic Cardiac Disabilities, Cardioprotective, Traditional Medicine, Sustainable Healthcare, Ethnopharmacology

IMPACT OF OIL SPILLS ON ENVIRONMENT

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ABSTRACT

The oil we use in our homes, to generate electricity, to propel vehicles, to heat buildings and is a big source of energy to large sectors of our economy comes from fossil fuel. But oil causes big problems to marine life when it accidentally spills into the oceans, seas, lakes and ponds. The most affected sea creatures are sea otters and sea birds as well as make seafood toxic .When oil contaminates the ocean, it can release volatile organic compounds into the atmosphere. Oil spill is a major global trouble. Moreover, humans halfway rely on marine life to survive but oil can seep into the clean water which make it unsafe to consume. The impact of oil spills on the environment is an important apprehension with far-reaching upshot. These pollutants then exposed to sunlight and come up with the formation of smog and strike the environment. However, it does not directly impact the ozone layer. My presentation highlights the causes and consequences of oil spills. Besides this oil spills are also influenced by natural disasters likes storms and high winds which may damage pipelines, barges and more.

SYNTHESIS AND CHARACTERIZATION OF ZNO/GYPSUM/GELATINE NANOCOMPOSITE FILMS: STRUCTURAL ANALYSIS AND ANTIMICROBIAL EFFICACY AGAINST STAPHYLOCOCCUS AUREUS"

Swati Sucharita Singh[1,2], Amrita Mishra[2] and Suraj K. Tripathy[1,2]

[1]School of Chemical Technology, Kalinga Institute of Industrial Technology, Bhubaneswar 751024, Odisha, India
[2]School of Biotechnology, Kalinga Institute of Industrial Technology, Bhubaneswar 751024, Odisha, India

ABSTRACT

Staphylococcus aureus (S. aureus) has long been acknowledged as being one of the most harmful bacteria for human civilization. It is the main contributor to skin and soft tissue infections. The Gram positive pathogen also contributes to bloodstream infections, pneumonia, or bone and joint infections. Hence, developing an efficient and targeted treatments for these illnesses is greatly desired. Recently, studies on nanocomposites (NCs) have significantly increased due to their potent antibacterial and antibiofilm properties. These NCs provide an intriguing way to control the growth of bacteria without causing the development of resistance strains that comes from improper or excessive use of the conventional antibiotics. In this context, we have demonstrated the synthesis of a NC system by precipitation of ZnO Nanoparticles (NPs) on Gypsum followed by encapsulation with Gelatine, in the present study. Fourier transform infrared (FTIR) spectroscopy was used to validate the presence of ZnO NPs and Gypsum. The film was characterized by X-ray diffraction (XRD) spectroscopy and Scanning electron microscopy (SEM). The system exhibited promising antibiofilm action and was effective in combating S. aureus and MRSA in concentrations between 10 and 50 µg/ml. The bactericidal mechanism by release of reactive oxygen species (ROS) was anticipated to be induced by the NC system. Studies on cell survival and in-vitro infection support the film's notable biocompatibility and its potential for treating Staphylococcus infections in the future.

ENVIRONMENTAL IMPACT OF VARIOUS INDUSTRY OVER AIR QUALITY MONITORING - A CASE STUDY ON SITAPUR DISTRICT OF UTTAR PRADESH

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Dr. Rammanohar Lohia Avadh University Ayodhya, Uttar Pradesh

ABSTRACT

The study was conducted at the adjacent area of Various Industries in Sitapur District of UTTAR PRADESH to determine the physico-chemical properties of effluent of Various Industries in Sitapur District of UTTAR PRADESH and River/Canal water to know the pollution load on environment. For the present study, sampling of water effluents was conducted before and after starting the Various sugar Industries at different stations. The samples were then analyzed and it is found that the effluent of Sugar Mills does not maintain the Department of Environment (DoE) Standard and Surface Water Quality Standard. A wide variation is found in the water quality of before and after starting the mill. The EC and TDS values of the effluent and the neighboring water vary from 612 to 1306 µS/cm and 430 to 927ppm respectively. High TDS, low DO content, high BOD, COD and conductivity values with high Cl-, K+, Ca+, Mg+, $SO4^{2-}$, $PO4^{3-}$, NO^{3-} content indicates a highly polluted condition of water. It is true that sugar mill plays an important role but adversely affect the environment simultaneously. Proper way of operation and imposing laws and regulations and maintaining those strictly, can reduce pollution level. Improving technology may be the best strategy in the context of reducing pollution level and environmental damage.

Keyword: Sugar industry, effluent and environmental impact, air pollution.

DISINFECTION OF ANTIBIOTIC RESISTANT BACTERIA FROM REAL WATER SAMPLES USING HYBRID-FENTON PROCESS

Pranjal[1,2], Suraj K. Tripathy[1,2] and Amrita Mishra[2]

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[2]School of Biotechnology, Kalinga Institute of Industrial Technology, Bhubaneswar 751024, Odisha, India

ABSTRACT

Gastrointestinal diseases caused by microbial contamination of water has been one of the enduring public health challenges of the mankind, wherefore demands continual innovation in the contemporary water treatment techniques. Contemporary water filtration techniques have been seen to have many shortcomings. Chances of reactivation of cells post treatment and generation of toxic bi products are some major limitations of conventional techniques. Further, they are not able to eliminate the antibiotics resistant genes of bacteria. To tackle this we have proposed a novel advanced oxidation process by integrating the effects of ultrasonication with conventional Fenton process. Real water systems (e.g. river, pond, lake and municipal tap water) represent the original environment of various microorganisms along with other chemical contaminants and nutrients. Their chemical composition is entirely vary from place to place. Along with the microbial contaminants, they also possess many chemical contaminants. Hence, the physiochemical features like conductivity, salinity, total dissolved solids and pH differs depending on the sample source. It is very important to investigate the potential of any water treatment technique in real water system from an application point of view.

Here, we have investigated the effect of ultrasound assisted Fenton process in disinfecting bacteria from real water samples. Different types of water from various sources were collected. Each of them were subjected to the disinfection process and their pattern was observed.

RECENT ADVANCEMENTS IN DEGRADATION TECHNIQUES OF PLASTIC AND POLYMER WASTE

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ABSTRACT

Plastic and rubber pollution has become a global problem. The mismanagement of deserted and toxic plastic additives have been a menace to marine life and land fauna as well as human beings for several decades and will continue to be. However, ways have been found to hamper their shelf life through degradation or recycling the rigid non-biodegradable polymer and plastic wastes.

Thermal processes can degrade plastic at a commercial scale. However, they are energy encompassing and can generate toxic gases. Degradation of plastic waste with the help of live microorganisms came out to be an eco-friendly approach, but its use is hindered by slow processing time and low degradation rate. Some studies even indicate that through radiation technology plastic waste can be converted into a variety of useful assets and reused in multiple ways simultaneously being sustainable for environment but its use is hindered by slow processing time and low degradation rate. Although it has its own limitations clinging with the use of high energy gamma rays. Aim of my presentation is to illuminate some extensive researches done in the discipline of plastic and polymer degradation through various techniques with their respective limitations.

RECENT ADVANCEMENTS IN DEGRADATION TECHNIQUES OF PLASTIC AND POLYMER WASTE

Deepanshi Batra

Chemistry Department, SRM University, Sonepat, Haryana

ABSTRACT

Plastic and rubber pollution has become a global problem. The mismanagement of deserted and toxic plastic additives have been a menace to marine life and land fauna as well as human beings for several decades and will continue to be. However, ways have been found to hamper their shelf life through degradation or recycling the rigid non-biodegradable polymer and plastic wastes.

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SAVE THE ENVIRONMENT (STE) was founded and registered on 19th November 1990. In 1992 with the collaboration of WWF (India), the organization started working to combat arsenic poisoning problem of water in the arsenic prone areas of West Bengal. Since then STE has been involved in various projects related to combat arsenic problem in India.

Our Vision
To protect present and future generations from various environmental hazards.

Our Mission
To create awareness and motivation among rural communities & provide cost effective, energy efficient & environment friendly technologies.

Our Activities
Conducting interactive sessions, workshops/ seminars, awareness programs, field operations through projects, science fairs, posters & quiz competitions.

Please join us and become part of our family
by enrolling yourself as Life Member of STE Family

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