INTERNATIONAL CONFERENCE

on

ENVIRONMENT, WATER, AGRICULTURE, SUSTAINABILITY AND HEALTH (EWASH-2020): EXPANDING OUR VISION POST COVID-19

&

Second Annual Conference of STE

Organized by

SAVE THE ENVIRONMENT

(A SOCIETY FOR RESEARCH, AWARENESS & SOCIAL DEVELOPMENT), KOLKATA, WEST BENGAL

Souvenir & Abstracts

Organized by

सर्वे भवन्तु सुखिनः
Save The Environment
A Society for Research Awareness and Social Development

SAVE THE ENVIRONMENT

(A SOCIETY FOR RESEARCH, AWARENESS & SOCIAL DEVELOPMENT)

KOLKATA, WEST BENGAL

www.stenvironment.org

Co-organized by

CSIR-National Environmental Engineering Research Institute Delhi Zonal Centre (DZL)

The Royal Society of Chemistry North India

Environment and Social Development Association (ESDA), Delhi

Hindu College, University of Delhi Delhi

Sponsored by

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GAUR SURGICALS

"The financial assistance received from Research and Development Fund of National Bank for Agriculture and Rural Development (NABARD) towards publication of journal/ printing of proceedings of the Conference is gratefully acknowledged".

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19 to 20 December, 2020

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ABOUT THE CONFERENCE

Overview of EWASH-2020

With the rapid acceleration of science and technology, world has acquired the power to transform environment in countless ways and on an unprecedented scale. Healthy environment is essential to the enjoyment of basic human rights-the right to life itself. Protection of the human environment is a major issue which affects the well-being of people and influences overall economic development. The need of the hour is that government and general public globally must come together to safeguard our environment and create ample scope for sustainability and health improvement. We see around us growing evidence of man-made harm in many regions of the earth: dangerous levels of pollution in water, air, earth and living beings; major and undesirable disturbances to the ecological balance of the biosphere; destruction and depletion of irreplaceable resources; loss to agriculture and gross deficiencies, etc. that have deleterious impact on the physical, mental and social status of human beings. Since the beginning of 2020, mankind has encountered another health crisis in terms of COVID-19 that has taken many lives till date and has also taken a toll on the environment.

Benefits of EWASH-2020

The gathering will proffer an excellent opportunity for collegial interaction with speakers and experts to envision sustainable solutions and action plans for human and environment health.

Theme of EWASH-2020

The conference aims to bring together scientists, researchers, teachers, industry personnel, government authorities, policy makers and students from all over the globe who are actively engaged in protecting the environment with special focus on water and agriculture. En masse we shall also focus on the status of human health during COVID-19.

THEME OF THE CONFERENCE

Sub themes

- **Environment management and sustainability**
- **Water and wastewater management for agricultural and industrial applications**
- **Green Chemistry for designing a sustainable future**
- **Impact of risk factors on public health**
- **Implementation of remedial measures for social development**
- **Actuarial perspective for environment and health improvement**
- **Bioprospecting for EWASH**
- **Envisioning a modus operandi for environmental protection and health upliftment in a post Covid-19 world**
- **Channelizing the innovative young minds for building a bluer and greener earth**

ABOUT THE ORGANIZERS

Save The Environment (STE) was founded and registered on 19th November 1990 [Reg no. S/66/489 of 1990-91]. Since then, STE has been privileged to collaborate with organizations and departments of repute, like WWF (India), AIIPH, Indo-Canada environment facility, DST and DRDO to counter the long standing issue of arsenic poisoning of water, especially in rural areas of West Bengal, India. STE has also been actively engaged in spreading awareness among general public for environment protection and water management.

For further details please visit: http://stenvironment.org

NEERI

National Environmental Engineering Research Institute (NEERI), Nagpur is a constituent of Council of Scientific & Industrial Research (CSIR), New Delhi and has a nation-wide presence. It strives for application of Engineering for Sustainable Development. It provides innovative and effective solutions for environmentally sustainable development.

For further details please visit: https://www.neeri.res.in

THE ROYAL SOCIETY OF CHEMISTRY, NORTH INDIA

The Royal Society of Chemistry North India section organizes various activities for the advancement of chemical sciences. This includes lecture series, meetings and workshops on green/ sustainable chemistry, etc. for students, educators and scientists.

For further details please visit: https://www.rsc.org

ENVIRONMENT AND SOCIAL DEVELOPMENT ASSOCIATION (ESDA), Delhi

Environment and Social Development Association, Delhi is a non-government and non-profit based national organization, principally dedicated to enhancement of public awareness on preservation and up gradation of environment and management of all forms of air, waste, water and river conservation etc.

For further details please visit: http://www.esdaindia.org

Hindu College University Of Delhi, Delhi

Hindu College is a constituent college of the University of Delhi in New Delhi, India. Established in 1899, it is one of the oldest for arts and sciences in India. It offers undergraduate and postgraduate programmes in sciences, humanities, social sciences and commerce.

IQAC

For further details please visit: http://www.hinducollege.ac.in/

COMMITTEES OF THE CONFERENCE

Organizing Committee

Chief Patron

Prof. Arunabha Majumder
Emeritus Professor, Jadavpur University, Kolkata and
Former Director, AIIPH, Kolkata

Co- Patrons

Dr. Sanjeev Goyal
Chief Scientist & Head
CSIR-NEERI, Delhi Zonal Centre

Convener

Dr. Kshipra Misra
President STE &
Former Addl. Dir., DIPAS (DRDO), Delhi

Prof. R. K. Sharma
Secretary
RSC-North India Section, Delhi

Co-conveners

Prof. Anju Srivastava
Principal, Hindu College, University of Delhi
Mrs. Chhanda Basu
General Secretary, STE
Dr. Jitendra K. Nagar
General Secretary, ESDA, New Delhi

Organizing Secretary

Dr. Priyanka Sharma
Scientist, DIPAS (DRDO) & Member, STE

Co-organizing secretaries

Dr. Reena Jain
Vice Principal, Hindu College, University of Delhi
Dr. Anuja Bhardwaj
Research Associate, STE & Editor, Prakriti Sanrakshan
Ms. Jigni Mishra
Project Associate, IARI &
E.C. Member, STE

ADVISORY COMMITTEE

Dr. A. K. Datta
Former CCR&D, DRDO, New Delhi

Dr. Laxman Prasad
Group Director, RK Goel institute of Technology, Ghaziabad and Former Advisor, DST, Govt. of India

Dr. Sanjay Bajpai
Advisor/Scientist 'G' & Head, Technology Mission Division (Water and Clean Energy), DST, Govt. of India

Dr. Sanjeev Varshney
Scientist 'G' & Head, Intl. Cooperation DST, Govt. of India

Dr. P.G. Dastidar
Scientist-G, MoES, Govt. of India, Lodhi Colony, New Delhi

Dr. Raj Kumar
Director, Patel Chest Institute, Delhi

Dr. Jayashree Bhattacharjee
Former Director, Professor & Hod Department of Bio Chemistry, Faculty of Medical Sciences, University of Delhi

Dr. Mukesh Sharma
Scientist 'E' & OIC National Institute of Hydrology, Roorkee

Mr. Umesh Chandra
Executive President, ESDA & Head - HSE RPMG at NMD, Reliance Industries Limited, Mumbai

Prof. Sanjeev Agrawal
Director, ACAPC, Amity University, Gurugram & Past Addl. Director, CPCB Delhi

SCIENTIFIC COMMITTEE

Dr. Malti Goel
Chief Executive, Climate Change Research Institute, New Delhi

Dr. Susan Titus
Scientist 'G', NMRL, Ambernath, Mumbai

Dr. P. K. Rai
Joint Director, CFEES, DRDO, Delhi

Dr. Anju Srivastava
Principal, Hindu College, University of Delhi

Dr. Reena Jain
Vice Principal, Hindu College, University of Delhi

Prof. Sunil De
Professor, Dept. of Geography, North Eastern Hill Univ., Shillong
& VP, Intl. Assoc. of Geomorphologists

Dr. Neelima Alam
Scientist E, Technology Missions Division (Energy, Water & All Other)

Prof. Md. Husain
Professor, Dept. of Biotechnology, Jamia Milia Islamia, New Delhi

Dr. Kalpana Bhargava
Scientist 'F' & Addl. Director, HEMRL, DRDO, Delhi

Prof. Dinesh Rangappa
Professor & Program Coordinator, Dept. of Nanotechnology

Dr. B. Rupini
Professor, SOITS, IGNOU, New Delhi

Dr. Nupur Bose
Associate Prof. and Head,
Department of Geography,
A. N. College, Patliputra University, Patna

Dr. A. K. Gupta
Herbal Medicines & Natural Products Laboratory
Department of Biotechnology, Maharishi Markandeshwar (Deemed to be University), Mullana, Ambala

Dr. Prashant Singh
Associate Professor, Dept. of Chem., DAV (PG) College, Dehradun, UK

Dr. Anubhuti Pasrija
Principal Scientist (DRDC-Analytical), Dabur India Pvt. Ltd.

Dr. Sayeed Ahmad
Associate Professor, Dept. of Pharmacognosy & Phytochemistry,
Jamia Hamdard University, New Delhi.

Dr. Nupur Bahadur
Fellow, Water Research Group
TERI-Deakin Nano Biotechnology Centre, Gurugram

Dr. Jaswinder Singh Maras
Assistant Professor, Molecular and Cellular Medicine, ILBS, New Delhi

Dr. Sonam Dutta
Assistant Prof., Dr. Bhim Rao Ambedkar College, University of Delhi

Dr. Saurabh Jyoti Sarma
Assistant Prof., Dept. of Biotechnology,
Bennett Univ., Greater NOIDA

Dr. Seema Kalra
Assistant Professor, Biochemistry, IGNOU

Mr. Mahidhara Davengere
Founder & M.D., Pramartha Analytics Pvt. Ltd.

Dr. Vaishali Mishra
ITL Public School, Sector-9, Dwarka, New Delhi

प्रो. बिमल कुमार रॉय
अध्यक्ष
Prof. Bimal Kumar Roy
Chairman

भारत सरकार
राष्ट्रीय सांख्यिकी आयोग
C-विंग, तीसरा तल, पुष्पा भवन, नई दिल्ली-110062
Government of India
National Statistical Commission
C-Wing, 3rd Floor, Pushpa Bhawan, New Delhi-110062
फोन /Tel : 29967127
E-mail : chairperson-nsc@gov.in

Message

I feel very happy that Save The environment (STE), Kolkata based NGO along with CSIR-NEERI, RSC, ESDA and Hindu College (DU) is organizing International Conference on 'Environment, Water, Agriculture, Sustainability and Health (EWASH-2020): Expanding Our Vision Post COVID-19'. The topic is most appropriate & timely and I would like to congratulate the organisers for their efforts.

Very good diverse set of speakers and participants reflects the professionalism and capable leadership. It is a valuable forum for all technical and social working people to discuss important environmental issues related to water, health & agriculture which are concerned globally. This is a platform provided by STE and other co-organizers, where experts/ faculty/ students and others including social workers can share their views to manage some of the most challenging environmental problems and explore possible collaboration between STE and others such as academia, Government organizations and NGO's.

Human has right to access to safe and sustainable water and environmental conditions but at the same time it is our moral responsibility to maintain these natural resources for the present and future generations. The indiscriminate withdrawal of ground water for agricultural, industrial and domestic supply, coupled with unabated pollution of surface water sources are behind the present crisis. We have to conserve our resources even under the current health-crisis of Covid-19. As a part of Government's efforts to contain spread of COVID – 19, the Ministry of Statistics and Programme Implementation (MoSPI) has taken several preventive measures like implementing various schemes to facilitate officials in developing health infrastructures at various levels. The need of the hour is to sensitize people and create as much public awareness as possible regarding sustainability of natural resources. I hope, the conference would address the issues and the experts participating in the conference would be able to formulate some workable recommendation for the policy planners. It's my great pleasure to wish the reputation & growth of STE under the present leadership. My heartiest congratulation and best wishes for the effective, successful and productive conference- EWASH-2020.

Best regards,

Dated : 15 December, 2020.

(Bimal Kumar Roy)

भारत सरकार
विज्ञान और प्रौद्योगिकी मंत्रालय
विज्ञान और प्रौद्योगिकी विभाग
टेक्नोलॉजी भवन, नया महरौली मार्ग
नई दिल्ली-110 016

GOVERNMENT OF INDIA
MINISTRY OF SCIENCE AND TECHNOLOGY
DEPARTMENT OF SCIENCE AND TECHNOLOGY
TECHNOLOGY BHAVAN, NEW MEHRAULI ROAD
NEW DELHI-110 016

D.O. No. INT/ILTP/E-WASH

Dated ..... December 15th, 2020

Message

I am delighted to note that in its second annual meeting "Save the Environment" is organising an International Conference on Environment, Water, Agriculture, Sustainability and Health.

Current pandemic has created several new normals. This has made us realize how important is the "Mother Nature" and also that there are ways and means to correct itself if human activities continues to pollute and make Earth an unliveable planet. Nature has done such corrections in past also, one of the examples is elimination of large creature dinosaurs after massive lava explosion through immense dust in atmosphere, preventing sun and good quality air to come to its surface.

Since the beginning of industrial revolution, until this pandemic hit, very few cared for environment, which included water budgeting, air pollution, and sustainability. Most of the conversations were made for records only and very few recommendations after global discussions were really implemented. The challenge of a tough regime has both social and political dimensions. Citizens across the world resist change. That's why after several declaration, including Montreal, Tokyo and Rio declaration, we are still thinking and planning on how to save the earth.

Post pandemic, we have felt that it is good to be close to nature. We are learning how to save our natural resources and do sustainable development. This would also require nurturing citizens to be healthy and immune to several diseases. I am confident that in this international conference these issues would be discussed, their scientific rationale debated and some key recommendations be made to be implemented by enforcement agencies.

I wish the conference a grand success.

With best wishes,

Sincerely yours

SK Varshney

सी. एस.आई. आर.- राष्ट्रीय पर्यावरण अभियांत्रिकी अनुसंधान संस्थान
दिल्ली क्षेत्रीय केंद्र, ए – 93,94, फेज -1
नारायणा ओद्योगिक क्षेत्र, नई दिल्ली – **110 028, भारत**

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

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

December 14, 2020

Message

With continuous increase in population, worldwide and in India as well, the pace of development required to meet the needs and aspirations of people has put tremendous pressure on the natural resources and in-turn on the mother Earth. Whereas, all the resources shall remain limited in the universe and can not be enhanced. The only possible way is to continuously evolve new technologies/processes that use lesser resources and generate more products to meet the continuously increasing requirements, while minimizing/ eliminating the wastes generation. Even the minimal wastes generated that are not understood how to be utilized today, need to be put back to the environment within its assimilative capacity, as these will become resources for future generations.

It is indeed a pleasure that "*SAVE THE ENVIRONMENT*", a Society for Research Awareness and Social Development, Gurugram along with CSIR-NEERI Delhi Zonal Centre, The Royal Society of Chemistry, North India, ESDA, Delhi and Hindu College, University of Delhi, Delhi is organizing two days *International Conference on "Environment, Water, Agriculture and Health (EWASH-2020): Expanding Our Vision Post COVID-19"* during 19-20, 2020, to discuss and deliberate various key environmental challenges, *particularly under the pandemic scenario.* I am sure with the participation and deliberations by various stakeholders including the subject experts, academicians, researchers, students, policy makers and media in the conference will help positively in addressing the national as well as global environmental challenges leading to attain the sustainable development goals for the people, even in the changed scenario.

I congratulate the Organizers and wish the Conference a Grand Success.

(S.K. Goyal)

Phone: +91 11-45609107; Telefax: +91 11-45609106 Email:sk_goyal@neeri.res.in;goyalneeri@gmail.com

Green Chemistry Network Centre (GCNC) Laboratory

(Setup under the grant from Ministry of Textiles, Govt. of India)

Prof. R. K. Sharma

Ph.D., CChem FRSC
Coordinator, Green Chemistry Network Centre
Honorary Secretary
Royal Society of Chemistry London, North India Section
http://greenchem.du.ac.in/

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Tel/Fax: 011-27666250
E-mail: rksharmagreenchem@hotmail.com
rksharmagreenchem@gmail.com

Message

I am delighted to welcome all delegates to this International Conference on "Environment, Water, Agriculture, Sustainability and Health (EWASH-2020): Expanding Our Vision Post COVID-19" jointly organized by the Royal Society of Chemistry London North India Section, Save The Environment, CSIR-National Environmental Engineering Research Institute, Environment and Social Development Association and Hindu College, University of Delhi.

It is a matter of great pride that this virtual conference is being organized amidst the global pandemic which requires grave thinking, cooperative introspection and analysis on the thematic areas of the present conference. This forum would also be an excellent platform for budding researchers to explore areas of collaborative endeavors and to share latest cutting-edge research findings with the international community through oral and poster presentations. Being the Honorary Secretary of RSC London North India Section and the Coordinator of Green Chemistry Network Center, I believe that organizing scientific conferences is the best way to aspire young generations towards environmental sustainability.

It is my firm belief that through this conference, we will be able to generate productive deliberations culminating into useful recommendations in addressing the current issues related to environment, water, agriculture, sustainability and human health. I would like to thank the entire team especially the convener Dr. Kshipra Misra (President, STE) who has contributed immensely towards making this virtual event a reality. Last but not the least, my sincere thanks to all the participants for helping in accomplishing the objectives of EWASH-2020.

My best wishes for the great success of the conference.

Prof. R. K. Sharma

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Message

I feel delightfully privileged to be able to welcome all the delegates to this International Conference on Environment, Water, Agriculture, Sustainability and Health (Ewash-2020): Expanding Our Vision Post Covid-19 & 2nd Annual Meet of Save The Environment.

As the world reels from the COVID-19 pandemic, the need for this shared space for research and networking has never been more urgent. It is indeed a matter of pride that Save the Environment has taken an initiative along with co-organizers CSIR-NEERI, ESDA, RSC London North India Section, and Hindu College to provide a forum that facilitates the exchange of knowledge from experts of various fields with young scientists, researchers, and educators.

The conference covers basic science in the field of environment, agriculture, water and health. This will be a cross-disciplinary benefit to the inventors in the field. Furthermore, this conference will also facilitate the participants to expose and share various novel ideas through oral and poster presentations.

I sincerely hope that this virtual colloquium would prove to be an effective arena to exchange ideas, discover novel opportunities, reacquaint with colleagues, meet new friends and together taking a step forward towards a sustainable future through best practices in chemistry.

I would take this opportunity to thank Dr. Kshipra Misra, Convener, EWASH-2020, President, Save The Environment & Former Additional Director, DIPAS (DRDO), Delhi for extending all the possible support in organzing this conference. I am also grateful to Prof. R. K. Sharma, Honorary Secretary RSC London North India Section and Co-ordinator, GCNC, DU for his encouragement and support towards the organization of this event. I would like to congratulate the entire organizing team for their wonderful efforts.

Dr. Anju Srivastava
Principal
Hindu College

ENVIRONMENT AND SOCIAL DEVELOPMENT ASSOCIATION (ESDA)

Plot No. 3/37, F-2, Sector-2, Rajender Nagar, Ghaziabad-201005, U.P.

Dr. Jitendra K Nagar
General Secretary,
Governing Body, ESDA Delhi
Mob: 9810086649

Message

I am pleased to know about the International Conference on ***Environment, Water, Agriculture, Sustainability and Health: a vision post Covid -19 (EWASH-2020)*** on 19th -20th December, 2020 that will be virtually organized by Save The Environment, (STE), Kolkata with many eminent organizations like CSIR-NEERI, ESDA, Hindu College & Royal Society of Chemistry. I congratulate organizers of the conference for choosing such scientific and public related topics based on environment and health challenges during pandemic of COVID-19. I hope that the conference will try to delve deeper into the conundrum of science versus development debate and come out with concrete recommendation.

It is good to note that many eminent speakers from diverse disciplines would be delivering lectures on different areas of environment, health, water conservation, climate change, agriculture, medical, biotechnology, environmental microbiology and sustainability science. Also noteworthy is the fact that students, research scholars, and academicians from throughout the world would be participating and presenting their work in the Conference.

I am very happy that our Society 'Environment and Social Development Association (ESDA) Delhi is Co-Organizer of this event. Behalf of ESDA, I welcome to all the Speakers, Guests, paper presenter and delegates across the World.

I extend all my best wishes to all the Organizing Institutes and the various committee members especially Convener of the Conference **Dr. Kshipra Misra** on this occasion and wish that this Conference would be a grand success.

With deep regards and thanks,

(Dr. Jitendra K. Nagar)

SAVE THE ENVIRONMENT (STE)

(A SOCIETY FOR RESEARCH, AWARENESS & SOCIAL DEVELOPMENT)

Dr. Kshipra Misra

President, Save The Environment &
Former Additional Director, DIPAS, DRDO, Delhi
9871372350 | kmisra99@yahoo.com

Message

It is a matter of great delight that **International Conference** on '**Environment, Water, Agriculture, Sustainability and Health (EWASH-2020): Expanding Our Vision Post COVID-19'** and &**2nd Annual Meet of STE** (Save the Environment, a society for research, awareness & social development)is being organized virtually during 19 - 20 December, 2020 by **STE** along with **CSIR-NEERI**(Council of Scientific & IndustrialResearch-National EnvironmentalEngineering Research Institute),**RSC** (The Royal Society of Chemistry, North India, **ESDA**(Environment and Social Development Association)and **Hindu College of University of Delhi** as Co-organizers.

With the rapid acceleration of science and technology, human has acquired the power to transform environment in countless ways and on an unprecedented scale. Healthy environment is essential to the enjoyment of basic human rights-the right to life itself. The protection and improvement of the human environment is a major issue which affects the well-being of peoples and economic development throughout the world; it is the urgent desire of the people of the whole world and the duty of all Governments. We see around us growing evidence of man-made harm in many regions of the earth: dangerous levels of pollution in water, air, earth and living beings; major and undesirable disturbances to the ecological balance of the biosphere; destruction and depletion of irreplaceable resources; loss to agriculture and gross deficiencies, harmful to the physical, mental and social health of man, in the man-made environment, particularly in the living and working environment. With the beginning of 2020 man has encountered another health crisis in terms of COVID-19 that has taken many lives till date and has indirect effect on the environment.

With this aim, the conference is being organized to bring together researchers, government authorities and policy makers from all over India and the world who

are actively engaged in sustainability of environment, water and health.We look forward to enlighten and execution of available technological and sustainable solutions to overcome the existing crisis in natural resources and ongoing pandemic.

A successful conference involves more than keynote lectures and invited talks; it is also a meeting place, where ideas about new research projects and other ventures are discussed and deliberated. Therefore, the conference also includes poster and oral presentations. Besides, it is a wonderful opportunity for all the delegates to interact with the experts of their own field and provides an excellent netw orking opportunity to collaborate with the leading researchers and scientists.

This time due to pandemic the conference is being organized online. This has enhanced our responsibility to engage our audience both interestingly an intellectually. I am confident that the conference will generate productive deliberations culminating into useful recommendations addressing the current issues related to human health & environment. I am highly indebted to the **Chief Guest Honourable Padma Shri Prof. Bimal K. Roy,** Chairperson, National Statistical Commission and Former Director, ISI, Kolkata**; Guest of Honour Shri Vijaypal Baghel,** Eminent Environmentalist and Renowned 'Green Man of India' and allour distinguished keynote, plenary and invited speakers and chairpersons for their invaluable contribution and sharing the innovative ideas. I heartily thank our co-organizers from NEERI, ESDA, RSC and Hindu College, Delhi University for coming forward to collaborate with STE for the upcoming EWASH-2020 conference.

I also express our sincere thanks to all the organizing committee members-my team who have worked relentlessly to make this conference possible and also the participants for attending and helping in accomplishing the aim of this conference.

We are also grateful to NABARD, New Delhi for providing the financial support. Last but not the least, I also express my sincere gratitude towards Gaur Surgicals, our sponsor in this conference.

With Regards

Dr. Kshipra Misra
Convener, EWASH-2020,
President, Save The Environment &
Former Additional Director, DIPAS (DRDO), Delhi

SAVE THE ENVIRONMENT (STE)

(A SOCIETY FOR RESEARCH, AWARENESS & SOCIAL DEVELOPMENT)

Mr. Chhanda Basu

General Secretary, STE

9830779260 | save1990env@yahoo.co.in

Message

This is a matter of great delight that this year another feather would be added to STE's crown in the form of EWASH-2020. I welcome each one of you to this International Conference on Environment, Water, Agriculture, Sustainability and Health: a vision post Covid-19 (EWASH-2020) during 19th -20th December,2020 that will be virtually organized by Save The Environment, (STE), Kolkata along with other very prestigious Organizations like CSIR-NEERI, Royal Society of Chemistry, North India Chapter, ESDA, Hindu College, University of Delhi. STE has been working relentlessly for the society. This society has always made an endeavour to outreach the people so that they come up with different and implementable solutions to the environmental and health problems. Conferences have always been a great platform for scientific interactions. This conference would also see congregation of the distinguished guests, invited and keynote speakers, scientists, professors, doctors, teachers and many others. This year we are also giving a special interactive platform to our budding intellectual force (students of schools and colleges).

I hope, this conference would cover various topics which have been mentioned under sub-themes and would be able to come out with concrete suggestions or proposals for practical implementation in the society.

On behalf of STE team and also being member of Organizing Committee of EWASH-2020, I thank our Chief Guests, Hon'ble Padma Shri Prof. Bimal K. Roy , Mr. S K Varshney, Adviser &Head, International cooperation, DST, Government of India, and Guest of Honour, Shri Vijaypal Baghel for accepting our invitation and grace this occasion. I am thankful to all our keynote, plenary and invited speakers for sharing their views on current research topics. We are also thankful to our International speakers for joining us in this event for sharing their knowledge.

I express my sincere thanks to NABARD and Gaur-Surgicals who have given us timely financial support.

No work can be accomplished without a dedicated organizing-team. The perseverance shown by this team is really commendable and admirable.

With Best Wishes,

(Mrs. Chhanda Basu)
General Secretary, STE

INTERNATIONAL CONFERENCE

on

ENVIRONMENT, WATER, AGRICULTURE, SUSTAINABILITY AND HEALTH (EWASH-2020): EXPANDING OUR VISION POST COVID-19

&

Second Annual Conference of STE

19 to 20 December, 2020

Message

As face of the organizing committee and on behalf of all its members, it is indeed a great pleasure for me to welcome each one ofyou to **EWASH-2020** &**2nd Annual Meet of STE**.

This two-days conference which is being organized virtually during 19-20th December, 2020 caters to the essentials of sustainable water, environment and health for human beings and at the same time would like to urge people regarding their moral responsibilities towards conservation of natural resources and their judicious utilization.

The conference would have the august presence of distinguished guests, invited speakers, faculty members, scholars, academicians, students and covers a number of keynote and invited talks; oral and poster presentations covering novel emerging technologies pertaining to the subject theme. For the first time, the conference provides an interactive platform for college and school students to proliferate their young dynamism among researchers and academicians.

On behalf of Organizing Committee of EWASH-2020,I express my gratitude towards our **Chief Guest, Hon'ble Padma Shri Prof. Bimal K. Roy** and **Guest of Honour, Shri Vijaypal Baghel** for accepting our invitation and grace this occasion. I am thankful to our keynote, plenary and invited speakers for sharing their views on current research topics. The organizing committee of EWASH-2020 is grateful to our International speakers from different continents for enhancing our knowledge. We look forward to receive their ideas on sustainable solutions and action plans for human and environment health.

The members of the committee are thankful to our co-organizers from NEERI, ESDA, RSC and Hindu College, Delhi University for coming forward to collaborate with STE for the upcoming EWASH-2020 conference.

The members of Organizing Committee appreciate the financial support provided by National Bank for Agriculture and Rural Development (NABARD), Delhi, India and our sponsor, Gaur Surgicals, Delhi, India.

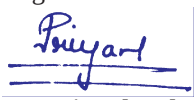
Each and every member of organizing committee have put their best efforts to give this conference a memorable one in every aspect.

As Chanakya says:

क्षणशः कणशश्चैवविद्याामर्थचसाधयेत्। क्षणत्यागेकुतोविद्याकणत्यागेकुतोधनम्।।

'Knowledge should be gained through minute by minute efforts. Money should be earned utilizing each and every resource. If you waste time, how can you get knowledge. If you waste resources, how can you accumulate the wealth.'

Regards.



Dr. Priyanka Sharma
Organising Secretary, EWASH-2020 &
Scientist, DIPAS (DRDO), Delhi

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ABSTRACTS

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INTERNATIONAL CONFERENCE

on

ENVIRONMENT, WATER, AGRICULTURE, SUSTAINABILITY AND HEALTH (EWASH-2020): EXPANDING OUR VISION POST COVID-19

&

Second Annual Conference of STE

19th & 20th December, 2020

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KEYNOTE ADDRESS

FUEL CELLS - CLEAN AND RELIABLE ENERGY

Manoranjan Patri

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ABSTRACT

In recent years, green and renewable energy systems have become the central area of research worldwide owing to the rapidly depleting fossil fuel reserves and environmental concerns. In order to cater to the ubiquitous power and energy requirements, indigenous technical knowhow is crucial for India's energy security. Fuel cells (FC) are being considered as the next generation power generating systems due to their high efficiency and low environmental impact. NMRL, with a flagship FC based Air Independent Propulsion (AIP) programme, is at the forefront of research on power and energy devices viz. fuel cells and supercapacitors. NMRL aims to develop affordable power solutions for surface combatants, submarines and warships, with potential civilian spin-offs through these alternative energy sources. A FC is like a battery, which generates electricity from an electrochemical reaction. However, unlike batteries, FCs can run indefinitely by using an external supply of chemical energy through hydrogen and oxygen/air. R&D effort at NMRL is focused on four types FCs viz. Phosphoric acid fuel cell (PAFC), High Temperature Polymer Electrolyte Membrane fuel cell (HTPEMFC), Solid Oxide fuel cell (SOFC) and Marine sediment fuel cell (MSFC). This highly interdisciplinary research at NMRL encompasses the entire scope associated with development of stable and high performance devices. It includes electrode and electrolyte material selection, optimization of multiple processes, structure-property correlations, unit cell evaluation, failure analysis, up scaling, stack design and assembly, operation protocols and endurance studies. This paper highlights the above issues and the technology readiness levels (TRL) of each of these FC technologies with particular emphasis on the specific material aspects and the differences in their basic working principles. The unique features and challenges associated with the NMRL patented materials and processes used for each technology will also be elucidated with an overview of operating temperatures, reactions and their respective advantages and disadvantages. Some of the NMRL patented materials technology for various fuel cell technologies includes (a) porous conducting carbon paper (b) graphite based heat exchange plates (c) high temperature polymer electrolyte membrane (d) corrosion resistant catalyst for PAFC and (e) novel process for onboard hydrogen generation.

KEYNOTE ADDRESS

BIO-PROFILING AND EFFECT DIRECTED ANALYSIS IN SEARCHING OF ACTIVE CONSTITUENTS OF PLANTS AND THEIR PREPARATIONS

Irena M. Choma[1]*, Hanna Nikolaichuk[1], Ewelina Sobstyl[1]

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ABSTRACT

Biologically active constituents of healing plants can be analyzed using bio-profiling as TLC-fingerprints and effect directed detection (EDD) such as thin-layer chromatography combined with direct bioautography (TLC-DB). TLC-DB, followed by spectroscopic identification gives full information on both structure and bioactivity of the sample constituents. Then, the method belongs to so-called effect directed analysis (EDA).

EDA based on planar chromatography is the method allowing for screening and identification of bioactive compounds even in complex matrices. The separation, bioassays and visualization are performed directly on TLC plate for many samples in parallelunder the same conditions. TLC-DBmay be based on any biological effect, e.g., antibacterial, antifungal, antioxidant or enzyme inhibition.

TLC-DB followed by LC-MS(i.e. EDA) was used to differentiate various specious from *Schisandra* genusas well as various preparations ofroot and rhizome of *Rhodiolarosea*L..TLC/LC-ESI-MS/UV-VIS was performed providing information about the presence ofmarker constituents (e.g. lignans in *Schisandra* androsavins in *Rhodiola*)known for their therapeuticefficacy. The preliminary experiments were focused on TLC-fingerprints and dot-blots.

Keywords: EDD, EDA, TLC-DB,Schisandra, Rhodiola

KEYNOTE ADDRESS

CLIMATE CHANGE: IMPACTS, MITIGATION AND ADAPTATION

Prof. Dr. Rao Y. Surampalli, FIE

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ABSTRACT

There are well documented facts that greenhouse gas (GHG) emissions have significantly contributed to global climate change. Although there are several GHGs, carbon dioxide (CO_2) contributes the highest proportion of green house effect mainly because of its higher concentration in the atmosphere. The greenhouse effect of constantly rising emissions of GHGs is responsible for the global climate change, particularly in terms of overall global warming though the condition varies with the regions, as either cooling, or wetter weather can be experienced at various regions; while on average the temperature of the planet is rising. Global climate change is also being experienced in various other types of global and regional scale changes; for example, melting of the glaciers and ice caps, droughts, hurricanes, floods, forest fires, etc. that threaten fragile eco-systems and affect migration of species. It is utmost important to step forward to reduce GHGs, mitigate climate change and evolve adaptation strategies at the earliest so as to prevent negative impacts on human society and the ecosystem. This presentation provides understanding and information about GHGs emissions, the current status and impacts of climate change, and the associated mitigation/adaptation strategies.

The potential climate change impacts include global warming, changes in weather patterns/precipitation, and sea level rise. Specifically, health impacts associated with climate change could be an increase in weather-related mortality, infectious diseases, and air quality-respiratory illnesses. Impacts on agriculture, forest and ecosystems include crop/forest health/yields/composition, shift in the ecological zones and geographic range of forests, and losses of habitat/species. Impacts on water resources may include change in water supply and quality, increased competition for water, more frequency of extreme weather, and shift of irrigation demands**.** The melting of glaciers, snow and ice causes sea level rise, which erodes the coast and damages many economic means of subsistence**.**

Broadly speaking, to address the impact of climate change, governments are putting in place strategies to develop green industries like renewable energy, and they are enacting regulations to reduce carbon emissions. On the other hand, companies and communities have been paying more attention to development of sustainable society; they are minimizing their own carbon footprint and waste production by adopting corporate sustainability agendas, and developing environmentally-friendly, economically viable and energy effective production/treatment processes. Achieving sustainable solutions to climate change requires long-term planning and actions.

KEYNOTE ADDRESS

GREEN CHEMISTRY IN PHARMA INDUSTRY

Rakeshwar Bandichhor

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ABSTRACT

Since last few decades, there has been a great interest in the development of Green chemical processes. Compared to conventional chemistry, these new Green paradigms offer avenues to bring down the carbon footprint. More importantly to the companies that use chemicals considering Green strategies in their industrial processes, they tend to offer significantly lower costs of finished product.

A connect between Green practices and raw material cost of the medicines will be discussed.

KEYNOTE ADDRESS

SOME MUSINGS ON SUSTAINABLE DEVELOPMENT: (WITH EMPHASIS ON SOLAR ENERGY EXPLOITATION AND ITS USE IN POTABLE WATER AVAILABILITY)

R. Bhattacharyya

Advisor DST-IIEST Solar PV Hub at IIEST, Shibpur, Howrah-711103
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ABSTRACT

Sustainable development and coexistence with the Biosphere have been enshrined in our Upanishads.

However, it has become an economic necessity after the publication of the Sir Nicholas Stern Report in the year 2006 outlining the financial burden due to Global warming which planners were brushing off till that time.

When global warming was finally heeded to by all the governments across the world active interest in cultivation of all sorts of renewal energy became a priority.

However, it must be appreciated that sustainable development is not easy to achieve. It requires a change of mind set and way of living.

In this context Solar energy exploitation has emerged as a saviour both Photovoltaic PV and Concentrated Solar Thermal (CSP), together with availability of efficient battery systems based on nanotechnology advances.

In this talk, I will present a glimpse of all these topics and give example how these measures can help alleviate scarcity of potable water in regions where they are most needed.

KEYNOTE ADDRESS

BIOTECH INTERVENTIONS IN HIMALAYAN MEDICINAL HERBS TOWARDS CONSERVATION AND SUSTAINABLE PRODUCTION OF ELITE PLANTING MATERIAL & PHYTOCHEMICALS

Prof. Rajinder S. Chauhan

Dean (Research & Consultancy) & Head, Biotechnology
Bennett University (Times of India Group), Greater Noida, UP, India

ABSTRACT

The Indian Himalayas are rich in biological wealth, particularly medicinal and aromatic plants, which provide raw material for various herbal drug formulations as well as high value phytochemicals of medicinal, nutraceutical and cosmetic value. The herbal product market is estimated at USD 80 billion with 7% annual growth rate, reaching USD6 trillionby 2050.However, around 90% of themedicinal plants used by the Ayurvedic and Pharmaceutical industries are collected from thewild sources, thus resulting in loss of genetic diversity, endangered status and above all destruction of natural habitats. The endangered status of several medicinal herbs has resulted in imposition of legal restrictions on the collection of raw material from natural habitats, which has not only caused shortage of authentic material to pharmaceutical and herbal drug industries but also economic constraints to the local communities, whose day-to-day livelihoods depend on those medicinal herbs. As a resultthe short supply of herbal material has resulted in adulteration, thereby affecting the efficacy and potency of herbal drug formulations. Therefore, a practical solution would be to undertake commercial cultivation of elite material of high value medicinal herbs to counter the multi-faceted problems of endangered status, non-availability of sufficient and high quality material to industries and more importantly not depriving rural communities from their revenue generating avenues.

Our group has undertaken a DBT supported programme support on “Elucidation of Biosynthetic Pathways & Development of Gene Markers for High Value Endangered Medicinal Herbs of North-Western Himalaya”with the overall goal of selecting genetically superior elite planting material of high value medicinal herbs, decipher biosynthetic machineries of major medicinal phytochemicals for developing gene markers and production platforms for phytochemicals, finally proceeding towards mass multiplication and commercial cultivation to ensure supply of authentic herbal raw material to industries along with generating entrepreneurial avenues among high altitude rural communities. Optimizing systematic cultivation practices in farmers' fields, post-harvest processing, and well-defined industry buy-back mechanisms are being set up through our collaborating institutes, which will go a long way in conservation and sustainable utilization of endangered medicinal herbs. The outcome of research activities undertaken to mitigate above mentioned problems will be presented during keynote presentation in EWASH-

KEYNOTE ADDRESS

MICROPLASTICS POLLUTION IN WATER SOURCES: MICRO GOING MACRO

Prof. Satinder Brar and Dr. Rama Pulicharla

ABSTRACT

Microplastic (MP) residues in the environment have become an emerging topic of interest across the globe due their universal measurements in natural water sources. The release of MPs into different water sources often from a wide variety of sources, including degradation of larger plastic debris to micro and nano-sizeplastics and wastewater treatment plant discharge. Due to plastics' complex chemical nature, receiving water sources is potentially exposed to a wide range and variety of plastic, and subsequent plastic degradation products, such as micro and nanoplastics. Other chemical additives of plastics such as plasticizers, flame retardants, acid scavengers, etc. are also enter water sources along with plastics. Very little knowledge and expertise have been accumulated on MPs occurrence in water sources over the past few years due to plastics' complex physical and chemical properties. Scientific understanding of plastics' structural properties is essential to explore the transport of MPs from source to wastewater, surface water and aquatic life. This knowledge provides valuable data for researchers and environmental managers and policy-makers to control plastic pollution at source and to develop advance treatment processes to remove the MPs from wastewater/drinkingwater sources. Further, MPs' ingestion by aquatic life and their potential impact(acute or chronic effects)due to continuous exposures are less well understood. Investigation of MPs' chemical properties and their transformations in the water source is essential to develop approaches to mitigate plastic pollution in water ecosystems.

INVITED LECTURES

INVITED LECTURES

WHY DO WE SLEEP ?

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Lucknow Road, Delhi-110054, India

ABSTRACT

Sleep in as important process of human physiology which represents the relaxation phase of biological clock. There are two main broad types of sleep, each with its own distinct physiological and neurological features: rapid eye movement (REM) sleep and non-rapid eye movement (non-REM) sleep. Non-REM sleep can in turn be divided into three or four separate stages. Non-REM sleep is sometimes referred to as “quiet sleep” and REM as “active sleep” during which a person dreams Physiologically, sleep is an active process. Basically, there are two sleep regulators: the homeostatic mechanism and the circadian rhythm which regulates physiological patterns over the course of the 24 hourday. Sleep-wake pattern is regulated by activity of the suprachiasmatic nucleus of the hypothalamus in the brain.].

Modern society is plagued by sleep disturbances, either due to professional demands or lifestyle or both the aspects, often leading to reduced alertness and compromised mental function, besides the well documented ill effects of disturbed sleep on physiological functions.

There is ample literature available which establishes the role of sleepin maintenance of cognitive functions such as learning and memory consolidation New learning and its consolidation i.e. the formation of long-term memories is attributed to REM sleep and a relationship between cholinergic function, duration and depth of REM sleep and cognitive functioning was observed

Sleep disturbances occur at high altitude. In a series of studies conducted by our group over last two decades, we studied sleep and cognitive functions at high altitude in the Eastern and Western Himalayas in soldiers of the Indian army. We found sleep disturbances recorded in the first week of ascent to high altitude. All night sleep recordings (polysomnography) showed a reduction in deep sleep (stages S3 and S4 of NREM sleep), increase in light sleep (stages S1 and S2 of NREM sleep), decrease in dream (REM sleep), with a reduction in Total sleep time. The Sleep efficiency was reduced at high altitude in the first week of ascent. We also found an impairment in cognitive functions, with alterations in Event related potentials i.e. a prolongation in P300 latency and poor scores of neuro-psychological tests.

Sleep deprivation leads to cognitive decline. We devised both pharmacological and non-pharmacological countermeasures to improve cognitive functions during sleep deprivation. These include Modafinil, Caffeine, Napping, Cognitive Re-training. These strategies were useful in reducing cognitive decline and in maintaining alertness and attention during Sleep deprivation.

Keywords: Sleep --- Sleep deprivation --- Cognitive function.

INVITED LECTURES

STERILE INFLAMMATORY MOLECULES: A PROGNOSTIC MARKER FOR PRE-ECLAMPSIA

Gausal A. Khan

Department of Physiology, Fiji School of Medicine
Fiji National University, Fiji Islands

ABSTRACT

Preeclamptic toxaemia is a syndrome, which accounts for 3-7 % of maternal mortality worldwide. Currently, the available prognostic criterion for PE is poor and is based on high blood pressure above 140/90mmHg, edema, protein urea, gestational age, dyspnea, oxygen saturation, platelet count, serum creatinine, aspartate transaminase & sFlt-1: PIGF ratio etc., occurring only in advanced stage of pregnancy. Inflammation is essential for successful implantation, pregnancy maintenance and delivery. Patients with no clinical sings of inflammation, but suffering from PE are poorly understood. Hence, it is hypothesized that SI molecules could be used as an early predictive marker of PE. Blood was collected from non-pregnant, pregnant and pregnant women with confirmed PE (n=20/gr; aged 18-45 years) as per American Congress of Obstetricians and Gynecology Criteria. Plasma was separated and nucleic acids (CAN) [i.e. extracellular RNA, extracellular DNA] and SI molecules were assayed. Our results showed that CAN [i.e. eRNA (1.5 fold); eDNA (1.2 fold)] were significantly ($p< 0.05$) up-regulated in women with symptomatic PE when compared to pregnancy with no PE as well as normal control subjects. We further showed that the significant higher ($p < 0.05$) level of SI markers; HMGB1 (2.5 fold); vWF (1.5 fold) & S100b (1.0 fold) in women with symptomatic PE when compared to pregnancy with no PE as well as normal control subjects. SI molecules are present in small amounts in the blood of healthy individuals, but are elevated in patients suffering from chronic diseases. So, our study also showed that SI molecules are significantly high in women with symptomatic PE when compared to pregnancy with no PE as well as normal control subjects. These SI molecules cross the placenta and circulate in the maternal bloodstream and activate several distinct signaling pathways through toll like receptors (TLRs) that trigger several disease processes. Most importantly, these molecules appear early well before the onset of disease process. Therefore, their early detection as biomarkers could be used as a tool to prevent disease onset and progression.

INVITED LECTURES

CARBON CAPTURE AND STORAGE: SEQUESTERING CARBON DIOXIDE IN THE ATMOSPHERE

Dr. (Mrs) Malti Goel

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ABSTRACT

Climate Change poses a key threat to today's societies and is caused by greenhouse gas emissions, mainly carbon dioxide (CO_2) emissions. Carbon Capture and Storage (CCS) is the process of capturing waste carbon dioxide usually from large point sources, such as a power plants or cement industry, transporting it to a storage site and depositing it, or utilization in value added products. The CCS emerged as a game changer technology to address climate Change threat. However, it was soon realized that it is not a silver bullet, though it does help removal of CO_2 in the atmosphere by capturing it at the source, which could be any industrial plant using fossil fuel combustion. Way to sequester CO_2 captured include; burring it in underground reservoir, or using it in plant growth or utilizing it by conversion into fuels and products. This paper will discuss about the need for adopting CCS by utilizing captured CO_2 as a possible option for clean coal industry.

INVITED LECTURES

CROP RESPONSES TO THE ELEVATED CO_2: RESEARCH AND TECHNOLOGY A SOUTH ASIAN EFFORT

D.C. Uprety, F.N.A.Sc.,

Emeritus Scientist
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ABSTRACT

Global climate changes are unique challenges to the agro-ecosystem. The exponential rise in the atmospheric CO_2 is an important global climate change which effectively influences the productivity of crop plants. This has been center of scientific and political debate in recent years after the Rio Earth Summit in 1992. Government of India and ICAR started impact assessment analysis of crop responses to the rising atmospheric CO_2 through an AP CESS fund project at IARI [Uprety and Abrol (1992) and subsequently by a National Fellow Project (Uprety, 1995)].

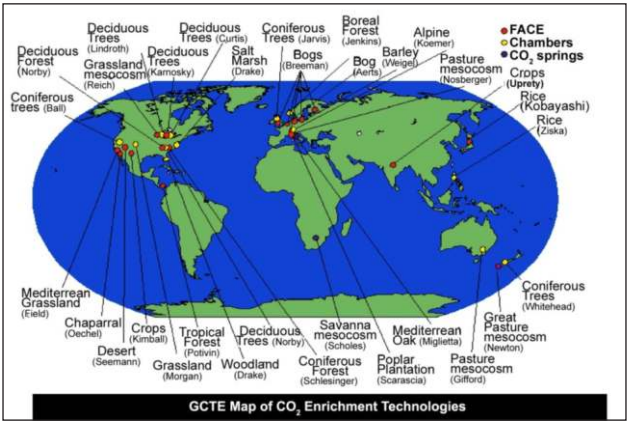
Innovative approaches for conducting long term experiments have been developed to investigate the impact of rising atmospheric CO_2 on crops (Uprety *et al.*, 1995 1996, 1998 & 2000). The characterization of the responses of crop plants to elevated CO_2 was done using open top chamber technology (Uprety *et al*., 1995, 1996, 1998, & 2000). It is cost effective for meeting the requirements of field research on CO_2 enrichment and was considered the only realistic choice available for crop response studies to elevated CO_2 environment.

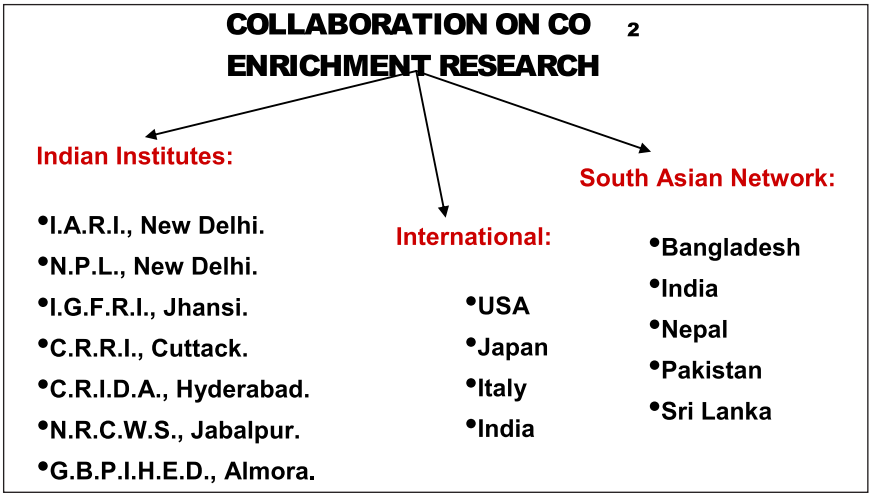
First South Asian PC based system of Free Air CO_2 Enrichment (FACE) technology in IARI fields was designed and developed to generate realistic biological crop response data (Uprety *et al*., 2000; Uprety *et al*., 2007a). Addition of these facilities has brought India GCTE research network which is acting in tackling vulnerable issue and adaptation strategies for meeting the rise in global food demand in the phase of global environmental change. This CO_2 enrichment technology was improved and made suitable to South Asian region. A network of CO_2 crop research of Nepal, Bangladesh, Sri Lanka, Pakistan and India was established and coordinated by Indian agricultural research Institute, New Delhi for multi country, multi disciplinary crop response studies.

Crop response studies, using OTC CO_2 enrichment technologies, demonstrated that elevated CO_2 significantly mitigated the adverse moisture stress effects on plant processes in *Brassica* species (Uprety *et al*., 1995). Studies have also demonstrated the transfer of CO_2 responsive characters from one parent *Brassica campestris* to the hybrid *Brassica oxycamp* (Uprety *et al.*, 1998).

The comparative study between C_3 (mung bean) and C_4 (maize) species showed significant variability in their response to elevated CO_2 particularly in respect to physiological processes (Uprety *et al*., 1996). Studies were done on C:N dynamics in *Brassica* species (Uprety & Rabha, 1999), micro analysis of photosynthetic parameters (Rabha & Uprety, 1998), changes in chemical composition of *Brassica* grains (Uprety *et al.*, 1997) and the interaction of elevated CO_2 and nitrogen nutrition (Uprety and Mahalaxmi, 2000). The outcome of these studies suggests various physiological, morphological, biochemical and anatomical adaptation strategies demonstrating how *Brassica* cultivars were able to ameliorate the adverse moisture stress effect under high CO_2 environment. Studies on rice cultivars using Phytotron facilities demonstrated the mitigation of high temperature effect due to elevated CO_2 (Uprety, 2005). Earlier studies on the responses of crop plants such as Brassica and rice cultivars to the elevated CO_2 showed significant variability in their responses (Uprety and Reddy, 2008). The variable responses of crop cultivars to the elevated CO_2 made the agricultural productivity and food security vulnerable, to the changed climatic conditions. Study was done to understand the impact of elevating CO_2 on grain quality of *Brassica* species. A significant increase in oil content and changes in its fatty acid composition demonstrated a positive change in the quality of oil. Similarly, in the case of rice cultivars the grain structure, grain chemistry, nutritional and cooking quality were found to be considerably affected by the elevated CO_2 (Uprety & Reddy, 2008).

Open top Chamber **FACE Technology**





Studies on the response of wheat species demonstrated (Uprety *et al.*, 2009) that the modern cultivars of *Triticum aestivum* hexaploid wheat were largely source limited. It appeared to have less assimilates than diploid wheat *Triticum monococcum*. While grain and leaf size increased with the ploidy level (Uprety *et al.*, 2010) from diploid to hexaploid wheat forms, the photosynthetic rate was reduced significantly. However, the larger leaf area and greater seed weight caused by elevated CO_2 had additive effect in improving the productivity of hexaploid wheat, whereas such a source sink balance was not present in diploid wheat. Studies also demonstrated that elevated CO_2 brought about significant changes on the grain structure (Sinha *et al.*, 2009) and grain chemistry of wheat species with variation on their response according to their ploidy level. The increasing CO_2 may present opportunities to breeders and possibly allow them to select for cultivars responsive to the elevated CO_2 with better sink potential (Uprety and Reddy, 2008). On the basis of the above study Uprety *et al.*, (2012) and Uprety (2014) identified and described various greenhouse gas mitigation technologies. These newly developed technologies will help farmers, scientists, students and policy makers to identify strategies to counter the challenges of rising atmospheric CO_2.

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INVITED LECTURES

EFFORTS AT DRL, TEZPUR FOR WATER CONSERVATION

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ABSTRACT

Water is a precious gift of nature and essential for all life forms on earth. Human body consists of more than 70% water. But today the status of water has become very alarming. In the last few decades due to extensive urbanization and industrialization, use of water has increased several folds leading to water scarcity at most of the places not only in India but worldwide. At the same time natural water resources which were fulfilling the water demand of mankind have become severely polluted with different types of physical, chemical, microbiological and radiological waste materials. On consumption the contaminated water leads to serious diseases.

DRL, the only DRDO laboratory of North East India has been active since its inception in the area of water quality survey surveillance and development of technologies for water purification. The water quality database for all the North Eastern states has been created with special emphasis to Army deployments. In collaboration with DTRL and project entitled TERRAGRAPH, the west Kameng and Tawang water quality data has been used for development of a mobile application called Terra i for easy access of data to army in usable form.

We at DRL are involved in development of different water purification technologies and products. Emphasis has been given to passive systems or systems using renewable energy source for self sustainability. Target contaminants have been iron the most prevailing one in this belt along with arsenic, fluoride and bacteria. Upgradation of products and development of new products incorporating latest technologies, have been undertaken on special request of services.

Different training programs along with product demonstrations have been conducted from time to time at different army locations to generate awareness for water related issues.

Under skill India launched by government more than 150 undergraduate and graduate students have been trained in water technologies which included quality survey, testing and development of point of use products.

In spite of our best efforts, it is also moral responsibility of all of us to safeguard this nature's gift by using different water management strategies. We should not forget the ancient practices and steps taken by government from time to time to safeguard this gift of nature. We all have to come together to protect our water resources from pollution by not disposing

waste into water bodies. We should also minimize our water usage by judicious use and reducing its wastage. We can go for rainwater harvesting to replenish our natural water sources as well as to store water for household and other uses. All the measures are going to work only if we educate the people with respect to water related issues and measures taken by government. If we all become serious and jointly put our efforts to save this gift of nature then only we will be able to provide clean water to our future generations.

INVITED LECTURES

DISINFECTION BY-PRODUCTS: INVISIBLE TOXICITY IN DRINKING WATER TREATMENT SYSTEM

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ABSTRACT

Disinfection is the critical and important requirement of drinking water treatment process to prevent the waterborne infectionin treated water. Itreduces the regrowth of pathogenic microorganism in the water distribution system. This disinfection process results in the formation of many disinfection by-products (DBPs). Trihalomethanes (THMs) formation in treated water is a very common process which involves reaction between chlorine with some naturally dissolved organic matters (NDOM),if present in water. The most common of THMs that are formed in the supply system includes Chloroform (CHCl3) Bromodichloromethane (CHCl2Br), Dibromochloromethane (CHClBr2) and Bromoform (CHBr3).These disinfection by-products create unpleasant taste and odour in drinking water and can cause high risk to human health, asthey are supposed to be one of the cancer causing agents.

The present paper gives an overview of the status of THMs in the treatment water system. Considerable values of different THMs were observed in the treated water from treatment plant and also at the consumer end. The value of THMs in final treated water ranged from Nil-240 µg/L that was slightly higher from the standard limit (200 µg/L) for drinking water. Similarly, the values at the consumer end ranged from Nil-108 µg/L. However considerable higher values were observed for Trihalomethane formation potential atboth, treatment system as well at the consumer end indicating the presence of some contamination existing in the treated water. Also the THMs formation is highly affected by change in temperature of water in supply system. High concentration was observed during March-April, whereas the concentrations were considerably low during peak winters.

People can be exposed to these DBPs through ingestion of drinking water (gastrointestinal tract), inhalation of indoor air (lungs), dermal during showering or bathing (topical), but primary exposure is from drinking water. Since these are cancer causing agents, their long-term exposure would be of great concern for human health.

Keywords: Disinfection, Trihalomethanes, Temperature effect, Human health.

INVITED LECTURES

NIRNAL™ ADVANCED PORTABLE BOTTLE FILTERS

Niranjan Karagi

Innovator, Nirnal Water Solutions.

ABSTRACT

The standard NirNal™ Advanced Portable bottle Filters have a sieve and bottom filter mesh that screen out larger particulate matter from the water. Activated Nanotechnology carbon granules act like a sponge. NirNal™ Stream filters have a dual-layer innovative carbon form that provides a large surface area to act like a sponge to adsorb contaminants. And the NirNal™ bottle filter removes substances by passing the water through a Nanotechnology carbon filter element designed to remove specific substances under low pressure. Water passes through a porous filter where chlorine (taste and odor) is adsorbed and broken down on the surface of the activated carbon. Lastly, the NirNal™ Advanced Portable bottle Filter uses water pressure to force water through a small carbon block and nonwoven. The nonwoven removes sediment, (10-5 microns) and the block structure removes smaller contaminants. Water contact with the carbon block allows for the adsorption and trapping of contaminants.

INVITED LECTURES

INTRODUCTION ON PNEUMONIA SCREENING

Vikrant Mishra

Introduction:
Gaur Surgicals is working toward providing world class services and providing the best technologies in Healthcare. This will benefit the community and we have more focus on patient care. We provide the latest technology in India that will be beneficial for patients and these technologies well accepted in other countries.

Most importantly at Gaur Surgicals we are able to win patient's trust through our commitment, proper guidance, cost effective treatment and round the clock services. India had the second-highest number of deaths of children under the age of five in 2018 due to pneumonia, a curable and preventable disease that claimed the life of one child every 39 seconds globally, according to a new report by the UN. The United Nations Children's Fund (UNICEF) said that globally, pneumonia claimed the lives of more than 800,000 children under the age of five last year - or one child every 39 seconds. Most deaths occurred among children under the age of two, and almost 153,000 within the first month of life.

The report said just five countries were responsible for more than half of child pneumonia deaths: Nigeria (162,000), India (127,000), Pakistan (58,000), the Democratic Republic of Congo (40,000) and Ethiopia (32,000). Pneumonia remains a leading cause of childhood mortality across the globe. In 2015, India, Nigeria, Indonesia, Pakistan, and China contributed to more than 54% of all global pneumonia cases, with 32% of the global burden from India alone. Masimo's Solution: Rad G

- Non- Invasive Point of Care Device
- Results displayed in less than a minute
- Motion Tolerance
- IMNCI protocol algorithm for Respiration Rate
- SpO2 Accuracy:

i. with motion: 3%
ii. without motion : 2%
iii. with low perfusion : 2%

- Intuitive Touchscreen
- Single probe fits all ages
- Rechargeable Li-ion Battery with upto 24hrs Battery Life
- Rugged and fall resistant

Clinical Benefits

- Suitable for ARI monitoring and clinical detection of pneumonia across all age groups specially newborns and infants.
- Appropriate case management as per IMNCI protocols
- Timely referral
- Rationalization of antimicrobial use
- Reduction in inadvertent oxygen use leading to decrease in incidence of retinopathy of prematurity (due to clinically proven high accuracy)
- Reduction in Infant and Child mortality
- Aptly suited to be deployed as part of SAANS program

Masimo Rad G Advantage

- Developed through a Bill & Melinda Gates Foundation Grant
- Piloted in Seven States of Himachal Pradesh, Chattisgarh, Punjab, Haryana, Jharkhand, Odisha and Uttarakhand by USAID with encouraging results
- SpO2 and RRp technologies are USFDA approved and the Rad G device is CE approved
- Absolutely Painless and Completely non-invasive
- Minimal training required to conduct pneumonia screening
- Instant results
- No hazard waste disposal
- Suitable for mass screening programs in field settings by ANM, RBSK teams, OPDs in DH, SDH, CHC, PHC.

INVITED LECTURES

BIOSENSORS FOR HEALTH & POINT-OF-CARE APPLICATIONS

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ABSTRACT

Biosensorsare powerful and innovative analytical devicesusing biological sensing element and transducer with wide range of applications, such as environmental monitoring, drug discovery, diagnosis, biomedicine, food safety and processing, defense, and security. Recent advancement in the field of biotechnology, microelectronics, and nanotechnology have improved the development of biosensors.1 Glucometers utilizing the strategy of electrochemical detection of oxygen or hydrogen peroxide using immobilized glucose oxidase electrode seeded the discovery of biosensors. In this presentation, the different types and principles of biosensors based on the bioreceptors and transducers will be discussed. Molecular recognition based on geometry and forces of interaction play an important role in the biosensor development. The advent of nanotechnology led to highly efficient and sensitive biosensors.2 They also provide an effective immobilization matrix for the various bioreceptors. Bienzymatic and their mimetic (metalloporphyrin)-based biosensors for reactive oxygen, nitrogen species and cytochrome cwill also be discussed. The role of antibodies & synthetic antibodies (molecular imprinted electropolymers) and their applications in immunosensors development for cytochrome c and copper, zinc superoxide dismutase will be highlighted.3 Among the biosensor techniques, electrochemical biosensors are cost-effective, miniaturized and applied for health &point-of-care applications. So, the fabrication of labVIEW based virtual biosensor instrumentation and microcontroller based portable biosensor devices will be presented for wide variety of applications.

INVITED LECTURES

VACANCY ENGINEERED BROWN TIO2 AND RGO NANOCOMPOSITE WITH ENHANCED PHOTOCATALYTIC PERFORMANCE

Dinesh Rangappa and Jagadish Babu

ABSTRACT

TiO_2 is one of the widely studied materials for various photocatalytic degradation, reforming and water splitting application. Superior stability towards photo-corrosion, appropriate band energy levels driving most photocatalytic reactions, and low-cost production are promising features of TiO_2. The TiO2 also shows good photocatalytic activity. However, a primary limitation with TiO_2 is that it only absorbs ultraviolet light constituting less than 5% of the solar spectrum. In this work, we use a facile, low temperature, vacuum-free, and solution-route synthesis approach to rationally induce oxygen vacancy/Ti^{3+} defects to reduce the bandgap of TiO_2 to 2.0 eV (3.2 eV for pristine white TiO_2) to form brown TiO_2 with enhanced visible-light absorption. The mechanism of defect formation is systematically deduced from the detailed investigation through Raman spectroscopy, spin-sensitive technique, high-resolution microscopy, and surface analysis. The brown TiO_2 yielded 8.1 mmol $h^{-1}g^{-1}_{cat}$ H_2.

OP-1

ENVIRONMENT AND THE YOUNG MIND: PERSPECTIVES AND ROLE

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ABSTRACT

The great challenge of the day is how the realization of the universe, being an organic entity, should be brought about and how it should be injected deep into the psyche of the contemporary man who has become a virtual prisoner of self-centeredurges.[1] To tackle this challenge would be a task of historic proportions. It will require a sense of mission not only on the part of political leaders, intellectuals and social reformers but also on the part of the common man, particularly the youth who is full of positive energy, ideas and dedication. Today's world is largely populated with young people who will have to live longer and face the consequences of current environmental decisions than their elders. Engaging youth in environmental protection not only creates direct impact on changing youth behaviours and attitudes,[2] but also inspires the society at large to come forward and do their bit for this pressing cause. This paper incorporates the role of youth in practicing ethical and moral values into the management of the environment, which has become a very important issue in today's time. The paper uses the perspectives picked up from the Indian ethos and scriptures about environment and their use for its protection.

Keywords: Youth, environment, Indian values, lifestyle.

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OP-2

RISK FACTORS AND PUBLIC HEALTH DURING COVID -19 PANDEMIC

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ABSTRACT

Risk factors are those which can mutate vulnerabilities into a catastrophe. They are difficult to curtail due to their persistent nature; affecting individual and public health significantly. There is no bigger public health crisis than COVID-19 today. In this scenario, the risk factors that can be identified are: social distance, exposure to very high vulnerable places like hospitals, vicinity of COVID patients, exposure to contaminated material (eatables, goods or garbage), and exposure to infected person within the family. Another major risk factor is bridging between the promise and reality of COVID vaccination. In the last 25 years, there have been only truly seven vaccines developed and the least it took for one to develop was 4 years for mumps vaccine, 5 years for Ebola and 13 years for Tuberculosis. In the case of COVID, 7500 million people around the world are at risk and need vaccination- which is a cruel task. Risk factors in community health impact the economy, culture and deportment of individuals permanently. Allocation of resources comes under severe strain; priorities get shifted and the negative impact on the other programs is immense. For instance- the decision to use the network of pulse polio and BCG vaccination for COVID-19 vaccine whenever it comes into action. This will impact the system and reach of the program. There are other significant issues like people avoiding health walks, gyms etc., routine medical checkups, face to face interactions with family and friends. The outcome of these are serious- intensive involvement on social networking platforms, exhaustive use of electronic facilties mobiles/ laptops/ television, people becoming habitual to isolation- further leading to sedentary lifestyles, medical complications and issues of depression and anxiety. Besides, one cannot ignore the impact on economy of scales, target identification and severe alteration of the livelihood (Migration/ Reverse migration). On a brighter note, the risk factors can be visualized as being instrumental in developing a sense of better hygiene and sanitation in public that will lead to drastic declination in the incidences of food/water borne diseases and contact-based infections like flu. Every risk factor is an independent challenge and hence a new war zone. Resilience of human race alone makes sure it survives to see the terminal exposure.

OP-3

MICROPLASTIC CONTAMINATION IN AGRO-ECOSYSTEMS: CONCERNS FOR FOOD SECURITY AND HUMAN HEALTH

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ABSTRACT

The global production of plastics has been increasing rapidly since its inception and mainstreaming into almost all everyday items. This reckless production and consumerism of plastics has created a problem that is affecting our environment and questioning its sustainability. One of the greatest features and yet the most dreaded characteristic of plastics is its non-biodegradability. The combined effect of mindless plastic production and usage coupled with careless disposal and its non-biodegradable nature has created a monster of sorts which is the menace of microplastics.

Microplastics are produced due to degradation of larger plastic particles in the environment. They have been widely reported to be present in different ecosystems including marine waters, fresh water bodies, ground water systems, terrestrial environment, glaciers, marine organisms, bird species and numerous other organisms, and even in food chains. The presence of microplastics in the terrestrial ecosystem including our agricultural systems and its effects has started to emerge as a research area in recent times. Microplastics may prove to be a major pollutant in this domain and therefore its study becomes important.

In this study, status of current knowledge regarding the presence of microplastics in the terrestrial domain while focusing on the agricultural ecosystem and its reported and possible effects were analysed. Commercially available compost samples were tested for the presence of microplastics in them and its effects on the physicochemical parameters. A peri-urban agricultural site on the floodplains of Yamuna river in National Capital Territory of Delhi was also surveyed to check for the presence of microplastics in it. All the compost samples tested positive for the presence of microplastics. A strong positive correlation was found between microplastic concentration and electrical conductivity. Microplastics were found to be present in all the irrigation water and agricultural soil samples from all the three peri-urban agricultural sampling sites. A significant correlation was found between the microplastic concentration and electrical conductivity of irrigation water samples. A similar relationship was reported between the microplastic concentration and pH and electrical conductivity of agricultural soil samples.

Analysis was also carried on the reported presence and effects of microplastics on various organisms including plants, marine organisms and various food items that make a part of the human food chain. Possible consequences of microplastic contamination for our future food security and also if it might create possible health implications for humans were established.

OP-4

THE ADVERSE EFFECTS OF ENVIRONMENTAL NOISE EXPOSURE ON HEALTH

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ABSTRACT

Environmental noise is defined as unwanted sound or a combination of sounds that has adverse effects on health. The effects can manifest in the form of physiologic damage of psychological harm through a variety of mechanisms. WHO reported that around one million healthy life years are lost every year due to environmental noise. It is reported that the physical and emotional effects of persistent noise lead to irritability, anger, nausea, headache, sleep disturbances and higher sense of helplessness, lack of control, tension, stress, unhappiness, anxiety and depression. Noise may cause cognitive impairment by a variety of mechanisms. Earlier studies have demonstrated that children in noisy environments have decreased attention on task and have lower performance on cognitive assignments compared to children in quiet environment. Recent found that traffic noise significantly impaired reading ability and comprehension as well as basic mathematics performance in children. These psychological and physiological non-auditory effects of noise result in detrimental health consequence and a decreased quality of life. Noise exposure may slow rehearsal in memory, influence process of selectivity in memory and choice of strategies for carrying out a task. It may reduce helping behaviour, increase aggression and reduce the processing of social cues during task performance.

Keywords: Environmental noise, stress, health effect.

OP-5

CURRENT SCENARIO OF RISK FACTORS ASSOCIATED WITH HUMAN FUNGAL PATHOGENS

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ABSTRACT

Although fungal infections pose a serious health threat affecting more than a billion of people, they are neglected due to poor health care facilities across the world leading in elevation in patients suffering from invasive fungal infections, resulting in approximately 11.5 million fungal infections and 1.5 million mortality rate annually among which *Candida* spp. is major cause of IFI (55%) followed by *Coccidioides* spp. (25.1%) and Aspergillus spp. (8.9%). It has been globally estimated that pathogenic fungi including *Pneumocystis jirovocii*, *Cryptococcus neoformans*, *Histoplasma capsulatum*, *Talaromycesmarneffei*cause Pneumocytosis (~500,000 cases), cryptococcal meningitis (Cryptococcosis) (223,100 cases), disseminated histoplasmosis (~100,000 cases), Penicillium Talaromycosis respectively in immuno compromised patients. In addition 3,000,000 cases of chronic pulmonary aspergillosis, ~700,000 cases of invasive candidiasis, ~1,000,000 cases of fungal keratiti and 10,000,000 cases of fungal asthma were addressed, concluding that about 80% of world's population is under serious fungal load.

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OP-6

PROSPECTS IN DEVELOPMENT OF PLANT BASED ALTERNATIVE MEDICINE AGAINST HUMAN FUNGAL PATHOGEN

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ABSTRACT

The current scenario of fungal infection and its therapeutics are not sufficient to overcome the global burden of fungal related health issues. More than a billion of people effecting from the mild superficial mucosal to systemic infections. Fungal infections have high morbidity and mortality. In addition, its potential to developed resistance against existing synthetic drugs is the challenge of global health issues. According to the global action fund for fungal infections (GAFFI) greater than 80% population affected worldwide in the next 15 to 20 years. Plant has alternative therapeutics for fungal infection and their natural compounds have been used in traditional medicine since prehistoric times due to their availability and efficacy without toxicity. Phytoactive compound has the potential defensive mechanisms against fungal pathogen and many more prospective ecological agents. The use of herbal medicines has been widely accepted in both developed and developing countries.

Approximately 80% of medicine related to human health is of plant origin and their sales exceeded US$65 billion in 2003. It is widely accepted that more than 80% of drug substances are either directly derived from natural sources or develop from a natural compound. Herbal medicine projected forecast to touch US$ 5 trillion by 2050.

Keywords: Fungus, anti-fungal, plant, herbal medicine, GAFFI.

OP-7

CHANNELIZING THE YOUNG MINDS FOR BLUER AND GREENER EARTH

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ABSTRACT

In this modern era of technology, exploitation of environment is at its peak and 'the young' minds nicely understand the importance of bluer and greener earth therefore there is an urgent need to take steps towards making heavenly earth. Young minds play an active and prime role in promoting and contributing towards bluer and greener earth .The main step in building a greener earth is to minimize carbon footprints released by greenhouse gas emissions which can be promoted by youths through various campaigns and movements. They could encourage it by effectively using communication technology which can contribute to 23% of global greenhouse gas emissions by 2030, if not used effectively.

Switching to renewable energy sources like wind energy, solar energy, biogas, promoting control on Power Usage Effectiveness, promoting afforestation and awakening people about the water sensitive urban designs and various conservation programs designed to complement existing water supply networks are certain ways which young minds can develop to have a greener and bluer earth.

Keywords: Carbon footprints, greenhouse gases, power usage effectiveness (pue), national action plan on climate change, clean energy technology, water sensitive urban designs.

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OP-8

ENVIRONMENT MANAGEMENT AND SUSTAINABILITY

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ABSTRACT

As Gandhi ji correctly said that earth has enough for everyone's need but not for everyone's greed. Sustainability and environmental management involve managing the Ocean, freshwater system, land and atmosphere. At the global scale, according to sustainability principal land use change is fundamental to the operations of the biosphere because alterations in the relative proportions of land dedicated to urbanization, agriculture, forest, woodland, grassland and pasture have a marked effect on the global water, carbon and nitrogen biogeochemical cycles. Other human impacts on the atmosphere include the air pollution in cities, the pollutants including toxic chemicals like NO2, airborne particulate matter that produce photochemical smog and acid rain, and the CFC that degrade the ozone layer. Scientists have warned of the possibility, under the influence of climate change, of a sudden alteration in circulation patterns of ocean currents that could drastically alter the climate in some regions of the globe. Increasing urbanization pollutes clean water supplies and much of the world still does not have access to clean, safe water. Loss of biodiversity originates largely from the habitat loss. Feeding more than seven billion human bodies takes a heavy toll on the Earth's resources, topsoil depletion and conversion to desert from constant tillage of annual crops, overgrazing, salinization, sodification, waterlogging, high levels of fossil fuel use; reliance on inorganic fertilisers and synthetic organic pesticides, reductions in genetic diversity by the mass use of monocultures ; water resource depletion; pollution of water bodies by run-off and groundwater contamination ; social problems including the decline of family farms and weakening of rural communities. Although biodiversity loss can be monitored simply as loss of species like dodo, vulture. Green Revolution had impacted seriously our environment. The spread of the agricultural practices of the Green Revolution may have helped to reduce hunger issues in developing countries, but it also created a significant deficit in agro-diversity and wild biodiversity around the globe. You might not be familiar with Chatsworth House, but nearly every banana that you have ever eaten comes from a descendent of one plant grown on the grounds of this Derbyshire estate almost two centuries ago. It reduces the quality of the soil used for growing crops.

Keywords: Pollution, Urbanization, Sustainable development, Environment.

OP-9

COVID-19: A TUMULTUOUS TURNING POINT

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ABSTRACT

Emergencies do not waste time with those who are unprepared. The recent COVID-19 pandemic is a perfect example. As we are nearing the first anniversary of COVID-19 outbreak and have started regarding this new way of life as the new normal, it's time to introspect. It's time to contemplate what could have prevented this virus from turning catastrophic, and what can be done now, to revert the effect of this pandemic and at the same time, be well prepared for any other unforeseen occurrences.

The unexpected arrival of the deadly Corona virus exposed the fragile health infrastructure of many countries. Lack of doctors and trained medical professionals and implementation of unplanned and unsystematic lockdowns in most nations led to an exponential rise in deaths due to a virus which merely causes cough, cold and fever. The virus has given us a major lesson to be prepared for any such future outbreaks. It has taught the stakeholders to be prepared for a pandemic, not just on paper, but also in practice. It has made governments re-consider their economic bills and make considerable investment on public health, so that people don't have to struggle to get a bed in public hospitals just because their government has failed to invest wisely on healthcare and so that enough precautionary measures (like masks and protective gears in case of COVID 19) are accessible to each and every citizen of a nation, especially the healthcare staff. Governments have been forced to analyse their progress in fields of Biotechnological research and medicine, so that they at least have some basic training and preparedness to face such pandemics in future. The corona virus pandemic has showed how disparities between the rich and poor nations will have to be reduced if countries want quick eradication of such outbreaks in future.

While everyone talks about the ill-effects of the Corona virus, one positive side of the pandemic should not be ignored- how the lockdowns and the quarantine period helped our nature in healing. Air quality in many industrial cities around the world saw major improvements as industries and commercial activities came to a standstill and the use of transportation reduced. Air quality in many Indian cities ameliorated by up to 60% compared to previous years. There

was a reduction in noise pollution, and one could sight many species of birds and animals that had not been seen in the past so many years. The water of river Ganga was labelled 'fit for consumption' after decades and the lockdown led to achieving a feat which even the 34-year-old Ganga Action Plan could not. But as one talks about the improvements made, we must also remember that the increasing cases of the infection has led to an increased demand of 'single-use plastic products' such as PPE kits, gloves and home delivery packages. Due to a decline in cargo export and import, organic wastes (agricultural produce and fishery products) are also on a surge. Countries will have to come up with innovative and unconventional plans to combat this new challenge. To continue and help in the nature's self-healing process, companies will have to invest in newer, eco-friendly technologies and train their workforce accordingly. A viable method to reuse the plastic wastes needs to be worked upon. Countries must pledge to reduce carbon dioxide emissions, lessen the production of solid wastes, battle against water pollution and promote sustainable development if they wish to not compromise the ability of their future generations to meet their own needs. One can say that the pandemic has acted as a catalyst for change which needs to be carried forward even after the outbreak is over.

OP-10

A CASE STUDY OF COMBINED EFFLUENT QUALITY PARAMETERS AND EFFICIENCY COMMON EFFLUENT TREATMENT PLANT, NORTH WEST DELHI, INDIA

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ABSTRACT

In Narela, which is located in North West of New Delhi capital of India, many small and medium scale Industries are in working condition due to these Industries residential area are more populous which generate 6 MLD mix effluent waste water from domestic wastage and industries to treat this mix effluent waste water a common effluent treatment plant (CETP) having capacity of 22.5 MLD was installed at Latitude of 28,45'N and Longitude of 77,09'E . Monthly wise representative sample of influent (Inlet) and effluent (Outlet) were collected period from April 2017 to March 2018 to assess quality parameters and efficiency of Common effluent treatment Plant (CETP). Samples of influent and effluent were analysed in laboratory for PH value, TSS, COD, BOD, SO4, OIL & Grease, TDS, Ammonical Nitrogen, Fluoride, Sulphide and Cl except PH value, Oil & Grease, Fluoride and few exception of Sulphide concentration of all other Quality Parameters in influent samples were found to be above the safe limit of EPA more concentration showed more pollution load in influent. This more concentration of TSS, COD, BOD, SO4, TDS, Ammonical Nitrogen and Chloride on average basis, reduced by 84.3%, 76.2%, 80.15, 40.4%, 8.5%, 39.36% and 23.6% respect in effluent which well within safe limit. This efficiency in term of percentage reduction was recorded at average flow of 6 MLD.

Keywords: Waste Influent, effluent, waste quality, percent decrease, parameters.

OP-11

USING WASTE STABILISATION PONDS AND THE APPROACH TOWARDS INTEGRATING THEM WITH EFFICIENT PRODUCTION OF SINGLE CELL PROTEINS

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ABSTRACT

Current troubles of compromised ecosystems, deteriorating economy, health diseases due to water contamination, and food insecurity, one low investment option for treating waste water is Wastewater Stabilization Ponds (WSPs). WSP and its effluent can be used for restricted and unrestricted irrigation (as has been the case in WSPs of Birjand, Iran), for creation of multi-purpose projects using innovative technological modifications (like 'VicInAqua' which incorporates aquaculture and irrigation in Lake Victoria basin, Kenya). Mechanisms peculiar to WSPs result in higher removal of ECs from industrial wastewater.

The approach is to set up efficient Single Cell Protein production in WSPs after identifying the sources of substrates from within the influent and the sludge, and by installing bioreactors for higher productivity. Such a plan will be especially beneficial for developing countries due to availability of land, and its potential to cure food insecurity and sanitize waste water.

Keywords: WSPs, sustainability, unrestricted irrigation, integrated aquaculture, carcinogenic ECs (emerging contaminants), mass SCP production in WSPs, food security.

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OP-12

STUDY OF HIGH-ALTITUDE SMALL MILLETS OF UTTARAKHAND WITH REFERENCE TO BIOPROSPECTION AND CROP PRODUCTIVITY

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ABSTRACT

Livelihood and development of hill people of Uttarakhand largely depends on the production of crops. Millets occupy an important place in agriculture of the Himalayan region of Uttarakhand. With the increase of population, the consumption of food also increases, in this regard considerable importance is given to processing and value addition of small millets. Environmental stress such as drought can adversely affects the growth of many dietary crops; climate change in future, might increase the chance of desertification that will affect the productivity of crops worldwide. In this situation, millets are those crops that withstand with this stress condition and can show good productivity against this abiotic stress factor. This may be due to the influence of endophytes present in the rhizosphere of millets. Basically, endophytes are responsible for promoting plant growth by providing essential nutrients to plant and known to induce tolerance against drought and improve plant resistance to drought. The present study focuses upon generation of knowledge about varieties of millets in high altitude areas of Uttarakhand, status of crop productivity; identification of root endophytes of selected crops of millets and their role with respect to promoting growth; capacity building and awareness to villagers and stakeholders about nutritional aspects of millets.

OP-13

USE OF BIOFUEL FOR SUSTAINABLE DEVELOPMENT

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ABSTRACT

Currently, in most countries over 70% of energy needs are met through fossil fuels that are not only extremely polluting but are also non-renewable and in limited quantity. Biofuels provide a better alternative to conventional fuels in that they are not only cleaner but some, such as bioethanol, also have uses in medicine and industry. In India, more than 750 million tonnes of biomass is available annually. With thorough research and case studies, the focus has been brought towards its production from 'biomass'. Biomass which contains cellulose, hemicellulose, lignin and even lipids and fatty acids, is processed using a variety of methods to produce different biofuels. Our emphasis lies on the production of biofuel from residual biomass, conventionally categorized as a 2G biofuel, as it not only puts the vast quantities of otherwise unwanted biomass to good use while preserving the actual crop for consumption but also helps mitigate the pollution caused by the improper disposal and burning of farm waste. This process ensures both economic and ecological sustainability. As part of our continued interest in this area, the production of biodiesel by catalytic transesterification of waste cooking oil has also been discussed. The method follows the Green Chemistry principle in view of the effective utilization of the waste.

The focus lies on studying current methodologies and exploring methods of biofuel production in order to promote it as a widespread practice. If used productively, biofuel can replace the consumption of all fossil fuels. The motive of this presentation is to discuss the advantages of biofuel as an environmentally sustainable and ecologically friendly alternative and the need to adapt it as our primary fuel.

Keywords: Biofuel; Bioethanol; Biodiesel; Biomass; Fuel; Ecological sustainability

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OP-14

SOLID WASTE MANAGEMENT: A CASE STUDY OF SOUTH DELHI

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ABSTRACT

Management of huge quantity of Municipal solid waste is one of the serious challenges faced by municipalities of the South Delhi. The aim of this paper is to present the management of solid waste in South Delhi. The results are reported on the basis of primary and secondary data collected from official and workers of Okhla Sanitary Landfill site, Waste to Energy plant, Okhla compost facility and South Delhi Municipal Cooperation. It is reported that around 3600 MT of partially segregated or un-segregated solid waste is collected from by SDMC from four zones i.e. South, West, Central and Najafgarh zone. Out of total collected waste around 3% of waste is transported to Composting plant, 46% is transported to Waste and Energy plant and major portion 51% is disposed of to Okhla Landfill. This paper also highlighted the need of creating awareness about segregation of waste at source, creating proper segregation Centre at each ward, enforcing municipal bye law of segregation at each ward and also to develop scientific and technological refined methods for waste collection and transportation so that maximum waste can be converted to compost, biogas or other useful products and the burden on landfill can be reduced.

Keywords: Municipal solid waste, generations, segregation, disposal, landfill, treatment.

OP-15

NATURAL NITRIFICATION INHIBITORS AND WASTE UTILIZATION FOR AUGMENTING NITROGEN USE EFFICIENCY: A POTENT NITRIFICATION INHIBITOR TO CONTROL NITRATE LEACHING

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ABSTRACT

Urea fertilizer is the main source of nitrogen for crops. Due to its low nitrogen use efficiency, it contributes to environmental pollution and health hazards. Nitrogen loss is one of the biggest problems in agriculture practices that are faced in current scenario. For increasing use efficiency of nitrogen fertilizers, certain nitrification inhibitors have been used as coating materials. The present study was undertaken to explore the potential of plant derived products as effective sources to minimize nitrogen losses in the environment. *Andrographispaniculata* (AP) and *Rhynchosia minima* (RM) extracts (hexane, dichloromethane, methanol, and water) were used at the rate of 0.05% of urea-N and their powder form at 1.0, 0.5 and 0.25% of urea-N. The wastes produced after solvent extraction of AP leaves and *Azadirachtaindica* seeds were also utilized in the experiment at 100, 50 and 20% of the applied N. The effect of these materials on ammonium-N, nitrite-N, and nitrate-N was determined under laboratory conditions. Lowest amount of nitrate-N was reported in RMextract (155-160 mg kg^{-1}) than APextract (180-210 mg kg^{-1}) as compared to urea control (227.26 mg kg^{-1}) on 21st day of incubation. In case of powder treated soil, APpowder was most effective having lowest nitrate-N, 162.35, 181.75 and 183.49 mg kg^{-1} at 1.0, 0.5 and 0.25% of urea-N doses respectively as compared to urea control (206.8 mg kg^{-1}). Among the wastes of APleaves and neem seeds, lowest nitrate-N was found in neem seed waste treated soil (130.98-182.45 mg kg^{-1}) as compared to APleaves extract waste (146.56-174.50 mg kg^{-1}). The present investigations suggest that extract and powder have the potential to retard the nitrification activities thus these plants may be taken up for developing less persistent, biodegradable, eco-friendly, and low-cost nitrification inhibitory natural materials.

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OP-16

SOLID WASTE GENERATION AND ITS IMPACT ON HUMAN HEALTH AND ENVIRONMENT IN INDIA

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ABSTRACT

Globally every single person is currently facing a general problem i.e. solid waste management as it adversely affects the human health and environment on daily basis. Unmanaged or improperly managed municipal solid waste contaminates the drains, rivers, streams, ocean causing flood and transmits diseases through breeding of vectors. The generation of enormous amount of solid waste in urban areas is a big problem, every year about 55 million tones of MSW is generated in Urban areas of India and because of expeditious urbanization and population growth it is expected that it will increase rapidly in future. Many researchers are working to develop new techniques for solid waste management. Landfills are the major pollution causing source in the urban environments. Illegal dumping of solid waste harms scenic resources pollutes soil & water resources and are dangerous to plants, animal and people. The municipal solid waste disposed improperly is one the prime reason for spreading the communicable diseases and ruining the quality of environmental components as well..

OP-17

STUDY ON HEAVY METAL ACCUMULATION IN THE PLANTS GROWN IN THE SOIL AMENDED WITH CETP SLUDGE IN DIFFERENT COMPOSITIONS

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ABSTRACT

Experiments were carried out to check the utility of sludge, a waste generated from wastewater treatment as a resource and its use as a soil supplement with special emphasis on heavy metal accumulation in plants. Sludge collected from Wazirpur common effluent treatment plant (CETP) was analysed for heavy metals (Cd, Co, Cr, Cu, Fe, Mg, Mn, Ni, Pb and Zn) and supplemented in soil. Pot experiments were conducted with crop plants *Brassica juncea* (black Indian mustard)and *Cicer arietinum* (Chick pea), by planting them, in duplicates, in 5%, 10%, 20% and 30% sludge mixed with soil. Controls (only soil without sludge) were also planted (**Figure 1**).

Figure 1: Full growth after 45 days; Front row : chick pea Back row : Indian mustard

The plants were allowed to grow for 45 days and then analysed for heavy metals using ICP-OES. Results concluded that the addition of sludge in soil do not affects the plant growth in general, but in terms of metal, mixing of sludge definitely increased the metal content in plant parts. It was also concluded that upto 10% mixing of sludge in soil, does not increased the metal content in plant parts in appreciable amounts while 20% and 30% sludge mixtures showed appreciable

accumulation of metals in the plant parts, which is not favorable. However, pretreatment of the sludge for removing excess toxic metals, before adding into the soil, will further enhance the use of the sludge in growing plants without amendment with soil. This aspect has not been covered in this study.

The Bioaccumulation Factor of more than 1 in case of Pb, Mn and Cr in Desi chana and of Cu, Pb, Mn and Cr in Indian mustard indicate that the plants are accumulators of the above-mentioned metals and they may be evaluated for phytoremediation. Different studies have shown that sewage sludge contains good amount of plant nutrients, the concern is mainly because of the high concentration of toxic metals, that it cannot be directly applied for land application. However, sewage sludge can still be considered as a beneficial alternative in order to supplement the organic chemical fertilizers.

Keywords: Soil, sewage sludge, supplement, plants, heavy metal accumulation, translocation, bioaccumulation, phytoremediation.

OP-18

SPATIO-TEMPORAL VARIATION OF BIOAEROSOLS IN DIFFERENT URBAN BUILT-UP INDOOR ENVIRONMENTS

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ABSTRACT

Bioaerosols are airborne particles that are living (bacteria, viruses, and fungi) or originate from living organisms. Their presence in the air is the result of dispersal from a site of colonization or growth. The health effects of bio-aerosols ranges from infectious diseases, skin allergies to chronic respiratory illness. In the present study, ambient levels of viable bioaerosol (fungi, Gram-positive and negative bacteria) were measured in different built-up indoor environment of University of Delhi i.e. Universitylibrary, University health center, and university residential flats.

Seasonal bioaerosols monitoring was conducted using active air sampler, Anderson cascade impactor (six-stage). The common fungal and bacterial species which were observed in all the indoor sites were *Rhizopus* spp., *Aspergillus* spp., *Cladosporium*spp., *Pseudomonas*spp., *Salmonella* spp., and *Klebsiella* spp. Among various indoor environments, maximum fungal concentration was reported in the university health center during winter season (520 ±32.2 CFU)/m^3) whereas; it was minimum in the university residential area (120 ±16.2 CFU/m^3) during Pre-Monsoon. On the other side, bacterial concentration was reported to be maximum in the University library (792 ± 19.1 CFU/m^3) and minimum in the university residential area (475± 13.3 CFU/m^3)during post-monsoon season. Higher bacterial counts in the University library was primarily attributed to the daily high footfall counts which directly influence bioaerosols concentration by increasing the rate of shedding of human skin cells, the release of microbes from the respiratory tract, and transport of microbes from floor surfaces tosurrounding suspended indoor air.

Our study authenticated that the bioaerosol level substantially varies with the micro-environment within the same eco-geographical area.The macro-classification of sites based on human occupancy, their activities, and types of waste generation, ultimately reflects the sources, ingressions, and diffusion of microbes in an environment; such information couldbe utilized to formulate ad-hoc strategy till the majority of the factors and their control mechanism are unidentified.

Keywords: Bioaerosols, indoor environment, colony-forming units (CFU), spatio-temporal variation.

OP-19

GREEN METHODOLOGIES FOR SCAFFOLD MANIPULATION OF SPIRO BARBITURATES: NOVEL FUTURISTIC DRUGS

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ABSTRACT

Spirobar biturates have a position of prominence in organic synthesis due to the multitude of pharmacological activities including antipsychotic, anti-HIV, anxiolytic as well as anti-proliferative properties exhibited by them, making them attractive synthetic targets and promising candidates for drug discovery. The preparation of these compounds, however, is a subject of concern as it employs the use of organic solvents which cause environmental as well as health hazards. This shifts our focus towards greener alternatives aiming to reduce or eliminate the VOCs and making the synthesis sustainable under the umbrella of Green Chemistry. Our work aims at designing newer and sustainable protocols for the synthesis of functionalized spirobar biturate moieties. The alkene produced from the condensation reaction between p-methylbenzaldehyde and 1,3-dimethylbarbituric acid using glycerol as solvent was reacted with triphenylphosphine and dimethyl acetylene dicarboxylate. The multi-cascade, one- pot synthesis proved to be environmentally friendly, with minimal waste generation, producing high yields in low reaction times and energy efficient conditions. The synthesized drugs were tested for their biological efficacy via various evaluative and theoretical studies using both In vitro and In vivo systems, and were found to provide pharmacological activities comparable to the drugs synthesised using non-green methodologies.

OP-20

MOLYBDENUM DISULFIDE – REDUCED GRAPHEME OXIDE (MOS2-RGO) HYBRID NANOCOMPOSITES FOR WATER SPLITTING APPLICATION

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ABSTRACT

Molybdenum disulfide (MoS2)-based hybrid nanostructures have attracted considerable attention as an alternative electrocatalyst for the hydrogen evolution reaction, over the Pt-based catalysts. However, the catalytic performance of these nanostructures is limited by their poor conductivity and small surface area. Herein, we report the fabrication of MoS2 and reduced graphene oxide (RGO) based hybrid nanostructures by an easy, cost-effective, less time-consuming, and in-situ one-pot supercritical hydrothermal process (MoS2-RGO) and their application in water splitting applications. Various combination ratios of MoS2-RGO hybrid nanostructures are characterized by X-ray diffractometer (XRD), High-resolution transmission electron microscopy (HR-TEM), and X-ray photoelectron spectroscopy (XPS) and confirmed the crystal structure, morphology, and chemical interaction of MoS2 and RGO, respectively. evaluated for their catalytic efficacy towards hydrogen evolution reaction (HER) by water splitting. Owing to their unique hybrid composition and structure, the as-prepared MoS2-RGO hybrid nanostructures exhibited enhanced catalytic performance for the HER, compared to bare MoS2.

OP-21

SYNTHESIS AND CHARACTERIZATION OF FE_3O_4@MOS_2 NANOPARTICLES AS A HIGHLY EFFICIENT, MAGNETICALLY RECOVERABLE AND REUSABLE HETEROGENEOUS CATALYST FOR REDUCTION OF 4-NITROPHENOL AND ORGANIC DYES

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ABSTRACT

In the present work, Fe_3O_4@MoS_2 nanoparticles are synthesized by a simple, inexpensive and environmentally friendly hydrothermal method and further explored as a highly efficient, magnetically recoverable and reusable heterogeneous catalyst for reduction of organic dyes nitrophenol, methylene blue and methyl orange which are among the major water pollutants from the industry. The synthesized Fe_3O_4@MoS_2 nanoparticles are well characterized for their structure, morphology, size, phase composition, magnetic property using X-ray diffraction (XRD), Fourier transform infrared (FT-IR) spectroscopy, scanning electron microscopy (SEM), energy dispersive X-ray (EDX) spectroscopic techniques. The catalytic reduction efficiency Fe_3O_4@MoS_2 for reduction of Methylene blue, methyl orange and Nitro phenol dyes in presence of NaBH4 was evaluated by optimizing the reaction parameters. Results suggest that the synthesized Fe_3O_4@MoS_2 is highly effective in the reduction of dyes in presence of $NaBH_4$ with a minimum quantity of catalyst and in a very less time of 3-10 mins compared to the photocatalytic method which is reported to be 120 mins in the absence of $NaBH_4$. Further, the catalyst particles were recovered after the completion of the reaction using an external magnet without any significant loss and the recovered catalyst also showed a similar catalytic efficacy even after several cycles. This significant feature of the prepared catalytic system makes it highly promising, not only from an industrial but also from an environmental viewpoint.

Keywords: Magnetic Nanocatalyst, Heterogeneous catalyst, Dye Reduction.

OP-22

STUDY OF GREEN SYNTHESIS FOR NANO $MGFE_2O_4$AND ITS APPLICATION AS PHOTOCATALYST

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ABSTRACT

Spinel $MgFe_2O_4$ nanoparticles (NPs) were prepared by sol-gel methods via green route. Green for Sol-gel was followed by using aloe-vera. X-ray diffraction (XRD), Scanning electron microscopy (SEM), Fourier transform infrared spectroscopy (FT-IR), UV visible Spectroscopy were used to study the effect of synthesis methodology on the behavior of synthesized NPs. Differences in crystallinity, particle size, photocatalytic and electrochemical activity of the $MgFe_2O_4$ NPs prepared by sol-gel method were observed. PXRD pattern of nanoferrite obtained by green method confirmed spinel phase structure of the prepared NPs with average size ranging from 13-25nm. The flake like morphology was seen for the prepared nanoferrite. FTIR confirms the absorption value of tetrahedral and octahedral sites. The $MgFe_2O_4$nanoferrite synthesized by green sol-gel method revealed exceptional electrochemical property with less charge transfer resistance. The correlation for EIS data with the photocatalytic mechanism is observed.

Keywords: Green sol-gel synthesis, photocatalytic activity, EIS.

OP-23

SUSTAINABLE BIOCHAR DEVELOPED FROM INVASIVE WEED *LANTANA CAMARA* L. FOR AQUEOUS REMOVAL OF ACETAMINOPHEN

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ABSTRACT

Invasive plants compete with native plants, poisons livestock and shrink the land available for agriculture which disrupts food production. *Lantana camara*L. (hereafter Lantana) is amongst the ten worst invasive species worldwide having invaded 75 countries. In India, about 303,607 km^2 of forest lands and 132,000 km^2 of pasture lands is under threat by this woody shrub. As such, it has a huge potential to serve as a feedstock for the preparation of sustainable biochar. In this study, Lantana derived biochar is used for the aqueous removal of acetaminophen. Pharmaceuticals are recognized due to their persistence and various other environmental concerns. With the increasing magnitude of drug use from the current pandemic, its entry into surface water and groundwater is concerning. Research in the remediation of water from these emerging contaminants is much needed. Preliminary studies show promising removal. Lantana derived biochar can be therefore considered as an attractive option for aqueous removal of pharmaceuticals.

Keywords: Water decontamination, biochar, invasive plants, pharmaceutical compounds, environmental management.

OP-24

GREEN SYNTHESIS OF MAGNETIC IRON OXIDE NANOPARTICLES USING WASTE FRUIT/NUT SHELL EXTRACTS AND THEIR APPLICATION AS FENTON-LIKE CATALYST IN DYE DEGRADATION

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ABSTRACT

Green chemistry, a key to sustainable development focuses on the design of safer chemical products and innovative processes in an economical way. It minimizes or eliminates the use and/or generation of hazardous substances and helps in achieving sustainability in the chemical production. Synthesis of nanoparticles by utilizing some of the green chemistry principles offers a viable and sustainable approach for nanotechnology. It has been observed the disposal of fruits, vegetable and nuts wastes is growing area of concern in urban lands. Studies have shown that they serve as the valuable reducing and stabilizing agents for green synthesis of nanoparticles. In the present study, a simple and eco-friendly method for the synthesis of magnetic iron oxide-nanoparticles (FeNPs) using extracts of pineapple peels and peanut shells as green reaction medium as well as reducing and stabilizing agent has been proposed. The method not only use non-toxic reagents and being cost effective, but also utilize waste effectively and reduces waste accumulation. The identity of synthesized nanoparticles has been established by FTIR, PXRD, SEM and TEM techniques. Further, the efficiency of FeNPs as Fenton-like catalyst is demonstrated for degradation of toxic dyes like Eosine Yellow from aqueous solutions in the presence of hydrogen peroxide (H_2O_2). The decolorization of the dye solution using FeNPs was monitored by UV–visible spectrophotometer.

Keywords: Green Chemistry, Nanotechnology, Waste management, Heterogeneous Fenton-like Catalysis, Wastewater remediation.

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OP-25

ROLE OF MYCORRHIZAL FUNGI AS NATURAL BIOFERTILIZER FOR ORCHIDS

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ABSTRACT

Chemical fertilizers, though proven to improve crop yield, face extensive resistance due to their detrimental effect on soil quality and environment at large. Biofertilizers, on the other hand, offer an eco-friendly and cost effective alternative to chemical fertilizers for integrated nutrient management. These living or latent microbial cells assist plant nutrient uptake mechanism when applied through seed or soil. Biofertilizers can be broadly categorised as nitrogen fixers, mineral solubilizers and plant growth promoters. The use of several bacterial and fungal species as biofertilizers has been well established. These microbial inoculants not only help in improving plant growth and maintaining soil fertility but also aid sustainable agriculture.

Endowed with beautiful flowers, long lasting charm, and convenient transportation, orchids hold a valued position in world trade as cut flowers and potted plants. Though orchids are grown primarily as ornamentals, some are used as herbal medicines and food. In nature, orchid plants are known to produce millions of miniscule seeds that lack a nutrient reserve (endosperm), and thus exhibit poor germination rates. These orchids are dependent on colonisation with specific mycorrhizal fungus which supplies carbon and vitamins to the developing embryo and aids in their ultimate survival. The fungi form fine hyphae and secrete enzymes/organic acids to mobilise nutrients whereas the fungal partner benefits by obtaining carbon requirements from host photosynthetic products. To meet the raging commercial demand, orchids are majorly propagated through tissue culture technology, but the plantlet survival capacity and development after they are shifted to ex vitro conditions is slow and requires much care. Keeping this view, application of fertilizers during the planting stage of orchids seems to be an appropriate resort for promoting its growth and development. The chemical and biofertilizers prevalent in the market are non-specific and hence the results cannot be predicted.

As orchids are known to rely on mycorrhizal fungi in natural conditions, these orchidaceous mycorrhizae can be suitably used as biofertilizers for encouraging the ex vitro establishment of orchids. Furthermore, the use of mycorhizae based biofertilizers can be extended and tried for survival and development other ornamental plants.

Keywords: Biofertilizer, environment, mycorrhizae, hyphae.

OP-26

SNAKES IN THE CITY: A SPATIAL AND TEMPORAL ASSESSMENT OF SNAKE'S ENCOUNTERS USING CITIZEN SCIENCE IN URBAN DELHI, INDIA WITH 8 NEW GEOGRAPHICAL RECORDS

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ABSTRACT

Wild animals are known to be attracted to urban setups due to ecosystem services associated with synanthropization, which often results in human-wildlife conflict. The capital city Delhi, surrounded by farms, ridges, and other green areas experiences regular snake occurrences in and around houses, gardens, and industrial areas. From January 2016 to December 2020, using the citizen science approach we have studied snake encounters in Delhi to determine composition of species, encounter frequency, seasonal activity patterns, and probable encounters sites in urban setup. We had documented 327 individuals belonging to 19 species from 9 families within Delhi. During the study period a total of 8 snake species belonging to 3 families were added to the existing herpeto-fauna checklist of Delhi. As a result, after this study, now Delhi has 23 species of snakes. Family Colubridae represents maximum number of species (12 species) followed by other three families Elapidae, Boidae, and Viperidae with 2 species each. The most recorded species being *Lycodonaulicus* (Common Wolf Snake) (26.6%, n=88), *Ptyas mucosa* (Indian Rat Snake) (11%, n=36), and *Oligodontaeniolatus* (Russell's Kukri Snake) (8.8%, n= 29) all from family Colubridae. The highest numbers of incidents were reported in the month of July (21.1%, n=69) and August (19.8%, n=65) during peak monsoon season when combining monthly data over the five years. A total of 8 different types of urban areas were identified in Delhi, i.e Residential (Housing societies and authorized colonies), Commercial (large Markets and shopping complexes), Industrial (Industrial zones), Institutional (School, universities, hospitals areas), Recreational (city Parks, public gardens, monuments), Conservational areas (Protected city forests) and Urban village (Informal settlements in Delhi). The maximum snake encounters were reported from Conservational areas (Urban forests) (30.2%) followed by residential areas (18.6%) and Urban village areas (12.3%). The incidence of snake encounters were found to be highly seasonal and appeared to be associated mainly with monthly rainfall and temperature.

Keywords: City, citizen science, human-wildlife conflict, snakes, urban biodiversity.

OP-27

NITRIFICATION INHIBITORS FOR SUSTAINABLE AGRICULTURE AND ENVIRONMENT: AN OVERVIEW

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ABSTRACT

Nitrogen (N), an essential element present in the atmosphere, is of vital importance for human life as well as for plants growth. However, the extensive use of chemical nitrogenous fertilizers in the form of manure and other N sources for improving crop productivity has led to environmental pollution and various health hazards. Among nitrogenous fertilizers, urea is the most widely used ammonium based fertilizer. About fifty percent of applied N is lost to the environment via volatilization, denitrification and leaching processes as ammonia, nitrous oxide and nitrate. Nitrous oxide with 300 times the global warming potential of carbon dioxide is one of serious environmental concern. Apart from environmental concerns, the extensive use of nitrogenous fertilizers is also impacting human health adversely. Some of the hazards due to nitrate and nitrite present in water bodies include methemoglobinemia commonly known as blue baby syndrome in infants and ruminants. The presence of nitrites and nitrosamines causes cancer, hormonal and heart diseases. Accumulation of excessive N on water surface leads to eutrophication and presence of nitrogen oxides contributing to ozone depletion. The rapid nitrification is mainly responsible for these N losses which can be minimized by the use of nitrification inhibitors. Therefore, intensive efforts have been made worldwide to develop products / technologies for improving the use efficiency of N fertilizer. The benefits of nitrification inhibitors and products based on these chemicals are responsible for enhancing fertilizer N use efficiency, increased rhizospheric microbial activities with greater photosynthetic partitioning and mineralization of soil N, thus enriching the soil. The use of synthetic and plant based nitrification inhibitors / regulators and products based on these inhibitors have been reported to augment the crop yields by increasing the availability of nitrogen to the crop and preventing the subsequent N-losses to environment.

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OP-28

EFFICIENT REMOVAL OF DICLOFENAC FROM AQUEOUS SOLUTION BY MICROALGAE

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ABSTRACT

The necessity of fresh water is constantly increasing, whereas its quality is deteriorating persistently due to the introduction of various pollutants in water bodies. Several micropollutants have been identified as emerging contaminants including pharmaceutical compounds in the last few decades. Diclofenac is one such major pharmaceutical contaminant. It is a non-steroidal anti-inflammatory drug and is largely consumed worldwide. It is frequently detected in surface water and ground water in µg/L-mg/L levels. It causes numerous side effects in non-targeted biotic organisms even at trace concentrations. Conventional wastewater treatment plants are incapable of removing diclofenac from water. Chemical treatment methods, though are effective, but associated with numerous downsides such as release of large amount of toxic sludge, requirement of high capital investment and harsh reaction conditions. Hence, there is a need of developing a strategic approach which should be environmental-friendly and cost-effective. Microalgae is a biological organism which can be considered as an ideal candidate for this purpose due to its various applications in wastewater treatment. Microalga is advantageous as it autotrophic, has rapid growth rate, highly adaptable to external environment and utilizes the wastewater as nutrient source. It can effectively remove diclofenac from water without producing and secondary pollutant in the form of sludge.

Keywords: Diclofenac; pharmaceuticals; microalgae; environment friendly; wastewater.

PP-01

HEAVY METAL POLLUTION AND CO-SELECTION OF ANTIBIOTIC RESISTANT HUMAN PATHOGENS

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ABSTRACT

Antibiotic resistance in human pathogens can multiply under selective pressures. Heavy metals in environmental reservoirs may lead to selecting antibiotic-resistant pathogenic strains. The increased and persistent concentration of heavy metals is due to waste discharge by different industries. The main source of heavy metals reaching the water bodies is by using fertilizers, pesticides for plants and antibiotics for fishes, pharmaceutical industries, agro-based industries, and chemical discharge by many other industries. Bacteria are generally highly sensitive to metal pollution but can evolve a variety of resistance mechanisms, mediated by chromosomal mutations or by the uptake of resistance genes on mobile genetic elements (MGEs). When a genetic change mediates resistance to both metals and antibiotics (cross-resistance), or when metal resistance- and antibiotic resistance genes are genetically linked on MGEs (co-resistance), metals can co-select for resistance to clinically relevant antibiotics. In environmental ecosystems, potentially toxic metals (PTM)/heavy metal contaminants may interact with native microorganisms residing in the same ecosystems. These organisms have developed resistance mechanisms that allow them to survive and, in some instances, to remove/reduce the contents of contaminants. This suggests that there is a genetic linkage or direct genetic causality between genetic determinants to these widely divergent antimicrobials, and metal resistance. Our study reiterates the correlation between the heavy toxic metals in water bodies and soil and its consequential increase in antibiotic resistant pathogens.

Keywords: Heavy metals, antibiotic resistance, mobile genetic elements, pathogenic bacteria.

PP-02

PROXIMATE COMPOSITION OF MINOR MILLETS FROM COLD SEMI-ARID REGIONS

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ABSTRACT

The nutritional importance of minor millets growing in geographically and environmentally isolated semi-arid regions remains largely unexplored, which has led to it being under-utilized for diet diversification. In this study, the proximate composition of three species of minor millets, namely, Barnyard millet (Echinochloafrumentacea), Finger millet (Eleusinecoracana) and Foxtail millet (Setariaitalica), grown in traditional millet cultivating regions (cold semi-arid) of the Himalayan range, have been analyzed. Two high altitude locations of contrasting cold temperatures in this region were selected for analysis. Dehradun which exhibits a temperature of 25-27°C, is located at 640 masl. (Meters Above Sea Level) in Uttarakhand West (UW), whereas, the second location, Pithoragarh which exhibits a temperature of 15-17°C is located at 1514 masl. in Uttarakhand East (UE). The results of this study record a 30.75 percent increase in average protein content of Barnyard millet grains when the same seed stock was grown at the second region of lower temperature, i.e. Pithoragarh (15-17°C), as compared to Dehradun (15-17°C). A 42.66 percent increase in average fat content was also recorded for Barnyard millet grains when grown at Pithoragarh (15-17°C). The two other millet species, Finger millet and Foxtail millet, did not record significant differences in protein and fat contents, however, Foxtail millet displayed marginally increased levels of sodium and potassium. In contrast to the other components analyzed, Total Dietary Fiber (TDF) was found to decrease with growth at the comparatively colder location of Pithoragarh. A 36.71 percent decrease in TDF content was recorded for Barnyard millet, whereas, a 19.25 percent decrease was recorded for Finger millet. Foxtail millet displayed a marginal decrease of only 5.3 percent in TDF content with growth at Pithoragarh. Starch concentration and moisture content for all three species was also studied, but did not record any notable differences due to growth at the colder location of Pithoragarh. The results here indicate an important role of cold temperature and high altitude in regulating the proximate composition of minor millet grains. Studies which explore the proximate composition of millet cultivars in such geographically and environmentally distinct millet growing regions, may reveal new information regarding the nutritional importance of minor millets, and the ideal conditions of growth for maximum nutritional benefit.

PP-03

GREEN CHEMISTRY FOR DESIGNING A SUSTAINABLE FUTURE

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ABSTRACT

Green chemistry is also called **sustainable chemistry.** By definition, Green chemistry is the field of science which aims to generate ways and products which are sustainable for future and not exploiting the natural sources. The main focus remains on minimizing the hazard and maximizing the efficiency of any chemical choice and the sustainability for future.

The term green chemistry was first given by Paul Anastas in 1991. Green chemistry involves 12 principles which reduce the use or production of unsafe substances. The poster on Green chemistry for designing a sustainable future includes the origin, importance, examples of implementation and efficiency of green chemistry in our nation and all around the world. Introducing the environmental challenge and how green chemistry plays its role in it.

Keywords: Green chemistry, environment, sustainability.

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PP-04

COAL: A SOURCE TO DECONTAMINATE WATER

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ABSTRACT

Since the late 19th century, coal has served to be a principal source of energy generation, globally. Rapid industrialization and commercialization of the coal mining has neglected the threat they pose to surrounding environment. Increase in number of coal mines due to high demand has polluted the surrounding water springs and rivers, depleted ground water table, destroyed the landscape and changed the air quality around the mining site, making it a source of leading occupational health hazards for the miners. However, with ever increasing population and rise in global demand for energy, coal mining will not be subsiding until advanced technology for clean and green fuel generation has been developed. Therefore, remediation and restoration of existing mine areas, treating nearby polluted water bodies and finding alternative ways for coal mining and energy generation could be an effective solution to mine environment. Coal other than being a fuel, it has various beneficial properties. One of such properties is the presence of useful microbes present in the coal and their surrounding mine environments. The study throws a light on presence of microbes in coal and their unique properties. Being in extreme environments, these microbes are exceptionally known for having potent bioactive properties that could be utilized in the bioremediation of rivers and lakes polluted with harmful pathogens. Identifying unique ways of using those microbes in water treatment could be a strategy in combatting water pollution. Additionally, presence of methanogens in coal seam areas generating methane could be an alternative way for a green fuel generation. Also, few fungal species present around coal mine areas are known for liquification of coal for efficient energy generation.

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PP-05

HYDROLYSIS OF STARCH USING AMYLASE PRODUCING MICROORGANISM ISOLATED FROM FOOD WASTE

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ABSTRACT

A microbial strain isolated from residential food wastes has proved to produce extracellular amylase. Amylase is a potential industrial enzyme that hydrolyzes starch into products like maltose, glucose, and maltotriose. α-Amylase is widely used in industries like detergent, biofuel, food, textile, and paper. The commercial applicability of enzyme always opens the area of research to find better amylase producing microbial candidates. Here in this study, isolation and screening of amylase producing microbes has been done. Out of 13 different microbes isolated from food waste, 4 isolates (A-304, C-312, D-309, and D-310) showed hydrolysis of starch into sugar. In this study, D-310 was found as the best candidate for converting 20g/l starch into 3 g/l of reducing sugar. The D-310 was optimized with maximum biomass at 16 hours of incubation at 20g/l starch concentration.

PP-06

HYPOGLYCEMIC DRUGS IMPEDES GROWTH OF HEALTHY HUMAN GUT MICROBIOTA

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ABSTRACT

The gut and bacterial association has a prevalent role in diseases and metabolic syndrome. However, unconstrained use of drugs and antibiotics has emerged as a serious threat to the healthy gut microflora and its ecosystem. The hypoglycemic drugs used in type- 2 diabetes (T2D) reportedly have a detrimental effect against gut microbiota which could imbalance the favourable mutualistic relationship causing imbalance between so-called 'good' and 'bad' bacteria. In the present study, we have investigated the effect of common hypoglycemic drugs Sitagliptin, Voglibose and Metformin against the growth of gut microbes i.e., Escherichia coli and Pseudomonas aeruginosa, and highlighted the molecular targets of drugs in silico. The antibacterial effect of hypoglycemic drugs was assessed by agar well diffusion assay, broth microdilution assay and broth macrodilution assay. The in-silico study of inhibitory targets of drugs against bacteria was performed using iGEMDOCK analytical tool. Molecular interaction between outer membrane proteins (OMPs) which are the virulence proteins in Enterobacteriaceae members and hypoglycemic were assessed.

Voglibose showed promising antimicrobial activity against all the bacterial cultures. The docking analysis demonstrated most stable interaction of Voglibose with Omp A and OmpX proteins of *E. coli*, while Sitagliptin exhibited stable interaction against OprF in P. aeruginosa. It can be inferred that the OMPs in gut microflora are the possible molecular targets of hypoglycemic drugs and inhibition of OMPs could be a reasonable factor hampering the growth of healthy gut microbes.

PP-07

AN INITIATIVE TOWARDS SENSITIZATION OF YOUTH FOR A GREENER EARTH

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ABSTRACT

Today's youth is tomorrow's leader. It therefore becomes imperative to channelize this unbound energy for a better future. As we brood over problems of deteriorating environmental conditions, the young minds need to be sensitized about the burning problems and possible remedies. The first initiative must come from home. The youth needs to be made aware of the beauty and benefits of plantation. With shrinking land spaces, especially in metro cities, indoor plants have emerged as beautiful alternatives for decoration and greenery. Growing plants like Aloe vera, snake plants, Areca palm, Gerbera etc. will not only beautify the place but also oxygenate the air. Schools have an important role to play here. They should design extra-curricular activities to encourage children to set up small home nurseries and contribute towards a greener earth. They must inculcate the habit in students to take the leftover of lunch (fruit peels, bread crumps etc.) back home to compost. Composting reduces landfill waste which subsequently reduces emission of GHGs into the atmosphere. The young minds must also be encouraged to use and promote eco-friendly and sustainable products like bamboo for house flooring, solar panels etc. Another important aspect that needs increased attention is 'Escalating Carbon Emission'. Excessive power loss from appliances, increased fuel consumption, and increased waste generation are some of our daily life practices that contribute to carbon emission. There is a need to educate the youth to minimize the power loss at home by simple steps like use of a power strip or an extension cord, replacing tube lights with CFLs and LEDs, buying energy efficient appliances (by checking the consumption rating of the appliance). An interesting school/ college assignment should be to perform an energy audit at home on a monthly basis. TRAINS OVER PLANES must be the mantra, wherever possible. By doing this one can reduce carbon emission upto 90%. The youngsters must keep “Green Earth” motto in mind even on vacations. Declining housekeeping services viz. laundry at hotels will ensure minimal water, energy consumption and lesser waste generation. It must be highlighted that water conservation of upto 50 gallons per day is possible only by reducing the shower duration. Such simple ideas are bound to attract the youth and get instilled in them as a daily practice. Once instilled in their minds, the youngsters would not only practice but also preach the significance of the 5Rs- Refuse, Reduce, Reuse, Rot and Recycle to

PP-08

SEPTAGE GENERATION AND TREATMENT USING MODERN TECHNOLOGY IN DEHRADUN

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ABSTRACT

Septage is defined as partially treated fecal matter stored in and pumped out of a septic tank. It is generally characterized by an offensive stink, presence of dangerous pathogens, such as viruses, and certain harmful greenhouse gases.Thedata indicates that there is a lack of organized septage management in Dehradun (Uttarakhand). Protocols such as septage collection, transportation and treatment are largely ignored. Census data estimates the population of Uttarakhand to be 17.5 times that of Dehradun. The density of population that this number amounts to is 1900 pplkm-2, which consumes approximately 150-155 MLD. Out of the total water consumption of Dehradun, a mere 24.42% is effectively treated by STPs, and the remaining waste water is directly discharged into water bodies/open fields. STP and FSTP are traditional methods of waste water treatment.STP is generally used in Small scale operations, and is not suitable for treating the Septage of Industries and Public toilets. Moreover, it is inefficient in handling sludge generated during treatment. FSTP is the first step in collecting daily household wastes in a septic tank, however, it takes a very long time between desludging steps, which causes the actual desludging operation to take longer than expected. Additionally, the biggest problem of fecal sludge management is that there is no designated disposal point which further delays the de-sludging operators. Here, we propose a modern method (Hybrid Constructed Wetlands treatment method) to treat Septage. The greatest advantage of this method is that it is a natural way of treating Septage. The combined method of CWs has high efficiency and is a green technology for Septage treatment. Septage is treated using natural physico and biological processes. This technology

does not produce further waste/sludge. It can be used for natural process like soils, vegetation wetlands as well as for improving the water quality. It is mainly used to treat the wastewater such as Stormwater, and this treatment promotes water re-use and public benefits.

Keywords: Septage, stormwater, pathogens, desludging, constructed wetlands and waste water, soils

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PP-09

DESIGNING AND DEVELOPMENT OF AN EFFICIENT BISPHENOL A (BPA) SENSOR BASED ON POLYANILINE

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ABSTRACT

Bisphenol A (BPA) is a chief industrial chemical, widely used as a monomer in the synthesis of polycarbonate based plastic containers used for food packaging. A major concern associated with Bisphenol A is that it leaches out from the consumer products like food storage containers, microwavable utensils, baby bottles and water bottles that are manufactured using BPA and leaches into the contents. The extent of leaching of BPA from containers into the liquid may depend more on the temperature of the liquid or bottle [1-2]. Studies have shown that exposure to BPA results in serious health effects on the brain and prostate gland of fetuses, infants and children [3]. In the present study, we have investigated the leaching out conditions of BPA from common use plastic materials under different temperature conditions using UV-vis spectroscopy technique. The results have indicated that no leaching was observed at room temperature and the degree of leaching increased with a rise in temperature (80 °C). The development of polyaniline based BPA sensor is in progress, capable of detecting BPA in different materials.

Keywords: Bisphenol A, Leaching, UV-vis spectroscopy.

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PP-10

CONSTRUCTING WETLANDS: AN INTEGRATED TECHNIQUE FOR INDUSTRIAL WASTE WATER MANAGEMENT

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ABSTRACT

"Water- Water everywhere, but not a drop to drink…!

Is this the brink from where we are going to be extinct?"

This is perhaps going to be the situation in the upcoming years, if our contemporary behaviour of unsustainable use of water resources persists. Water, the most precious life sustaining element who's each drop is like an elixir for any organism, is presently being underestimated for its value and potential. The inflation in the price of petroleum and diesel is shocking, and such will be the price and indeed higher for each litre of water in the near future. Currently the rate of consumption, contamination and wastage of water are much more than the water being regenerated naturally and its impurities being getting assimilated and degraded naturally, and that is what threatens the sustainability of the system. But there are solutions and constructing wetlands for integrated industrial waste water management is one of them. Constructing wetlands are cost effective and sustainable system for waste water treatment. Presently, most of the industries discharge their water soluble/insoluble effluents in the nearby water bodies or to the ground water, and something that exists in the name of water treatment is the conventional sedimentation and chlorine disinfection process which cannot remove the pollutants like dissolved heavy metals etc.

But along with this an innovate approach of constructing wetlands near the industrial units, with the supply of primarily treated effluents can be done where various species of plants algae, fungi and bacteria can be seeded which can neutralised, absorb and assimilate the pollutants, and hence the waste water gets managed naturally. These wetlands over the time can become rich in biodiversity and can also supplement the vast number of ecological services. 0ne such initiative has been undertaken by the town people of Arcata along with a state university of California as these constructed wetlands acts as an ecosystem, so they are self-sustaining and self-regulating and require little or no management, hence the industrial waste water is returned back to nature sustainably.

PP-11

LIGNIN DEPOLYMERIZATION: ROLE OF ACID HYDROLYSIS BEHAVIOR ON RICE STRAW LIGNIN

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ABSTRACT

Chemical reactions mostly have a dependency on catalyst concentration. It was always suggested to use a higher concentration of catalyst to get higher yield and purity. While somehow, it may not be applicable for biological material degradation. The action of higher concentration enhances the rate too much that disrupts the product appearance and structural integrity. Here in this study, the degradation of rice straw biomass was executed for lignin extraction using the acid hydrolysis treatment method. This technique helps in the removal of maximum cellulosic parts like cellulose and hemicelluloses by converting them into soluble sugars and remains left out lignin. It was investigated that the higher concentration of sulfuric acid as 72% v/v (80.77% w/w) causes some structural changes in chemical bonds and changes lignin into its highly condensed phenolic polymer named L-72. While slightly lesser concentration of sulfuric acid 63% v/v (72.26% w/w) does not have an adverse effect on lignin structural integrity and is found as free form lignin named as L-63. The impact of condensation was observed during the depolymerization of L-72 and L-63. The rate of depolymerization in alkaline medium (NaOH 1.5% and Na2S 0.5%) is higher in L-63 (98.3%) than L-72 (34%) using lignin 2 g/l. This means the structural condensation increases the rate of polymerization and decreasing depolymerization efficiency. So, it is concluded to use the free-form, soft, and light-brown lignin for depolymerization and monolignol formation. It also helps in the purification and separation of phenolic monomers.

PP-12

ROLE OF QUARANTINE ENTOMOLOGY FOR EFFECTIVE LEGISLATIVE CONTROL OVER INVASIVE ALIEN SPECIES (IAS) OF INSECTS

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ABSTRACT

IPCC declared the year 2020 as International year of Plant health, but what an unfortunate coincidence that Global outbreak of novel corona virus mishap human health across the world. Imposing quarantine is the measure to exclude entry of Pest into the country. As like Human Quarantine, Plant Quarantine is a legal restriction on the movement of Agricultural commodities for the purpose of Exclusion, Prevention Or delay in the spread of plant Pest and diseases in an uninfected area. These approaches undertaken under plant Quarantine (Regulation of import into India) order 2003. There are several agencies involved in plant Quarantine in India like DPPQS Faridabad, NBPGR New Delhi, NIPHM Hyderabad, NBAIR Bangalore. The detection of insect pest in quarantine done by several techniques like visual examination, sieving, x-ray radiography, seed transparency,staining insect egg method, respirometry method and acoustics and many more. But still several pest taken entry into the country in the past last two decades like Eucalyptus gall wasp (*Leptocybeinvasa*), Cotton mealy bug(*Phenococcssolenopsis*), Papaya mealy bug (Paracoccsmarginatus), Jack Beardsley mealy bug (*Pseudococcusjackbeardsley*), Madeira mealy bug (*Phenacoccusmadeirensis*), south American tomato pin worm (*Tutaabsoluta*), Coconut spindle infesting leaf beetle (*Wallacea sp*.) and many more. Many insect pest threats to India near future like Citrus long horned beetle (*Brontispalongissima*), Cassava mealy bug (*Phenacoccusmanihoti*), Mediterranean fruit fly (*Ceratitiscapitata*), cotton boll weevil(*Antonomousgrandis*), and Colorado potato beetle (*Leptinatarsadecimilinata*). Strict quarantine, Pest Risk Analysis(PRA) and phytosanitary certificate are essential for exclusion Invasive Alien Species(IAS) of insects during international trade to restrict entry in India. As the world trade in agricultural commodities increasing, chances of introduction of Exotic pest into new area also increasing. Hence strict measures to be taken to reduce the pest load. Invasive Alien Species(IAS) harm natural biodiversity and block food chain. For sustainability in agriculture and to gain food and nutritional security effectively legislative control measures to be followed at seaport, airport, and land frontier.

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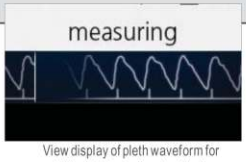

View display of pleth waveform for additional information, facilitating patient assessment

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GAUR SURGICALS

National Bank for Agriculture and Rural Development

Our Mission: Promotion of sustainable and equitable agriculture and rural prosperity through effective credit support, related services, institution development and other innovative initiatives.

Research and Development on matters of importance pertaining to agriculture, agricultural operations and rural development including the provision of training and research facilities.

Consultancy services related to Agriculture & Rural Development through subsidiary (NABCONS).

Our Functions:

Provide Credit/Refinance for production credit and investment credit to eligible banks and financing institutions.

Development functions undertaken through Farm Sector Promotion Fund (FSPF), Financial Inclusion Fund (FIF), Watershed Development Fund (WDF), Tribal Development Fund (TDF), Rural Infrastructure Development Fund (RIDF), etc.

Supervisory functions in respect of Cooperative Banks and Regional Rural Banks.

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