6TH ESDACON 2022
Annual International Conference of ESDA
15-16 October, 2022 | Delhi (India)

Ministry of Environment, Forest and Climate Change
Government of India

SUSTAINABLE DEVELOPMENT GOALS

UN environment

Azadi Ka Amrit Mahotsav

WORLD ENVIRONMENT SUMMIT 2022

(Conference Awards Exhibition)

15-16 October, 2022 (HYBRID MODE)
Convention Centre
Jawaharlal Nehru University
New Delhi (INDIA)

Abstract Book and Souvenir

Organized by
Environment and Social Development Association (ESDA)

In Association with

Center for the Study of Regional Development, JNU, New Delhi

Dr. B.R. Ambedkar College University of Delhi, Delhi

CSIR-NEERI

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Professor PB Sharma
Vice Chancellor
Amity University Haryana
Founder VC DTU & RGPV
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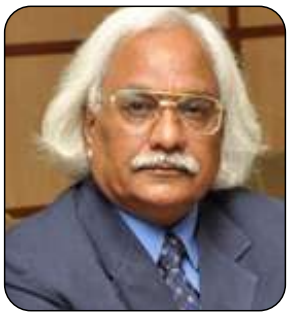
AMITY UNIVERSITY GURUGRAM

5th October 2022

Message



It gives me immense pleasure to learn that ESDA is organizing its World Environment Summit 2022 at Jawaharlal Nehru University, New Delhi from October 15-16, 2022.

The importance of monitoring, modelling, analysis and affirmative actions on war footings for mitigating environmental degradation and climate crisis cannot be over emphasized at a time when the world community is firmly committed to create a new world of sustainability. The post Covid-19 strategies for development, in my opinion require a major shift from mass production, propelled mass consumption, that led us to inflict a great global harm to environmental and human health.

At this ESDA World Environment Summit let us all pledge to create a new world of our dream that shall thrive on the Holy Trinity of Simplicity, Integrity and Sustainability and foster inclusive and sustainable development and growth all around the world in all sectors of human endeavor. Let Air, Water, Soil and Sea be our focus alongside with technology innovations for sustainability during our deliberations at this summit and let our collective brain waves lead us to implementable solutions to fast-track corrective measures as it is already too late. In this quest let us not forget that we all must lead by example to fulfill the promises that we make today for our selves and for the future generations.

I wish the World Environment Summit 2022 a great success and commend Dr Jitendra K Nagar and his brilliant team for organizing a summit so important for the people and the planet.

(Prof PB Sharma)

بسم الله الرحمن الرحيم

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ދަރުދަރަށް ދިވެހިރާއްޖެ
ފ/ފ، ދިވެހިރާއްޖެ

Message

Message from the Dean of Research, Villa College, Maldives

We all have a paramount duty to protect, safeguard and preserve the environment and biological diversity of our planet, for now and for the future. Therefore, it is vital that we manage our development activities in a manner that respects the nature. We have a duty to put our collective minds to action to come up with more sustainable technologies and solutions that can help the planet to heal and flourish.

The '**3rd World Environment Summit 2022**' organised by the Environment and Social Development Association (ESDA India) and other partners is an opportune platform for academics, students, policymakers and practitioners to converge their ideas and solutions in the spirit of collaboration for ensuring a cleaner, healthier and more sustainable planet.

I wish all participants of this momentous gathering success in their deliberations and hope to see valuable and concrete solutions and policy guidance produced out of their cogitations.

Dr. Ahmed Shahid
Dean of Research/ Asst. Professor
Institute for Research and Innovation
Villa College, Maldives

डॉ. मृत्युंजय महापात्र
मौसम विज्ञान विभाग के महानिदेशक,
विश्व मौसम विज्ञान संगठन में भारत के स्थाई प्रतिनिधि
एवं कार्यकारी परिषद के सदस्य
Dr. Mrutyunjay Mohapatra
Director General of Meteorology,
Permanent Representative of India with WMO,
Member of Executive Council, WMO

भारत सरकार
पृथ्वी विज्ञान मंत्रालय
भारत मौसम विज्ञान विभाग
मौसम भवन, लोदी रोड़
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Government of India
Ministry of Earth Sciences
India Meteorological Department
Mausam Bhawan, Lodi Road
New Delhi - 110003

Message

I am pleased to note that Environment and Social Development Association (ESDA), a non-Government, non-profit organization is organizing "3rd World Environment Summit – 2022" at Jawaharlal Nehru University, New Delhi in collaboration with a number of reputed national and international Universities/ Institutes.

Environment plays a significant role to support life on earth. However, there are a number of manmade activities that are constantly causing damages to the environment through global warming and its impact, especially in terms of extreme weather events related natural disasters.

In the present scenario, this is an apt issue to deliberate upon. I am sure "3rd World Environment Summit – 2022" would provide a key platform to Scientists, Environmentalists and Enthusiasts to discuss this issue related to environment at length and suggest measures to minimize damage to the environment and chalk out measures for environmental protection.

I convey my appreciation to the Environment and Social Development Association (ESDA) for organizing this Summit and wish for the successful organization of the event.

11.10.2022

(Mrutyunjay Mohapatra)

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Dr. S.K. Goyal
Chief Scientist & Head

October 9, 2022

Message

Environmental challenges are many, be it climate change, biodiversity loss, declining forests, resources crunch, industrial pollution, scarcity of food, shortage of potable water, health problems and so on . the fundamental cause of all these problems is ever increasing human population on the earth. To meet the needs, and aspirations of the population all the time, efforts are being made to manage within the available limited resources on the earth by continuously developing efficient processes and technologies, over the decades & centuries, and this needs to be further accelerated at a much faster pace to catch & match the growing demands, keeping the environment quality and waste minimization/ waste utilization at the center. The wastes are to be managed in such a way that they do not cause harm to the environment and in turn affect quality of life of the people, rather become resources of the future. In order to achieve overall sustainable life style each country needs to assess its assimilation potential with respect to its environment, population and plan development accordingly.

It is indeed a pleasure for me that the Environment and Social Development Association, Delhi is organizing two days World Environment Summit 2022 encompassing a wide spectrum of themes related toEnvironment, Human Health, Natural Resources, Climate Change, Agriculture, Technologies, Management, Sustainable Development etc. with the support/ collaboration/ partnership/ association/ involvement of various academic/ research/ social organizations during October 15-16, 2022. I am sure with the participation and deliberations by various stakeholders including various subject experts, academicians, researchers, students, policy-makers and media in the conference will help positively in addressing the national and global environmental challenges leading to attain the sustainable development goals for the people.

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

(S.K. Goyal)

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DR. BHIM RAO AMBEDKAR COLLEGE
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Ref: DBRAC/Message/ESDA/2022-23/ Dated: 14.10.2022

RITA MATHEW BENJAMIN
Chairperson, College Governing Body

Message

I feel elated to know that Environment and Social Development Association (ESDA India) is organizing the '3rd World Environment Summit 2022' in collaboration with Dr. Bhim Rao Ambedkar College (University of Delhi) along with a host of other international and national institutions of repute such as Villa College (Maldives), Tribhuvan University (Nepal), International Centre for Migration, Health and Development (Switzerland), Jawaharlal Nehru University, CSIR National Environmental Engineering Research Institute, Amity University, GD Goenka University and GRC India on 15-16th October 2022 at the V.P. Chest Institute (University of Delhi) in hybrid mode.

The timing of the organization of this International Conference is very apt. Globally, the nations are facing unprecedented environmental threats ranging from climate change, natural disasters, environmental pollution, deforestation, desertification, water shortages, etc. This Conference would give a just platform for young and brilliant researchers, business delegates and talented student communities, environmentalists, social activists and policymakers to discuss and seek solutions to these environmental problems. I hope and expect that some of these environmental issues will be discussed in detail at the conference, leading to recommendations for addressing the environmental challenges and sustainable development goals set by the United Nations by 2030.

It is encouraging to note that numerous notable speakers from a variety of fields will be giving lectures on a variety of environmental issues, including sustainability, pollution, climate change, solid waste management, biodiversity, conservation, and natural resource management. The fact that students, researchers, and academics from all over the country will be participating in the Conference and presenting their work is also noteworthy.

I send my best wishes to the organizers and participants of this International Conference.

Sd/-
(RITA MATHEW BENJAMIN)
Chairperson, College Governing Body

DR. BHIM RAO AMBEDKAR COLLEGE

(University of Delhi)

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Ref: DBRAC Dated: 12.10.2022

Prof. R. N. Dubey
Principal

Message

In the present era, the scenario of environmental issues has taken a toll on mother planet's health. The deliberations to come up with straightforward solutions within each nation and to learn from the experiences of other nations in order to guarantee sustainable progress and development using the resources that are currently on the planet. In addition, involving a large number of institutions to organize a flagship event is a significant step toward addressing environmental issues.

The '3rd World Environment Summit 2022' will be organized by the Environment and Social Development Association (ESDA India)' Delhi in collaboration with Dr. Bhim Rao Ambedkar College, University of Delhi and other eminent institutions like Centre for the Study of Regional Development, Jawaharlal Nehru University, New Delhi, CSIR-National Environmental Engineering Research Institute, Amity University Haryana, GD Goenka University Gurugram, Amity University, GRC India and in foreign partnership with Villa College Maldives, Tribhuvan University, Kathmandu, Nepal and International Centre for Migration, Health and Development, Geneva (Switzerland) at the Paintal Memorial Auditorium, Vallabhbhai Patel Chest Institute, University of Delhi, Delhi (India) in hybrid mode on 15-16 October 2022.

The myriad of knowledge exchange ideas shall be hosted. I hope and expect that all of these issues will be discussed in detail at the conference, leading to recommendations for addressing the environmental challenges and sustainable development goals set by the United Nations by 2030. I also wish the conference a great success.

(Prof. R. N. Dubey)
Principal

Environment and Social Development Association (ESDA)

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Er. Umesh Chandra
Executive President

Message

Building on the success of previous conferences, the Environment and Social Development Association (ESDA India)' Delhi is to organize the **'3rd World Environment Summit 2022'** (International Conference | Awards) in collaboration with Centre for the Study of Regional Development, Jawaharlal Nehru University, New Delhi, CSIR-National Environmental Engineering Research Institute, Dr. Bhim Rao Ambedkar College, University of Delhi, Amity University Haryana, GD Goenka University Gurugram, GRC India and in foreign partnership with Villa College Maldives, Tribhuvan University, Kathmandu, Nepal and International Centre for Migration, Health and Development, Geneva (Switzerland) at the Vallabhbhai Patel Chest Institute, University of Delhi, Delhi (India) on **15-16 October 2022.**

I look forward to learning the latest results from top industrial, government, and academic scientists on these topics and everything else that is presented, covering a wide range of critically important sessions. It would lay a platform for the interaction between experts around the world and aims in the burgeoning topics of environmental issues. The program has already been shaped to be excellent, and the networking opportunities will be indeed outstanding and will add to the pleasure of the meeting and provide lasting memories beyond the science.

The phenomenal work envisaged by Environment and Social Development Association (ESDA India in previous conferences has generated much enthusiasm, catapulting the number of individuals each time for dissemination of information. I look forward to many more years of direct participation in the conference and the wonderful advances, and the broader international knowledge-base, that this conference will produce. I add my best wishes for a successful and fruitful conference and my thanks to all organizers.

Dr. Umesh Chandra
Executive President, ESDA India

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Message

Being associated with ESDA has been a great learning journey for me personally and with our association for commitment towards improving the environment and making it sustainable for living, I feel privilege that we are on the right path and hope that success will be ours. Today, it gives me an immense pleasure to inscribe a message for the upcoming "**3rd WORLD ENVIRONMENT SUMMIT 2022**" (Conference | Awards) to be held on **15th – 16th October 2022.**

In this online summit, I could see its rich qualitative content. I am also able to envisage its great potential that would provide such a platform for active deliberations amongst various stakeholders including researchers & students and would aim to produce actionable suggestions for the policy makers. The major focus would remain on the following aspects:

- To build capacities on best practices on affordable, alternative solutions
- Sustainable and clean energy
- Pollution control and management
- Restoration of ecosystem services
- Cure & prevention of environmental health diseases
- Affordable and sustainable spatial planning techniques and sustainable transport systems.

Attempts would be made to explore the inter-linkages between global environmental challenges, human health, and sustainable development considering SDG's 2030 and Paris Agreement 2015-2016.

I hope ESDA & other organization will continue their efforts to promote Environment, Human Health, and Sustainable Development Goals.

I convey my best regards and wishes for the success of the occasion and the great circulation of the Souvenir.

Dr. Dhiraj Kr. Singh
Co-Organizing Secretary, WES-2022
Managing Director, GRC India

एमएसएमई चैंबर ऑफ कॉमर्स और भारत का उद्योग
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To **05-10-2022**
Dr. Jitendra K. Nagar
Organizing Secretary, WES-2022

General Secretary, Governing Body, ESDA Delhi

Subject: Blessing Letter for the souvenir of World Environment Summit 2022 to be held on 15-16 October 2022 at JNU, New Delhi (India)

We are very pleased to know the initiative taken by ESDA, Delhi to organize 3rd world Environment Summit 2022 on 15th & 16th October 2022 at **Convention Centre, Jawaharlal Nehru University (JNU), New Delhi (India)**

International Conference and Awards with collaboration with JNU, CSIR NEERI, Amity University, GD Goenka University & MSME Chamber of Commerce and Industry of India, Glad to know that 900-1000 participants will be attending the Global Event .

We are sure that your words based on deep professional insight and field-based experience, will provide a life-long motivation to all of us.

We are wishing you for your successful Event.

Best Regards

Indrajit Ghosh
Chairman
MSME Chamber of Commerce and Industry of India
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Ref. No. ESDACON/2022

Date: 12th October 2022

Dr. Jitendra Kumar Nagar
Chairman, ESDA
Organizing Secretary, ESDACON-2022
Ass. Professor, Dept. of Environmental Science
Dr. Bhim Rao Ambedkar College
University of Delhi, Delhi
Email: jitendranagar79@gmail.com

Message

Greetings from WES 2022!

I have the great pleasure to welcome all the esteemed guests, speakers, delegates, and participants to **3rd World Environment Summit 2022** (International Conference & Awards) i.e. Environment and Social Development Association (ESDA India)' Delhi which is an eminent organization profoundly known to unveil the novel developments in the field of Environment.

This summit, being held during 15-16 October 2022 at Paintal Memorial Auditorium, Vallabhbhai Patel Chest Institute, University of Delhi, Delhi (India) is the continuation of highly successful conferences about the burning issue of environmental protection which is being organized by Environment and Social Development Association (ESDA India)' Delhi in collaboration with Centre for the Study of Regional Development, Jawaharlal Nehru University, New Delhi, CSIR-National Environmental Engineering Research Institute, Dr. Bhim Rao Ambedkar College, University of Delhi, Amity University Haryana, GD Goenka University Gurugram, GRC India and in foreign partnership with Villa College Maldives, Tribhuvan University, Kathmandu, Nepal and International Centre for Migration, Health and Development, Geneva (Switzerland).

I am confident all participants, students, experts, and policymakers will immensely benefit from the wonderful event "World Environment Summit 2022 "which will be full of inspiration and the exchange of new ideas. I would like to thank the ESDA organizing committee members like Dr. Umesh Chandra, , Ms. Kavita Khatana, Dr. Geetanjali Sageena, and Dr. Parveen Kumar for their endless hard work of months to make this conference a huge success.

I wish grand success of the summit

Dr Jitendra Kumar Nagar
General Secretary, ESDA India
Organizing Secretary, GWC 2022

Prof. & Head
School of Engineering and Sciences,
GD Goenka University, Gurugram, Haryana

Message

Congratulations to the ESDA team for organising and hosting this event, 'World Environment Summit 2022'. This summit addresses a very topical and critically important theme. As countries move up the development curve, the environment is most affected. It is therefore imperative that we take concerted actions in unison to switch to save our environment. The main focus of this summit would be to build capacities on best practices on affordable, alternative solutions, sustainable and clean energy, pollution control and management, restoration of ecosystem services, cure & prevention of environmental health diseases, affordable and sustainable spatial planning techniques and sustainable transport systems. The aims of this symposium are congruent with global initiatives in accelerating awareness and action on environmental degradation and climate change. Because of the background of the participants, we are effectively talking to our future leaders, scientists, policymakers, corporate executives, community workers and others about the need to conserve the environment and switch to renewable energy. Rapidly developing economies like India will spearhead the growth in global energy demand thereby impacting the environment. In order to address this challenge, we need a multidisciplinary approach on a global scale. This is evident in the existence of this summit, and it is also clearly apparent in the collaboration that is already taking place among nations around the world.

I feel excited and honoured to have a chance to work with all the co-hosts, chairs, and participants of this event. I hope that this summit will provide our participants with a truly transformative experience through a variety of knowledge and perspectives to overcome the challenge of meeting our growing energy demands in an environmentally benign way. This event may also just provide the required boost that our country needs for bringing about a new, clean and green tech revolution, while also reducing the disastrous impact of climate change events.

I welcome you and hope you will find the Symposium as a great forum for exchanging ideas and information on the role of solar energy to help achieve a sustainable economy, improved quality of life and protection of the environment.

Sincerely hoping that you would enjoy the World Environment Summit 2022

Dr. Naresh Sharma

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abstracts

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The Rights Side of the Environment: Operationalising the Human Right to a Clean, Healthy, and Sustainable Environment

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ABSTRACT

The human right to a clean, healthy, and sustainable environment has been recognised by the UN Human Rights Council resolution 48/13 (8 October 2021) and by the UN General Assembly resolution A/76/L.75 (28 July 2022). This recognition and acknowledgement bring to light the obvious interrelated nature of human rights and the ever-present reality of our collective responsibility to preserve and protect the environment. Although these resolutions do not constitute an explicit internal law 'obligation' in relation to the right to a clean, healthy, and sustainable environment, it is pertinent that the normative value of the environment in the full realisation of human rights is now stronger than ever. It also brings to attention the need for urgent action towards the effective implementation of existing multilateral environmental agreements (MEAs) to affect the full realisation and enjoyment of human rights. With more than 150 countries already recognising and protecting the right to a healthy environment in their constitutions or national laws, the case for concrete action is now clearer. At this historic juncture, it is pertinent to explore the opportunities in operationalising environmental rights and aligning them with existing environmental commitments. Renewing our pledge to protect the environment with more ambitious, coherent and coordinated action is the way forward. In this keynote, I argue that the inclusion of the right to a clean, healthy, and sustainable environment in the internationally recognised normative frameworks should be taken up by academics and human rights practitioners as a milestone towards building consensus and strengthening of the legal and policy settings that can create better conditions for action and accountability from all States. Appreciating the interrelated and interdependent nature of human rights, it is time for call to action towards bold steps and global solidarity to preserve our environment and ensure that people everywhere can enjoy their human rights. Such an integrated approach can help achieve SDGs, protect the global environment and help fulfil the human rights.

Keywords: Environmental rights, sustainable development, human rights.

Some Epidemiological aspects of Lymphatic Filariasis and its Prevention by using Fish Predators

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ABSTRACT

Out of 20 studied districts, the highest frequency of patients found in Lalmonirhat and Thakurgaon followed by Gaibandha. In the present study, 69.2% patients were found in north zone and 30.8% patients in south zone. 89.81% patients were found in endemic area (17 districts) and 10.18% patients were found in non-endemic area (3 districts). There was no patient in age group (0-10), the highest number of patients was found in age group (41-50); the highest number of patients goes to healer for treatment rather than doctor and health complex; 90.5% patients are suffering in leg swelling, hand swelling (7.6%), 0.7% and 1.2% patients are suffering in breast and scrotum swelling respectively. The most patients of endemic districts are illiterate having knowledge gap. More effective breeding grounds for *Culex quinquefasciatus* was higher in north zone. Pit surrounding the tube well harbored the highest concentration (75.07%) of *Culex quinquefasciatus,* followed by abandoned pond (20.68%) and ditches (4.25%); peak population of *Culex quinquefasciatus* was rom November to April. Out of eight different predators, *Clarias batrachus* were found in most of the breeding grounds. Fishes were allowed to feed upon different instars of *Culex quinquefasciatus* to determine their predation capacity; *Clarias batrachus* consumed the highest number of larvae (24,372.76/ day) followed by *Oreochromis mossambicus* (4,915.48/day).

Key words: Lymphatic filariasis, epidemiology, vectors, prevention and predators.

Games and the Environment: The Effective Use of Digital Games in Environmental Education and Awareness with School Age Children

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ABSTRACT

Environmental education and awareness are at the forefront of international school curricula. However, there is some confusion around environmental education and environmental information. Environmental education is beyond learning some facts or absorbing information. It is a process that provides opportunity to explore environmental issues, participate in finding solutions to those issues and taking actions to help improve the condition. Therefore, schools required more than just conducting content and information-based environmental education classes. The most popular approach to education at school age children are now considered as game-based learning, especially using digital games and simulations to explore environmental issues, engage in problem solving and getting involved in climate actions. This paper presents research on the effective use of Minecraft Education Edition (M:EE) in teaching environmental education. This popular game comes with a library of pre-made worlds on sustainability, climate action and climate issues. In the research students were given an opportunity to use M:EE to design solutions to climate issues such as global warming and sea-level rise. This research employed a qualitative design, and the data collection methods included videos, focus group discussions and observations. The students built their solutions and presented a video, which was then coded into how well they have addressed the issue, the solutions and their presentation. Results show that students have achieved very high learning outcomes, fully developed solutions and have addressed the issues exceptionally well. Hence, this research concludes that using games is an effective strategy for environmental education and very effective in engaging students on global issues.

Keywords: Environmental education; games; Minecraft; learning solutions.

Effect of solids content on bioleaching of metals from spent refinery catalysts using sulfur-oxidizing microorganisms

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ABSTRACT

Spent hydroprocessing catalyst is a hazardous solids waste that contains high concentrations of toxic and valuable metals (Al, Ni, V, and Mo). Bioleaching is an emerging eco-friendly biotechnological technique that recycles these metals from refinery spent hydroprocessing catalysts effectively. The objective of the present work was to study the effect of spent catalyst content on the bioleaching efficiency of the Al, Ni, and V from a spent atmospheric residue desulfurization catalyst (ARDS). Lab-scale bioleaching experiments using sulfur-oxidizing microorganisms were conducted with varied spent catalysts content (1% to 10% w/v) at 32 °C and 150 RPM. The results indicated that spent catalyst content was a vital parameter affecting bioleaching efficacy. In general, the bioleaching efficiency decreased with the increasing spent catalyst content. The maximum bioleaching yield (V-99%, Ni-92%, Mo-77.4%, and Al-38%) was realized at the lowest spent catalyst content (1%), whereas the lowest bioleaching yield (Ni-73.2% and V-51.7%, Mo-51%, and Al-13.2%,) were observed at the highest spent catalyst content (10%). The low bioleaching yield at higher spent catalyst content can be explained by the fact that at higher spent catalyst content, the mixing of the spent catalyst pulp becomes difficult, which results in mass diffusion limitations, causing a decrease in the bioleaching yield. However, no major differences (<10%) in bioleaching yield of Al, Ni, and V were observed between spent catalyst concertation of 1% (V-99%, Ni-92%, Mo-77.4%, and Al-38%) and 2% (91% V, 88% Ni, Mo- 72.0%, and 33% Al). Thus, from an economic consideration, the recommended total solids content for the bioleaching of spent catalyst is 2%. The outcome of this study shows that spent catalyst concentrations play an important role in bioleaching.

Keywords: Bioleaching, solids, spent catalyst, sulfur-oxidizing microorganisms.

Evaluating the level of environmental degradation in the Maldives using an Environmental Kuznets Curve

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ABSTRACT

Maldives has been an active and resounding voice at all international platforms, advocating to reduce global carbon emissions and calling for action to address the devastating effects of human actions on the environment. Even though Maldives is one of the most vulnerable states to climate change and has its tourism-based economy heavily reliant on its delicate nature and biodiversity, there is no denying that the country has its fair share of carbon emission and other environmentally harmful activities. This study analyses the relationship between carbon emission and economic development of Maldives using the Environmental Kuznets Curve (EKC). This study also analyses the reason for increase in carbon emission in the Maldives despite the existing policies designed to move towards net zero emission targets. This study uses 29 years of data from 1990 to 2019 to compute the EKC curve and to establish a correlation between carbon emission and economic development for the Maldives. Ordinary Least Squares (OLS) method is used to run the correlation tests. The results of the analysis show a strong positive relationship between environmental pollution and economic growth. The results suggest that the Maldives has long way to achieve the EKC turning point. The calculated turning point estimates that GDP per capita should reach more than USD 50,000 to achieve the EKC turning point for the country. Given the time it may take to reach this turning point, there is an urgent need for the Maldives to take more targeted and immediate actions to reduce carbon emissions.

Keywords: Environmental degradation, Environmental Kuznets Curve, Maldives, Carbon Emission, Economic Development.

An ecological perspective on the effect of antibiotics on soil microbial community

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ABSTRACT

Due to the indiscriminate and excessive usage of antibiotics in clinical and veterinary settings, the environment is becoming a sink for antibiotic waste. In the environment, non-targeted microbes are exposed to these antibiotics at a high concentration causing undesirable changes in their community structure. From an ecological perspective, antibiotics direct the evolution of native microbial community by creating a selection pressure which causes alterations in their composition and function. Despite the plethora of knowledge available on antibiotic resistance, the phenomenon of antibiotics acting as an ecological factor driving the evolution of soil microbial communities' lacks understanding. In order to better understand this phenomenon, the ecological framework of Grimes's Competitor-Stress Tolerator-Ruderal (CSR) model was employed. Data from metagenomic studies investigating the changes in abundance of microbes in response to antibiotics were extracted and analyzed through an ecological lens according to the CSR model. In our analyses, we proposed antibiotic to be acting as three primary abiotic factors alone and inducing responses in soil microbes which formed the basis for their ecological classification. In line with the CSR model, the non-susceptible microbes were categorized as degraders, resistant, and resilient groups, analogous to competitors, stress tolerators, and ruderal strategists, respectively. Most microbes belonging to phyla Firmicutes, Bacteroidetes, Proteobacteria, and Actinobacteria were observed to adopt the resistant or degrader strategy under antibiotic pressure. Furthermore, microbes assigned to the same life strategy displayed similar functional traits, irrespective of their taxonomic affiliation thereby fitting precisely into distinct CSR life strategies. Therefore, the application of Grime's CSR model forms a basis for ecological classification of microbes, and provides an explanation for microbial community alterations in response to antibiotics.

Keywords: Antibiotic pollution, Ecological classification, Grime's CSR theory, Microbial community change, Soil microbial community.

Comprehensive monitoring of contaminants and associated risk using aquatic ecology and indicesin Gomti river at Lucknow stretch, India

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ABSTRACT

A sustainable ecosystem is of essence to river body for surviving and maintaining the ecological balance. Rivers and lakes are getting polluted with the indiscriminate discharge of variety of contaminants which makes it a global concern. In present study, 20 km stretch of Gomti river was studied at 5 sampling locations in Lucknow for three consecutive seasons during 2021. Physicochemical-bacteriological parameters, heavy metals, PAHs, OCPs, and algal diversity of water and sediment samples were analyzed, followed by indices and multivariate statistics. Statistical evidence showed strong positive correlation ($p>0.95$ at 0.01) among turbidity, phosphate, sulfate, chloride, Ca-H, TSS, TH, TDS, TS, BOD, COD and EC.WQI values gradually increased from S1 (56.7) to S5 (181.8) sites which denotes degree of significant deterioration of water quality downstream of river.16SrRNA gene sequencing identified and confirmed thepresence of some pathogenic bacteria in water samples.Concentrations of heavy metals were 2-10 fold higher than prescribed BIS limits. Geo-accumulation index, contamination factor, enrichment factor and potential ecological risk index were used to evaluate risk of metal contamination in bed-sediments.16-PAHs concentrations ranged fromND-32.8 µg/l in water samples. Among organochlorine pesticides analyzed, concentrations were in order of aldrin>pp-DDT>β-HCH>γ-HCH>α-Endosulfan>pp-DDE>α-HCH. SEM-EDX and ATR-FTIR analyses were performed for characterization of river bed-sediment. Besides, algal diversity narrated 21 genera belonging to 4 classes; Cyanophyceae, Chlorophyceae, Bacillariophyceae and Euglenophyceae.Predominant algal species namely *Oscillatoria sp.*, *Lyngbya sp.*, *Scenedesmus sp.*, *Phormidium sp.*, *Stigeoclonium sp.*, *Chlorella sp.*, *Ankistrodesmus sp.*, *Nitzschia sp.*, and *Euglena sp.* were encountered abundantly. Algal-cells enumeration counts were $2.3*10^4$ to $3.8*10^4$ cells/ml in water samples using a haemocytometer. It is evident that the river has lost its self-purification system due to anthropogenic disturbance toits ecology. Study may be beneficial to improve biodiversity by reducing the burden of potential influx sources and incorporating environmentally friendly strategies.

Keywords: River pollution, contaminants, heavy metals, pesticides, bacterial community.

Invasive Species-derived Biochar for Aqueous Nitrate Sorption

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ABSTRACT

Increasing nitrate concentration in aqueous media across the globe has attracted the scientific community's attention. Increased nitrate concentrations (due to high water solubility and chemical inertness)threaten human health and the ecosystem as it causes blue baby syndrome and eutrophication. Various treatment technologies for aqueous nitrate sorption are available such as electrodialysis, ion exchange, reverse osmosis, biological and chemical denitrification, and adsorption. Biological methods, reverse osmosis and, ion exchange produce a large amount of waste that further needs disposal. Adsorption is a cost-effective and sustainable option for nitrate removal. Biochar is a suitable candidate for removing nitrate on a larger scale. Biochar is a carbon-rich byproduct obtained by the pyrolysis of organic matter/waste. Biochar produced from invasive species (*Prosopis juliflora*) bark is economical and sustainable adsorbent for removing aqueous nitrate. Exhausted biochar can be utilized as a fertilizer for soil health and plant growth. However, pristine biochar did not show significant nitrate removal. So, biochar was acid-activated using hydrochloric acid, which enhances the nitrate removal efficiency by up to 90%. Acid-activated biochar was characterized for physicochemical and elemental properties. Activated biochar prepared from *Prosopis juliflora* bark can provide a sustainable option for nitrate removal as well as waste management.

Keywords: Nitratesorption, acid-activated Biochar, eutrophication.

An insight on existing remediation technologies for chromium-contaminated soil: Mechanism and Applicability

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ABSTRACT

Cr (VI) is become a global concern due its higher toxicity, redox potential, bio-accumulative, and persistent nature in the environment. The major anthropogenic sources of the Cr (VI) are the industries like textiles, ceramics, wood preservation, metal plating, corrosion inhibitors in cooling and mining activities. However, weathering of ultramafic rock and leaching from the overburden of chromite mines too add Cr (VI) into the soil. Since Cr (VI) is very mobile and soluble, it can contaminate the subsoil, surface water, and groundwater by penetrating deep into the soil matrix. Soil act as a source and repository for the Cr (VI) pollution in terrestrial medium. Cr (VI) contamination has the potential to be hazardous to human health due to its ability to enter the food chain and eventually become mutagenic, teratogenic, and carcinogenic. As a result, effective remediation technology is necessary to treat soil contaminated with Cr (VI). Surface capping, chemical reduction and leaching, electrokinetic, immobilisation, stabilisation/solidification, phytoremediation, and bioremediation are a few recent physical, chemical, electrical, and biological remediation technologies that are practical and beneficial for chromium removal from the soil media. The main factors that influence the selection of treatment technology are the type of contaminant, adaptation properties and its transport behaviour in the particular soil matrix. These soil remediation techniques generally use different working mechanisms and exhibit unique applications, benefits and restrictions. More importantly, the effectiveness and cost of these techniques in actual field use vary greatly. This paper will discuss the source of Cr (VI) in soil, its fate, toxicity, and oxidation-reduction reactions, as well as the selected physical and chemical remediation technologies for removing chromium from soil.

Keywords: Chemical reduction, Electrokinetic, Iron derivates, Soil remediation, Stabilization/ Solidification.

Effect on Bio-electricity generation for various types of wastewater using Microbial Fuel Cell Technology - A Green energy initiative

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ABSTRACT

Microbial electrochemical systems (MES) have diverse applications, which include microbial fuel cells (MFC, for harnessing bioelectricity). MFC is emerging as a sustainable technology for electricity generation in addition to treating wastewater. This paper aims at bio- electricity generation with various wastewater samples considered using dual chamber microbial fuel cell (DCMFC). In this paper, a comparative analysis of the power density obtained using kitchen wastewater with the addition of acetate, kitchen wastewater with the addition of silver nano-particle and dye wastewater as the substrate has been done. The DCMFC fed with acetate added kitchen wastewater (sample A) as the substrate was operational for continuous 45 days whereas the cells that were fed with dye wastewater (sample B) and silver nanoparticles added kitchen wastewater (sample C) were operational only for 25 days and 12 days respectively. The polarization curves for the MFC with three different samples were plotted and the maximum power density obtained from these curves has been recorded. Results show a significant variation in the values of power density. The values that were obtained for DCMFC with samples A, B and C are 0.546 mW/m^2, 0.0497 mW/m^2 and 0.004 mW/m^2 respectively at an external resistance of 1 K. The results demonstrated that the kitchen wastewater with acetate being the richest in organic content among the three samples could generate power more efficiently. On the contrary, for the dye wastewater and the kitchen wastewater with nanoparticles in it, the power generated was less due to the fact that both the dye wastewater and the silver nanoparticles proved to be toxic to the growth of microorganisms.

Keywords: Bio-electricity generation, Kitchen wastewater, Microbial Fuel Cell, Polarization Curve, Power Density.

Waste-water Treatment by using Magnetic Modified Aloe-vera waste using biosorption Process Thermodynamic study

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ABSTRACT

Background and purpose:
In this research work using Magnetic Modified Aloe -vera leaves Residue powder using as a bio-adsorbent for removing Azo dye (Acid Yellow -36) from aqueous s solution under the batch system by biosorption method (Waste water treatment). To determine the behaviour of different parameters such as Concentration, pH, temperature, Contact Time and investigation the thermodynamics parameter. Determine the mechanism in their biosorption process.

Research Method:
In the batch system ,1000 mg/L stock solution of was prepared using distilled water. Working concentration solutions of Azo dye were prepared by appropriate dilution 303 K and stirring rate (rpm) of 120. All biosorption experiments were conducted at room temperature at 303 K and stirring speed 120 rpm. Each Flask was filled with 100 ml dye solution and amount of bio-adsorbent dose 0.5 g. Analysis all the parameters and thermodynamics

Results:
The optimum contact time and pH for the uptake of dye were obtained at 30 minutes and acidic pH of 2 . The results showed that the experimental data in thermodynamics system Gibbs free Energy is negative value indicate the spontaneous reaction. Enthalpy Value is (-4.0559 KJ/ Mol K) indicate Exothermic Reaction.

Conclusion:
Magnetically modified aloe-vera leaves were found to be suitable bio-adsorbent for removal of dye from wastewater.

Keywords: Wastewater Treatment, Bio-adsorption, Magnetic Modified Aloe-vera Leaves powder, Thermodynamics.

Ecological and Human Health risk associated with heavy metals in sediments and bioaccumulation in some commercially important fishes in Mahanadi River Basin

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ABSTRACT

Disposal of untreated municipality sewage, industrial wastes and agricultural runoff into the Mahanadi River causes increased heavy metals load in the river basin. The present study assesses the concentrations of heavy metals (Cr, Cd, Hg, Cu, Zn, Pb and As) in water, sediments and their bioaccumulation in some commercially important fishes. The potentialecological risk of heavy metals in sediments and human health risk associated with the consumption of fish accumulating heavy metals are also evaluated. Potential ecological risk analysis of sediment heavy metal concentrations indicated that four sites in the middle stretch, threesites in the lower stretch, and two sites in Hirakud reservoir, posed a considerable ecological risk. The concentration level (mg/kg) of heavy metals measured followed the hierarchy as follows: Zn (89.47)>Cr (73.9)> Cu (44.4) >Pb (29.5) >As (13.8) >Hg (0.48) >Cd (0.32). The bioaccumulation factor (BAF) determined in five different fish species showed hyper-accumulation of Cu while Cd was the least bioaccumulativewith a hierarchy of Cu >Hg>As > Pb > Cr >Zn > Cd. The demersal fish *Clariasmagur*was observed to be the mostbio-accumulative to heavy metals. Potential human health risk assessed using Estimated Daily Intake (EDI), Target Hazard Quotient (THQ), Hazard Index (HI) and Carcinogenic Risk (CR) wasfound to be within the acceptable threshold. However, continued disposal of heavy metals could posea greater carcinogenic risk in this region.

Keywords: Ecological Risk, Fish, Heavy Metals, Human Health Risk, Mahanadi River.

Exogenous application of silicon nanoparticles encourages growth and physiological activities of menthol mint (*Mentha arvensis* L.) under chromium toxicity

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ABSTRACT

The purpose of my research is to provide information that how growth and physiological parameters of *Mentha arvensis* L. (Lamiaceae) changed when supplemented with Silicon nanoparticles (SiNPs) which were already under chromium stress". To attain food security, growing countries strive to promote nanotechnology for boosting crop production and ensuring agricultural sustainability. Additionally, the application of nanotechnology in terms of agrochemical formulations and specific target-delivery of biomolecules proved helpful in uplifting agricultural productivity without doing any harm to the environment. A randomised pot experiment was designed at Aligarh Muslim University, to explore the effect of various foliar concentrations of SiNPs (40, 80, 120, 160 & 200 mg L^{-1}) on the overall performance of the plant under Cr stress (60 mg kg^{-1} of soil). Different growth parameters and physiological attributes like total chlorophyll, chlorophyll fluorescence, carotenoid content, carbonic anhydrase activity and nitrate reductase activity were measured after 90 days of sowing. Consequently, exogenous application of SiNPs, at the applied concentration (120 mg L^{-1}) exhibited a beneficial effect and was found to be the most effective in improving Cr tolerance by strengthening chlorophyll content and improving photosynthetic rate due to enhancement in the activity of certain photosynthesis-related enzymes.Due to their wide variety of potential applications and unique physiochemical properties of SiNPs could be recommended for the improvement of the growth and synthesis of chlorophyll and plant quality.

Keywords: Menthol mint, Silicon Nanoparticles, Chromium.

An Overview of Water Quality of Indian Rivers and River Bank Filtration

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ABSTRACT

Water is an essential element for the survival of mankind. For consumption and maintaining personal hygiene water has no substitute. Rapid urbanization and industrialization have been causing tremendous pressure on the existing surface and ground water resources both in quantity and quality. The causes of water quality in surface water and their effect in Indian rivers have been discussed. The quality of river water improves as it travels laterally across the riverbank as well as beneath the riverbed. Considering the enormous potential of treatment of river water through surrounding porous media many countries have recognized the benefit of river bank filtration (RBF). RBF is highly cost effective, its application and use in India needs to be encouraged.

Keywords: Horizontal collector well, Infiltration gallery, Managed Aquifer Recharge, Natural water treatment, River bank filtration, Water quality.

Antioxidant activity and Phytochemical Screening of *Nyctanthes arbortristis* plant extract

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ABSTRACT

This study is aimed to analyse the secondary metabolites and antioxidant activity of the leaves and flower extract of *Nyctanthes arbortristis*. Plant parts were cleaned with distilled water and dried for 20 to 30 days in a shed environment. The flowers and leaves were ground into powder after being dried. The extraction was done with ethanol solvent. Filter the extract with the help of whatman filter paper and it was dried to get pure extract. After getting pure extract, the extract was used for the preliminary phytochemical studies. Standard methods are used for the screening of the extracts viz. Wagner's test for Alkaloid's, Alkaline reagent's test for Flavonoid's, Salkowaski's test for Phytosterols etc. Antioxidant activity assessed with FRAP (Ferric Reducing Antioxidant Power) assay. FRAP assay depends upon the ferric tripyridyl triazine (Fe (III)-TPTZ) complex to the ferrous tripyridyl triazine (Fe (II)-TPTZ). The results of investigation indicate high antioxidant activity in flower than leaves extracts of *Nyctanthes arbortristis*. Present study also indicates that Alkaloids, Phytosterols, Carbohydrate, Phenols, Proteins and Steroids show the presence in both extracts but terpenoids found only in the leaves extracts. The study concluded that the extracts from the Leaves and flowers of *Nyctanthes arbortristis* possess Antioxidant properties and could serve as Free Radical Inhibitors or Scavengers, which may act as Primary Antioxidants and can be used in Pharmaceutical Industry. The presence of secondary metabolites in the extracts can be effective and safe even when synthetic drug fails, they may synergize the effects of other compounds in the medicines.

Keywords: Antioxidants, FRAP Assay, Free radicals, *Nyctanthes arbortristis,* Phytochemical screening.

Impact of Different Concentrations of Gibberellic Acid and Naphthalene Acetic Acid under Different Soaking Time on Seed Germination and Seedling Growth of Kagzi Lime (*Citrus aurantifolia* Swingle.)

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ABSTRACT

A field experiment was carried out at fruit block VCSG UUHF Bharsar in ventilated poly house condition during the year 2021. The experiment was conducted in 14 different treatment combinations of GA_3, NAA and soaking time with three replications and each replication contained 15 seeds under a Factorial Randomized Complete Block Design. The findings of the investigation indicated that the treatment combination S_2G_4 (seed soaked for 24 hours + GA_3@150 ppm) resulted in minimum days taken for initial germination (26.00 days), maximum germination per cent (60.53 %), survival per cent (80.43%), plant height (18.80 cm), shoot diameter (2.02 mm), number of leaves (24.86), shoot fresh biomass (2.53 g) and shoot dry biomass (1.23 g). While, the maximum root length (13.32 cm), root diameter (2.51 mm), root fresh biomass (2.61 g), root dry biomass (1.40 g), total fresh biomass (3.71 g) and total dry biomass of seedling (2.18 g) was found superior in treatment combination S_2G_7 (seed soaked for 24 hours + NAA @150 ppm). Therefore, it can be concluded that the GA_3 @150 ppm + seed soaked for 24 hours was found best treatment combination for vegetative growth.

Keywords: Kagzi lime, gibberellic acid, Naphthalene acetic acid and soaking time.

Oxidative Potential and Risk Characterization of Heavy Metals in Sub-micron Particles during Foggy and Non-Foggy Periods at a site in the Indo-Gangetic Plain

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ABSTRACT

The exposure to ambient sub-micron particulate matter (PM_1) can induce oxidative stress, contributing to global burden of diseases. The evaluation of the oxidative potential (OP) of PM_1 is thus critical for health risk assessment. Sampling of PM_1 particles for the present study was conducted at Campus of Dayalbagh Educational Institute, Agra to determine concentrations of crustal and trace elements in submicron mode (PM_1) particles, to reveal the detrimental effects of PM_1-bound metals (Cr, Cd, Mn, Zn, Ba, Pb, Cu and Ni) and their association with oxidative property in PM_1 samples. The samples were collected in the foggy (November 1, 2021 – December 27, 2021) and non-foggy periods (April 1, 2021–June 30, 2021). The oxidative property of PM_1 was also assessed by the dithiothreitol (DTT) assay. Mass concentration of PM_1 was 106.5±16.2 and 42.1±23.9 $\mu g/m^3$ during foggy and non-foggy period, respectively. The volume- and mass-based dithiothreitol (DTTv and DTTm) activities of PM_1 were significantly higher in foggy period than non-foggy period. Seasonal variations in DTTv and DTTm were much larger than mass concentrations of PM_1, indicating that specific chemical components are responsible for PM_1 derived OP. Strong correlations ($r > 0.700$, $p < 0.01$) were found between DTT activity and water-soluble transition metals (Cr, Cu, Mn and Ni). In both periods, Mn exhibited the highest Hq (hazard quotient) value and Cr exhibited the highest IlCR (Incremental Lifetime Cancer Risk) value for both adults and children.

Keywords: Sub-micron Particle, Heavy metals, Oxidative potential, Health risk.

Hydrogeochemical investigation and qualitative appraisal of ground and mine water resources of Mahanadi Valley coalfield, India

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ABSTRACT

The present study deciphers a geochemical evaluation of groundwater and mine water resources available in Mahanadi Valley coalfields to understand the source of contaminants, to assess the water quality and quantity for drinking, irrigation and industrial uses. A total of 67 water samples were analysed for pH, TDS, EC, major ions (F^-, Cl^-, HCO_3^-, SO_4^{2-}, NO_3^-, Ca^{2+}, Mg^{2+}, Na^+, K^+) and heavy metals (Fe, Mn, Cu, Ni, Co, As, Se, Ba, Al, Zn) as per standard methods. The pH range of studied waters is 3.26-8.52, inferring acidic to alkaline nature. A relatively lower values of the ratio $HCO_3^-/(HCO_3^-+SO_4^{2-})$ and the dominance of SO_4^{2-} in total anion (TZ^-) of the mine water samples reveal that mine water chemistry is being controlled by weathering of sulphide bearing minerals. On the contrary the groundwater chemistry is majorly influenced by weathering of carbonate and/or alumino-silicate rocks with a secondary contribution from dissolution of CO_2 gases. Water quality indices based on water's cumulative characters identify that around 71% of groundwaters and 64% of mine waters are collectively fallen in the excellent and good water quality classes set for drinking use. Ions such as F^- and NO_3^- and heavy metals such as Mn, Ni and Fe are depleting water quality for drinking use. Other side sodium adsorption ratio, ranging from 0.1 to 5.32 $(meq/L)^{0.5}$, is reflecting that all samples are suitable for irrigation use. The USEPA-based assessment of non-cancer health risk from the intake of these waters depicts that around 45%, 53% and 64% of the total samples are showing hazard index values greater than 1 respectively for adult female, adult male and child populations. This denotes that child population is on higher risk and people intaking such water may face non-carcinogenic health problems in future.

Keywords: Health risk assessment, hydrochemistry, elemental flux, water quality index.

Interactive effects of moss cover and seasonality on soil enzymatic activity and microbial biomass carbon in different Central Himalayan Forest soils, Uttarakhand, India

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ABSTRACT

Soil enzymes and microbial biomass carbon are indicators of microbial communities in soil and combine information from soil physicochemical properties, organic matter dynamics and microbial status. The present study assessed the effects of moss cover and seasons on soil enzymatic activity and microbial biomass carbon in different temperate forest types of the Central Himalayas, Uttarakhand, India. Soil microbial biomass carbon (SMBC) was determined by chloroform-fumigation extraction method and different enzymatic activities were determined following standard methodology. We observed that the enzymatic activity and microbial biomass carbon showed significant variations under two substrates and within seasons also ($p<0.05$). The values for enzymes and SMBC were higher under moss cover during the rainy season and during winter season the values were higher under soil without moss cover. Different forest types also showed significant variations ($p<0.05$) in enzymatic activity and SMBC. Soil dehydrogenase (1376.95 µg TPF/gDW/hr.), β-Glucosidase (5.59 mg PNP/gDW/hr.) and urease activities (516.08ug $NH4^+$/g DW/hr.) were highest in Cypress forest. In contrast, acid phosphatase (18.36 mg PNP/gDW/hr.), arylsulfatase (2.79 mg PNP/gDW/hr.) and phenol oxidase (8269.40 µMABTS$^+$/g DW/min.) activities were higher in Kharsu-oak forest. SMBC activity (1727.36 µg C/ gm) was highest in Moru-oak forest under moss cover. These results indicate that moss cover positively influenced soil enzymatic and microbial activity. The study also indicated that the oak-dominant forest types are better at sustaining soil microbial biomass carbon and enzymes. Overall, these findings highlight the importance of saving moss cover and including them in forest management practices to improve soil microbial diversity, enzymatic activity, and soil quality enhancement in Central Himalayan forests.

Keywords: Central Himalayas, Microbial biomass carbon, Mosses, Seasons, Soil enzymes.

Foliar application of chitosan-elicited defense responses against mosaic virus in tomato (*Solanum lycopersicum*)

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ABSTRACT

The control of plant diseases by inducing plant resistance to avoid yield losses due to the incidence of diseases by various pathogens. As a result, there is an increasing demand for interactions between host and pathogen and molecules to induce defence mechanisms in crops. Hence, in this study, we report the efficacy of chitosan-elicited defence responses in *Solanum lycopersicum* against tomato mosaic virus. Chitosan was applied via foliar spray 10, 20, and 35 days after transplantation as a preventive treatment against the natural viral infection. At the time of harvesting (70 days after transplantation), virus accumulation, photosynthetic performance, as well as gene expression for proteins affecting resistance responses were studied. It was observed that there was a significant reduction in virus accumulation in chitosan-treated plants compared to untreated plants. Similarly, a positive effect of chitosan on chlorophyll fluoresce, gas exchange dynamics, total phenol, total sugar, ascorbic acid, lycopene, and beta-carotene was observed in chitosan treated plants. The analysis of gene expression suggested the occurrence of chitosan-induced, systemic acquired resistance-related responses. Our data indicate that treatment of chitosan by seed treatment and 10 to 30 days after transplantation elicits defence responses in tomatoes to control viral disease incidence and prevent deleterious symptoms by mosaic virus.

Keywords: Chitosan, tomato, tomato mosaic virus, hydroponic, disease resistance.

Microbial diversity of Antarctica and Southern Ocean and their diverse industrial application

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ABSTRACT

Antarctica is the largest pristine wilderness in the world. With the capability to survive, adapt and thrive in diverse conditions of temperature, pH, pressure, salinity, UV radiation, etc., antarctic microorganisms possess robust enzymatic and bio-catalytic systems which are useful in a variety of industrial applications. Southern Ocean, which harbors rich microbial diversity, seems to have a promising future in the development of novel biologically active substances. In the present investigation, samples (water, sediment, and algal mats) were collected during the expedition to the Southern Ocean and Antarctica. Water and sediment samples were collected from different locations of different islands/peninsulas like Bharti Station, Fisher Island, McLeod Island, Broknes peninsula, and Stornes peninsula. Lake water samples were found to be contaminated with coliform bacteria; however, Faecal coliform were absent when tested with selective media. Presence of MPN coliform indicates the degree of pollution and sanitary quality of lake water. Coliform contaminations are found in the lakes which are in the vicinity of those areas which are regularly accessible. Moreover, the presence of coliform bacteria in the samples indicates an alarming situation and need to be investigated further. During the Southern Ocean expedition, seawater samples were collected in sterilized bottles from different depths using CTD operations. On-board culturing of microorganisms was done using selective media for investigating their roles in bioremediation. Some bacteria have shown efficient degradation of anionic surfactants. Identified culturable bacteria can be used for variety of industrial applications for the benefits of society and mankind.

Keywords: Antarctic Lakes, Southern Ocean, Extreme Environment, Industrial applications.

Bioefficacy of *Jathropha curcas* nanoparticles against the larvae of malaria vector

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ABSTRACT

Mosquito control programmes are faced serious and relevant challenges including the development of resistance in some Culicidae species and the rapid proliferation of highly invasive mosquitoes globally. Synthetic insecticides are used to control mosquito vectors, which results in resistance, environmental consequences and high operating costs. The development of environment friendly methods of vector control is a significant public health concern. In the present communication, polymeric nanoparticles (PNPs) loaded with crude oil of *Jatropha curcas* seeds were synthesized using polyethylene glycol (PEG) and evaluated their larvicidal activity against *Anopheles stephensi*. The melt-dispersion process was used to synthesize the nanoformulations in 1%, 2%, and 4% oil ratios. The larvicidal potentiality of PNPs with an optimal loading of 4% of *J. curcas* seed oil was noticed to be more effective than other nanoformulations, with LC_{50} values of 26.520 and 10.427 ppm and LC_{90} values of 96.37 and 39.849 ppm after 24 and 48 hrs. of exposure. The PNPs were prepared using easy, affordable, and environmentally benign process which may be used as alternate to control mosquito vectors.

Keywords: *Jathropha curcas*, Crude oil, Polymeric nanoparticles, Larvicidal, *Anopheles stephensi*.

Effects of Air Pollution on Crop Plants in the Industrial area

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ABSTRACT

It is commonly well-known that air in industrial areas contains a significant amount of dust particles smog and toxic air pollutant, Agricultural crops can be injured by air pollution when too high concentrations of various air pollutants are in atmospheric air. Visible symptoms markings on the plant leaves, resulting in reduced growth and crop yield and death of the plants. The plant development and the severity of the injury depend on the concentration of the particular pollutant, and other factors. Suphur dioxide (SO_2), Nitrogen oxides (NO_2), and Respirable suspended particulate matter (RSPM) is the main and common air pollutant produced in huge amounts in the combustion of coal and other fuels in industrial areas. Sulphur dioxide concentrations in the air have decreased in the past two decades, mainly because we use eco-friendly energy sources or more Non-sulphur-containing fuels for the generation of energy through sunlight, hydro, and wind but many industries depend on coal-burning electricity which is the main cause behind the increasing concentration of Sulphur dioxide in the air composition and its much and more impacts on agriculture crops around those practices in industrial areas. The present study focuses on the present and previous air quality status in the Pithampur Industrial area in Madhya Pradesh, India, and their toxic pollutant's effects on crop plants. We observed various air quality parameters in the area and their visual effects on leaves of crop plants, Leaf area, leaf relative water content, chlorophyll content, dust retaining capacity of leaf, narcosis, chlorosis, shape, and size of the leaf, spot, and leaf color, it is recorded the significant effects of air pollution on agriculture crop plants leaves in the industrial areas.

Keywords: Air Pollution, Agriculture, Crop, Toxic Pollutant, Industries.

Study of *Moringa oleifera* on Lifespan and Healthspan of *Caenorhabditis elegans* model organism

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ABSTRACT

Aging is the basic aspect of animals which is characterized by different degenerative changes. It reduces the functional efficiency of an organism and brings it towards mortality. The main focus of this study was an investigation of the lifespan and healthspan of *Caenorhabditis elegans* (*C.elegans*). *Moringa oleifera* is a fast-growing, drought-resistant tree of the family Moringaceae, native to the Indian subcontinent. The previous studies on this plant reported that leaves and seeds extract of *Moringa oleifera* showed different properties including antioxidant, anticancer, anti-diabetic and anti-inflammatory. Thepresent study involvesthe isolation of different bioactive compounds present in the leaves and seeds of *Moringa oleifera* which are having high nutritional value. The wild-typestrain of*C. elegans* is used as an experimental model organism. The outcome suggests that the Methanolic extract of *Moringa oleifera* leaves and seeds show a significant increase in healthspan and lifespan under normal laboratory culture conditions. The stress tolerance level of *C.elegans*has also been investigatedwith regard tothermal and oxidative stress. Thepreliminary results showthe improved health span conditions as recognized byphysiological functions like body bending, pharyngeal pumping and reduced intracellular ROS accumulation suggesting ameliorating effect of *Moringa oleifera*on the aging of model organism *C.elegans*.

Effect of extreme temperature changes on phenolic, flavonoid contents and antioxidant activity of tomato seedlings

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ABSTRACT

Changes in climatic conditions are one of the most important abiotic factors affecting plant growth and crop quality. Plants exposed to thermal stress respond by accumulation of secondary metabolites (SMs). Tomato (*Solanum lycopersicum*) is a cosmopolitan crop, eaten by world's greater population due to its high nutritive value and young plants could be strongly affected by extreme events imposing severe consequences on the development and crop yield. Scientists have investigated the phytochemical effect of thermal stress in seedlings of *S. lycopersicum*, useful in justifying mechanism of tolerance in tomato plant to thermal stress in the context of climate change. Testing the possibility of increase in secondary metabolites due to thermal stress maybe useful to make plants more tolerant to extreme climatic events. Seedlings of *S. lycopersicum* were subjected to heat shock and cold shock in comparison to control. The activities of phenolic compounds, flavonoids, total phenolic content (TPC), total flavonoid content (TFC) and antioxidants were estimated under the four temperature treatments. Using standards and HPLC estimation, differences in the amounts of TPC and TFC in different compounds were strongly correlated to thermal stress. The major peaks of phenolics and flavonoids were assessed for all the setups. Cold shock plants exhibited highest number of signals and highest absolute quantity of SMs, phenolics, flavonoids and highest antioxidant activities (in DPPH and ABTS assays). The research determined the strong relation of complexity and quantity of phenolics and flavonoids in tomato's extract to thermal stress. Additional research is necessary to reveal molecular response of tomato to such thermal stress.

Keywords: Antioxidant activities, flavonoid content, phenolic content, *Solanum lycopersicum*, thermal stress

Study of Acanthocephala infection in Fish *Channa* species in relation to body length and Sex of the host of Chapra, Bihar

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ABSTRACT

Fish, *Channa* species is a common freshwater fish with high nutritional value such as presence of Omega-6 fatty acid. It has a better economic importance because it is used by human as a healthy diet.*Channa* species are found in paddy field and mud, making them more susceptible to parasites. Due to parasitic diseases poses a great threat in the culture of fishes. Acanthocephalans are one of the most widely distributed parasites infecting fishes throughout India or world. The acanthocephala infectsthe intestine of fishes and disrupted at the point of penetration. The aim of this work was to study the fluctuation of acanthocephalan infection rate in relation to sex and length of the host. Total 128 fishes of *Channa*species (*Channapunctatus, Channagachua and Channastriatus*)were examined for the presence of acanthocephalan parasitesduring January –May (2017). Out of total no. of 128 fish examined, 60 fishes found to be infected by acanthocephala. Fishes were collected from the different local market of Chapra then dissected and identified the parasites which occurs in the fish intestines. For statistical analysisprevalence and mean intensity are calculated. The analysis revealed that the female host has higher prevalence (57.33%) compared to male (50.94). For length-wise analysis host fishes were divided into three length groups and it found thatintermediate length group (15-18.9 cm) of fishes has higher prevalence (47.82%) than the other length groups.

Keywords: Acanthocephalan, infection, sex, length, *Channa.*

Evaluation of Scalable Regenerative Agriculture Practices for Improving Soil Health and Reducing Environmental Footprint

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ABSTRACT

Achieving food security under climate stress with tropical agricultural soils invariably deficient in one or more essential nutrients urges innovative pathways to enhance nutrient use efficiency. Non-judicious use and soil addiction to chemical fertilizers significantly reduced the partial factor productivity in different crops in South Asia. In 2020, the Indian government paid the price of this nutrient gap through subsidies, where nutrient-based subsidies contributed 0.5% of the country's gross domestic product (Rs. 0.73 lakh crore). Integrated nutrient management (INM) can offer an eco-friendly and sustainable option to encourage balanced nutrition to crops and reduce micronutrient deficiencies and environmental footprint without compromising the yield. Strategic research was initiated at ISARC to identify the key drivers and indicators of regenerative farming (RA) practices in Eastern UP that potentially improve soil health and mitigate GHGs emissions without yield penalty. Practical, accessible, and sufficient organic inputs are needed to develop healthy soil-water-crop-human nexus, which could later lead to climate resilience for small and marginal farmers. Our results showed that rice grain yield under regenerative agriculture increased by 0.3 t/ha over conventional systems. Use of INM under RA across different wheat varieties, 0.2 t/ha yield gain was achieved while reducing 25% of NPK application. The average net profit achieved in INM over FFP was USD 100 per hectare per season. Crops and varieties responded differently to natural and organic systems. Mustard was highly susceptible to aphid attack and needed to have better pest management and resistant varieties. On the other hand, Mentha is highly suitable for organic systems. Indigenous rice varieties like Kalanamak and Kalamegha varieties and basmati rice responded better than hybrids under organic systems. Sustainable intensification through integrated nutrient supply systems fosters the inclusion of stem nodulating legumes, optimization of bacteria consortium, and other sources of symbiotic and non-symbiotic nitrogen fixation, improving phosphorus solubility and promoting cereal-legume rotation in the farming system. Low-input responsive rice varieties are better suited and must be screened for RA systems. Thus, long-term research will be ideal to understand the dynamics of improved soil health that combat soil degradation and increase climatic resilience, which increases the region's productivity and sustains the systems with decreased environmental footprints.

Keywords: Organic inputs, climate resilience, GHGs mitigation, soil health, crop diversification

Novel approach of food fortification of pigmented rice in Geriatric Pediatric and diabetic mellitus

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ABSTRACT

More than half of the world's population use rice as a staple meal. The major people in Asia use rice for energy, supplying 80% of their carbohydrates, 7-8% protein and 3% of their fat requirements. Drug molecules have historically been found in food. Lesser or no toxic or no negative impact on the natural molecule can have. This Study deals with the quantitative and qualitative assessment of nutritionally important content in 100 pigmented rice landraces (*Oryza sativa*) of Uttarakhand hills India and met analysis of fatty acids in red rice. 10 market available varieties were analysed for comparative assessment. Various studies are going on many different rice varieties in combating diabetes, hyper-lipemia, and other diseases, etc. the levels of antioxidant molecules in rice are lower than in other cereals Since rice contains high amounts of various naturally occurring antioxidants and other medicinal components, as well as potentials for the development of rice-based supplements for Pediatric and Geriatric, medicines, food preservatives, and cosmetics, it can use to enhance health and longevity.

Keywords: Diabetic rice, Geriatric, Human health, Nutrients, Pediatric.

Genomic repeat content influences the rate and spectrum of spontaneous mutations

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ABSTRACT

Mutations are known to be causes of many inheritable diseases and cancer apart from being the driving force of evolution. Various intrinsic and environmental factors are known to be affecting the mutation rate and spectrum. Low complexity regions of the Genome are previously known to be more prone to Insertion- Deletion mutations. We try to explore the relationship between the low complexity regions of the genome and base substitution rate by collecting high throughput mutation accumulation experiments from the literature and computing the repeat and low complexity regions of the genomes used by the respective studies as reference. We find that there is a positive correlation between the genomic repeat fraction and base substitution rate for Prokaryotes and Fungi while no such relationship was observable in other taxa due to inadequate sample size. Fitting a linear model shows also confirms a significant relationship. The effect of repeat fraction was also studied with base substitution parameters, showing a negative relationship between AT Bias while no correlation was observed with Ts/Tv ratio. These results show the importance of genomic structure in understanding the mutations and associated health hazards.

Keywords: Low complexity regions, Base substitutions, Mutations, RepeatFinder.

Role of Superoxide dismutase enzyme on respiratory diseases caused by various environmental factors

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ABSTRACT

Particulate matter present in the air is one of the main causes of the production of reactive oxygen species in the body, leading to oxidative stress in the respiratory system. The ramification of the phenomenon causes pulmonary inflammation and apoptosis of epithelial cells which leads to an increase in the oxygen stress level in various respiratory parts like lungs, bronchioles, alveolus, and trachea. While particulate matter of more than 2.5 micrometers is easily filtered by our body, particulate matter of 2.5 um or less is considered a threat to the respiratory system. Due to the microscopic size of PM2.5, it can pass through the filtration of the nose and damage the respiratory system due to its toxic effects. The presence of PM2.5 can stimulate the excess production of reactive oxygen species causing oxidation of proteins and lipids and it can also lead to the activation of pro-inflammatory substances like neutrophils and macrophages. To counteract the ever-rising level of reactive oxygen species, an antioxidant enzyme like superoxide dismutase plays a vital role in converting reactive species like superoxide anion to more stable molecules like oxygen and water. However, if ROS production overwhelms the antioxidant system, it can lead to disruption in the homeostasis of pro-oxidants and antioxidants leading to the development of various respiratory illnesses like lung cancer, asthma, COPD, emphysema, etc. Moreover, pre-existing respiratory diseases are also likely to worsen with the inhalation of the pollutant of PM2.5, further causing irreversible damage. While SOD seems to be a promising candidate for the treatment of respiratory disease, the results are still far-fetched to be considered effective. A more thorough insight into the relationship between SOD and respiratory illness is required for developing therapies through the manipulation of SOD levels in combination with other drugs.

Keywords: Superoxide dismutase; respiratory diseases; reactive oxygen species; environmental factors; antioxidant

Analysis of Global Energy Status Quo & its Impact on Climate Change

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ABSTRACT

Climate change is an important indicator showcasing the damage to nature's equilibrium. Due to anthropogenic changes, there has been a substantial increase in Greenhouse gas concentration in the atmosphere, in the past few decades. Greenhouse gas emissions are the most important factor impacting climate change. Global energy production and consumption are the main factors responsible for the increased global greenhouse gas emissions. 3/4th of global greenhouse gas emissions are contributed by carbon dioxide only. The main sources of Carbon dioxide gas are, power production by combustion of fossil fuels, i.e., mainly Coal for electricity generation and petroleum-based products for transportation. Per capita, the carbon footprint is also an important indicating factor of global carbon emissions. It is the need of the hour to limit greenhouse gas emissions and implement strict policy measures so that the equilibrium in nature is maintained. The aim of this paper is to supply some background on climate science, critically analyze global energy production and consumption and its impact on climate change, a few key policy change ideas, key ways to circumvent the dangers, and different modeling states for the climate.

Key word: Climate Change; Equilibrium; Greenhouse Gases; Production; Consumption.

Bioremediation of Wastewater through Vermifiltration

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ABSTRACT

Inadequacy of treatment facilities in the developing countries has resulted in generation and treatment of wastewater and it has become an important health issue in the developing countries (Singh *et al.,* 2015). About 80% of water used by man reaches the sewer system as wastewater (Sinha *et al*., 2008). This work has been carried out to study the efficiency of vermifiltration i.e. use of earthworms for treatment of wastewater collected from the drainage canal of Burla town, Sambalpur. The physico-chemical parameters like pH, electrical conductivity, TSS, BOD, COD, nitrate, fluoride, chloride which are considered as indicators of the pollution load in the wastewater were analysed. There was significant reduction in various parameters with respect to the duration of retention of the wastewater in the vermibed. There was reduction of pH, Electrical Conductivity, TSS, BOD, COD, Nitrate, Fluoride and Chloride by 1.2%, 36.9%, 40.3%, 60.5%, 44.4%, 47.2%, 39.7% and 55.1%, respectively by 30th day. Vermifiltration facilitates the microbial activity in biodegradation of organic load of wastewater. By controlling the hydraulic loading and retention time the treatment of wastewater in decentralised manner is possible. It can be an efficient, eco-friendly and cost effective alternate method for treatment of wastewater.

Keywords: Bioremediation, Vermifiltration, Vermibed, TSS, BOD, COD.

Analysis of water quality and fish biodiversity of Indrapuri Dam (Rohtas) Bihar

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ABSTRACT

As we all know that clean water is a very important component for the survival of life on earth. Fresh water reservoirs that are being contaminated due to different factors such as washing clothes, agricultural runoffs, sewage runoffs, pollution, man made activity and many more can affect the health of locals who consume fish from this water. Indrapuri Dam (Rohtas in Bihar) is an important freshwater resource and is the fourth longest barrage in the world. It provides numerous benefits. It is home to flora and fauna especially fish and also used drinking water for fishermen.

The current study attempts to ascertain the dam's current status of fish biodiversity, study was conducted from April 2022 to September 2022. There are 25 species of fish belonging to 12 distinct families, including the Bagridae, Schilbeidae, Siluridae, Cichlidae, Cyprinidae, Claridae, Erethistidae, Heteropneustidae, Pangasiidae, Mastacembelidae, Channidae, and Notopteridae The fish growth pattern in dams is improved during the monsoon season, which also brings about a change in fish species and water quality. Less than 50 families of fishermen who rely only on the dam for their livelihood are located 3 kilometers away. So to improve aquaculture laboratory research was done to evaluate the quality of dam water at various locations. Physical and chemical parameters were tested from several sites. The outcomes have been examined using the recommended standard value. PH, Total dissolved solids, Dissolved oxygen, Conductivity, Nitrate, Salinity, Chloride, Sulphate, Alkalinity, and Total hardness have been recorded separately. After analysis of these parameters, it has been concluded that water quality is healthy and can be used for fish culture, domestic, irrigation and also for drinking purposes.

Keywords: Indrapuri Dam, physico-chemical parameters, fish diversity.

Ecophysiological plasticity and the associated adaptations varied along the topography mediated light environments for *Quercus semecarpifolia* in central Himalaya

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ABSTRACT

Due to the considerable topographic variations in the Himalayan forests, incident sun radiation in the forest canopy is highly unequal. This results in significant environmental differences at a finer scale and the subsequent variations in photosynthetic productivity. Consequently, smaller scale ecophysiological investigations, rather than landscape level models, are more effective and instructive. We investigated leaf ecophysiological differences between two *Q. semecarpifolia* forest sites, located in aspect mediated varying light regimes, in the same catchment in central Himalaya. Across the seasons and diurnal intervals, the higher sunlight environment (S) demonstrated considerably higher rates of photosynthesis (A) than the lower sunlight environment (N). Although, temperature was a key contributor to seasonal fluctuations in photosynthetic physiology, photoperiod significantly determined the seasonal and diurnal plasticity of leaf ecophysiological traits. The study highlighted the critical function of stomatal modifications in dealing with and modifying the ecophysiological ability of the leaf to survive effectively against different environmental stresses produced by solar changes, consequently maintaining optimal photosynthesis. The regression model for A and stomatal conductivity (gsw) explained larger contribution of gsw (higher R^2 value) to tune the photosynthetic plasticity as an adaptive function against such varying stresses across the seasons. We examined, how the leaf chlorophyll content modified between the two light regimes, across the seasons to determine the chlorophyll adaptation strategy. The N aspect had higher leaf chl a, b, and chl a+b and a lower chl allocation ratio (a/b) than the S, optimised the required light reception in photoreaction centres for improved photosynthetic performance. Observing the light response curve, we discovered, the same species developed significantly distinct light response strategies and photosynthetic capacity in S and N for the given various magnitudes of PPFD.

Keyword: photosynthesis; stomatal conductivity, leaf gas exchange; plant water potential; light response curve.

Distribution mapping and diversity assessment using Internal transcribed Spacer region, *matK* and *rbcL* of *Ilex venulosa* and *Ilex khasiana* from Meghalaya

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ABSTRACT

Ilex venulosa and Ilex khasiana, which belongs to the holly family, Aquifoliaceae Bartl., is the largest family with a single genus Ilex, comprising of deciduous and evergreen bushes or trees with economic importance as crops, firewood, ornamentals and medicinal use (Lima et al., 2016). Ilex venulosa is an endangered tree (IUCN 2010) with grey bark, serrate leaves and red fruits, while Ilex khasiana is a critically endangered (IUCN 2007) grayish-brown bark tree with purplish-red fruits endemic to Meghalaya. In nature, propagation by seed germination in both these tree is unusual; the seeds fail to germinate because of incomplete and rudimentary embryos (Hu, 1989). Also, any viable seeds have a prolonged period of dormancy, making them problematic for use in conventional conservation work. So, the present study aims to generate a distribution map of this species and to assess the genetic diversity of I. venulosa and I. khasiana. The distribution mapping of I. venulosa and I. khasiana profiles revealed high accuracy of the potential habitats in the East Khasi Hills of Meghalaya. Field surveys revealed five new locations for the occurrence of I. venulosa viz., Lad Mawphlang, Swer, Pomlum, Mawkajem, and Langkyrdem. Whereas I. khasiana were found to present as previously reported viz., Upper Shillong, Mattilang park Mawphlang Dam and Jakrem. Assessment of genetically diverse populations are selected to improve the improvished populations, thus reducing the probability of genetic drift with diverse germplasms and allowing them to propagate and increase in number through natural regeneration. DNA sequence-based character and distance analysis of various loci reflects the fundamental relationships and genetic divergence. Sequence analysis of I. venulosa and I. khasiana using ITS, matK and rbcL showed lower genetic divergence. Populations of I. venulosa from Pynursla showed a relatively higher level of diversity than those from Sohra. The population of I. khasiana from Mawphlang Dam showed a relatively higher level of diversity than those from Upper Shillong. The present study revealed a low level of genetic diversity which indicate a limited gene flow among populations of the I. venulosa and I. khasiana. It is possible that the low genetic diversity may be one of the factors contributing towards the current threat status of the species. Thus, priority conservation actions must be taken to conserve these species in their own habitats by checking anthropogenic destruction, enriching the genetically impoverished populations with diverse germplasms, and allowing them to propagate and increase in number through natural regeneration.

Keywords: Distribution Mapping, Ecological Niche Modelling, Genetic Diversity, I. venulosa, I. khasiana.

Studies on seasonal variations in plankton population of a fresh water Perrenial pond (Digghi Pond) Dighwara, Saran (Bihar)

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ABSTRACT

Planktons both Phyto- & Zooplanktons form the basic of pond productivity. In Digghi pond, Dighwara Saran (Bihar) India, the total number of plankton has been recorded maximum during winter season (2161.4µg/l) and minimum during post-monsoon season (551.3µg/l). However, maximum percentage occurrence of phytoplankton (65.43%) with minimum zooplankton percentage (34.57%) have been recorded in monsoon season, indicating an inverse relationship in between them. Among phytoplankton, Chlorophyceae were dominent in winter season (15 genera); Cyanophyceae+Mixophyceae in summer season (7 genera) in summer season; Bacillariophyceae in monsoon season (12 genera) and Euglenophyceae in post-monsoon season (5 genera). These indicate almost a positive relationship in between Bacillariophyceae & Euglenophyceae, but an inverse relationship in between Chlorophyceae & Cyanophyceae+Mixophyceae. Further, the present investigation showed only one peak. On the other hand, the percent occurrence of zooplankton has been recorded maximum in spring season (51.01%) and minimum in monsoon season (34.57%) indicating that pH & temperature have some effect on the growth & production of zooplankton. As far zooplankton is concerned, these have been categorized into Rotifers which have been recorded maximum during monsoon season (12 genera); Cladocera during post-monsoon season (9 genera) Copepoda during post-monsoon season (5 genera) and Protozoa during early monsoon season (4 genera). Further, an inverse relationship has been observed in between Rotifera & Cladocera and to some extent in between Copepoda & Protozoa. Therefore, it can be suggested that the requirement of the nutrients & available in the pond vary according to specific groups of organisms whether they are phyto- & zooplanktons.

Keywords: Plankton population, Digghi pond, Winter season, Monsoon season.

Impact of Landuse Change on Biodiversity in Changthang, Eastern Ladakh

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ABSTRACT

Land use change is a key factor of global environmental change. In Ladakh, development, economic growth and other factors have been driving intense changes in land use patterns, which have had a mix of negative and positive impacts for biodiversity. This study aims to map land use and land cover changes over two decades between 1999 and 2019, while also identifying important drivers of change and their impact on biodiversity with a special focus on the Changthang region, eastern Ladakh. This analysis uses multiple data-sets generated through remote sensing, qualitative and quantitative interviews, community mapping, camera trap surveys and transect walks. The results indicate that human settlements in Changthang have increased from 1.46 sq km to 8.08 sq km between 1999 and 2019. In contrast, wetlands in the area reduced from 114 sq km to 93 sq km in the same period. Hotspots for anthropogenic use and biodiversity richness overlap in areas around Tso Kar, Tsomoriri, Samad Rokchang (between Tso Kar and Pang), parts of Rong valley (between Nyurnis (Nee) and Kiari), around Pangong-tso, Hanley and the rangelands of Mudh and Dungti. The current trajectory of land use change has probably contributed to the intensification of competition over rangelands use by pastoralists and wildlife. We identified several drivers of land use change in Changthang, including tourism, geo-strategic location, and climate change.

Keywords: Biodiversity, Changthang, Environmental change, Landuse change, Rangeland.

Groundwater contamination in different cities and towns of India

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ABSTRACT

Water is an essential resource without which life is not possible on earth. Drinking water needs are predominantly dependent on groundwater resource. Quantity and quality of water, both are of prime importance. Stress on water resources in India is increasing day by day due to rapid rise in population and increasing water demands. World Resources Institute, Washington, in the year 2020, have found that globally water withdrawals have more than doubled since the 1960s due to growing demand. North-western India is highly vulnerable to water stress and more than 100 million people in India, resides in areas with poor water quality. The common contaminants in groundwater are of geogenic nature including arsenic, nitrate, fluoride, iron, and nitrates. Some other pollutants like phosphates, heavy metals and microbes results from human activities. Improper and indiscriminate disposal of solid and liquid waste including industrial, agricultural, and urban waste material, the practice of open defecation, sewage, corrosion in pipes and improper maintenance of piped distribution supply, are some of the anthropogenic sources polluting groundwater. The physicochemical and bacteriological parameters are the indicators of groundwater quality. Different cities and towns of India are facing problems due to various geogenic and anthropogenic contaminants in water. The present review paper discusses the scenario of groundwater contamination and their possible sources in India.

Keywords: Groundwater, water pollution, physicochemical parameters, microbial contamination, treatment.

Farmer's Viewpoint on Resource Conserving Technologies and its significance in Odisha, India

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ABSTRACT

Odisha is an agrarian state and rice is the predominant crop, mainly cultivated using the Puddled Transplanted (PTR) system. This establishment method requires about 150±10 ha-cm of water. Therefore, this production system is becoming less profitable due to declining water tables, increasing water and labor scarcity, and energy-intensive nature of puddled transplanting and high methane emissions from rice fields. Direct Seeded Rice (DSR) and Alternate Wet and Drying (AWD) are promising options to replace the traditional transplanted system.

A study was conducted to know farmers' perspectives on adopting DSR technology. The data was received from a structured questionnaire-based survey conducted among 100 farmers [50 DSR and 50 Control (Farmers who practiced PTR)]. Some commonalities and differences mark Farmers' preferences for DSR adoption according to their socio-economic characteristics and cost of cultivation. With DSR, there was a saving of about Rs 3200-4500 per hectare in labour cost and irrigation water. However, extra expenditure was required for herbicide applications. Methane emissions were found less in DSR as compared to PTR system. However, nitrous oxide emissions were higher due to the aerobic conditions in DSR. GHG emissions were calculated using the CCAFS CFT-MOT model. Secondary data for modeling was used from the farmers' survey. It was concluded that developing better varieties and soil-specific integrated packages will help in the broader adoption and upscaling of DSR and reduce the environmental footprint of PTR. Also, the role of promotion agents in disseminating technology is crucial.

Keywords: Aerobic rice, CFT-MOT Model, Direct Seeded Rice, Greenhouse Gas Emissions, Puddled Transplanted Rice, Resource Conservation Technologies.

Technological Adoption and Improvement in Sustainable Farming Practices for the Livelihood Security of Hill Farmer's

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ABSTRACT

Uttarakhand is the state with immense potential in the agriculture and horticulture sector due to various weather activities and its climate make the state different from other states. In the Garhwal regions of Western Himalaya, maximum of farmers are involved in the subsistence types of farming system. Most of populations are migrated towards nearby towns and other places, only small group of farmers are working on agriculture and allied practices. Adoption of sustainable agriculture technologies to optimize various cash crops productions in Block Narendranagar, Tehri Garhwal promises to boost the sectors of agriculture productivity and profitability. The main aim of the study is to assess the role of adoption of new cropping pattern with their traditional crops and farm technologies. The study is mainly based on the primary data collected through semi-structure questionnaire, personal interview and focus group discussion. The primary data were collected from the 80 respondents of different clusters in the study area. The result shows that the 47.97% farmers are those who have adopted or shifted to new technological interventions. Out of those who have adopted the technological interventions practices, maximum of Farmers about 63.54% have aware with the help of Department of Agriculture/Horticulture followed by NGOs, KVKs. Out of total respondents the main reasons for adopting the new cropping patterns are, availability of new variety of crops seed in government department which is about 57.29% followed by change in climate pattern, and high economic value of these crop.

Keyword: Technological Interventions, Sustainable Agriculture, Traditional Farming, Adoption.

Biodiversity in Smart Cities: Digital Aspects for *Argyastriata* (Jungle Babbler) Sustenance

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ABSTRACT

Digitalisation plays crucial role in bringing biodiversity to the digital world. UNECE (United Nations Economic Commission for Europe) and ITU (International Telecommunication Union) jointly described smart sustainable cities as innovative cities which use ICT (Information and Communication Technology) and other digital means to improve quality of life and efficiency of urban ecosystemswhile ensuring sustainability. While developing smart cities, we must ensure that their biodiversity should flourish along with the human population. As urbanisation is the most intensive and rapid human driven factor that threatens biodiversity, finding an indicator species' responses to urbanization is crucial for predicting the consequences of land cover changes. For this we need data on various species. Digital transformation is providing opportunities which change the way we think about discovering, delivering and managing biodiversity and environmental data.'Data' holds the power to change the lives of citizens and wildlife alike. In form ofdata, information and knowledge become accessible, available and applicablein new, different ways and increase involvement of citizen scientists in supporting ecological and environmental research. For citizen scientists to be involved in biodiversity assessment we need applications like *i*Naturalist, Citizen Science app and more of such applications to be developed. Softwares like ObserverXT and BORIS help researchers analyse the behaviour of animals with respect to environment. Behavioural data can be used identify factors affecting behaviour in wild and manmade ecosystems, which can be further used for the benefit of animals. The Jungle Babbler,*Argyastriata* is an important bird species of the semi-arid agro-climatic zone of India. Its role in developing and sustaining urban ecosystems of this zone and its potential candidature as an indicator species of urban habitats needs to be explored digitally.

Keywords: Jungle Babbler, *Argyastriata,* digital, data, biodiversity.

Ethology of the Jungle Babbler (*Argya striata*) and the Large Grey Babbler (*Argya malcolmi*) : A Comprehensive Review

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ABSTRACT

The Jungle Babbler is a common resident species in India. Its role as an important biocontrol agent is well established. Various studies on the qualitative and quantitative studies have been conducted on diverse behaviors like foraging, vocalization, territoriality, nesting and parenting. A recent taxonomical review has placed them in a new genus *Argya*. The intra-specific interactions of this species are reported to be closely related to those of social mammals rather than other bird species. Another species closely related to the Jungle Babbler is the Large Grey Babbler, on which few studies have been published. Review of literature reveals certain gaps in research, viz. discrepancy in the group size reported for Jungle Babblers. There is a maiden study done way back on the foraging behavior of Large Grey Babblers. No single detailed study has been reported to cover all the aspects of foraging behavior like communication, vigilance, intra-specific and inter-specific interactions and locomotion during foraging by both the species. No study has used modern tools like behaviour coding softwares like Observer XT for accurate time activity budget estimations. Detailed analysis of foraging behavior of the species will prove to be helpful for the welfare of babblers, the ecosystem, the environment, the academicians, the farmers and the nation at large and contribute to the knowledge base for better management of ecosystem and the repertoire of avian foraging behavior.

Keywords: jungle babbler, large grey babbler, *Argya striata*, *Argya malcolmi*, software, behavior.

Assessment of *Withania Somnifera* phytochemicals potential to inhibit *Mycobacterium Tuberculosis*

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ABSTRACT

The emergence of *Mycobacterium tuberculosis* (Mtb) resistant strains against available anti-tuberculosis drugs become a global concern. To overcome this resistance, there is an urgent need to explore new novel targets with minimal side effects and effective Mtb inhibition. Medicinal plants are a rich source of phytochemicals that are being utilised to develop medicines to fight against various infectious diseases. Phytochemicals-based Mtb inhibitors may reduce the disease reactivation and can be further developed as effective drugs against tuberculosis. PyrG (CTP-Synthase) and PanK (Pantothenate kinase) are both crucial enzymes for essential biosynthesis pathways to support the growth of Mtb and are identified as novel targets to combat resistance in Mtb strains. Thus, in this study, the phytochemicals of 65 medicinal plants were subjected to structure-based virtual screening against Mtb PyrG and PanK. Among all medicinal plants, six compounds of *Withania somnifera* (Quercetin 3-rutinoside-7-glucoside, Rutin, Chlorogenic acid, Isochlorogenic acid C, Withaoxylactone and 2, 3-Dihydrowithanolide E,) exhibited maximum inhibition with substantial docking score (-13.2 to -8.8 kcal/mol). Furthermore, molecular dynamics simulation and ADME analysis indicated the stability of docked complexes and drug-likeness for selected compounds, respectively. These findings suggest that phytochemicals present in *Withania somnifera* can be considered adequate lead drug molecules against Mtb.

Keywords: MD simulations, PyrG, PanK, Phytochemicals, Tuberculosis.

Simplify soil health estimation for diversify land use system

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ABSTRACT

Soil is an important natural medium for crop production and sustainable agriculture but it's treated only as a physical support for plant growth. Soil health plays a central role in improving crop productivity, profitability and governing ecosystem services. Soil health term mostly used for farmer's point of view while its synonym term is soil quality used by scientists to capture changes in physical, chemical and biological soil properties of the land. Healthy soil functions as a living, dynamic system that provides a variety of ecosystem services, including preserving water quality, crop production and managing recycled nutrients from soil to plant system. Soil microbial diversity and activity are the primary factors and key indicators of soil health improvement. Understanding the key indicator of soil health under different soil types and land use is crucial to offer context specific management practices. Soil available nutrients have traditionally been estimated with methods that utilize harsh chemical extractants in testing soil for inorganic N, P, K and soil organic carbon. In our study, we have considered different soil systems (Yara DSR, Yara TPR, Organic, CS conventional farming and CS Regenerative Farming) where the rice cropping system followed all soil systems. Among them, Hence Haney's calculation the organic soil system has performed better in terms of other soil systems.

Keyword: Soil Health, Crop productivity, Soil physical properties.

Anthropogenic Activities, Underlying causes and Their Impacts on Forest Health- A Case Study on Forest of Yamunanagar District (Haryana)

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ABSTRACT

Activities like deforestation, fragmentation and forest degradation can result in global climate change. The recently released India state of forest report 2020 revealed that forest cover of the Yamunanagar district is 194 km^2 which is 10.97% of the total geographical area. Every decade a considerable forest area is lost or degraded in the susceptible region which is facing challenges both on its diversity and density with dramatic consequences on forest health. The forest resource of the country therefore should be well managed in a scientific way to meet ever-increasing demand on a sustainable basis. This presentation summarizes the anthropogenic activities, underlying causes and their impacts and their significant reasons in particular fringe places of the Yamunanagar forest Division Haryana. It also identifies the possible measures to protect and /or improve the forest health in the Yamunanagar district. Methods used for it are random or periodical field survey and direct field observation with the help of questionnaires. Sample questions are like sustainability related, awareness related, plantation related, household, income and education related. Social customs and traditions are responsible for 72% positive changes, 28 % negative changes carried out by agroforestry, forest plantation leads to 33% improved availability of fire wood while the number of family members always bring negative changes by 57%. So, we conclude that pressure on forest resources, population burden, dependency on forest services and poverty are the main factors causing negative impacts in *Jagadhari* range. While illegal timber cutting, encroachment, flood, waterlogging and overgrazing are main causes of degradation in *Chhachhrauli* range. In *Sadhaura* range natural species replacement, forest fire and agro forestry are main causes of deforestation as well as degradation. Illegal mining, harvesting of non-timber as well as and timber harvesting are main anthropogenic activities resulting in forest patches and cover loss in *Kalesar* range.

Keywords: Anthropogenic activities, Forest, Forest cover, Illegal mining and Degradation.

Rainwater harvesting: A sustainable model for solving the rural water crisis

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ABSTRACT

Rainwater is a possible source for recharging groundwater and can be captured for various purposes, reducing groundwater consumption. It has the potential to be a permanent solution to the problem of the global water crisis. It is more pertinent because India is experiencing the most extensive water crisis in its history and about 600 million of its citizens lack access to water. According to the analysis, 21 cities, including Bangalore, Delhi, Hyderabad, and Chennai, will likely have depleted their groundwater supplies by 2021. Therefore, an alternative solution must be prescribed. An integrated system of rainwater gathering and careful groundwater use could be a viable solution for sustaining water resources. Girls and women are disproportionately affected by a lack of access to adequate drinking water and sanitation services in rural India. In rural areas, it is generally known that women and girls continue to bear the majority of household tasks. It comprises managing the demand and supply of water according to the needs of the family. Due to a lack of water facilities, young women and girls must walk great distances to obtain water for household purposes. It was determined during the United Nations Conference on Environment and Development that women play a vital role in water provision, management, and protection. This micro-level study examines the role of women and girls in acquiring and utilising water in an interior rural area where the supply of drinking water is inconsistent and inadequate and quality assurance is lacking. This study also conducted a scientific investigation on the current water quality and associated health issues, which are detrimental to the physical health of end users. The study proposes a comprehensive plan of integrated rainwater gathering to solve the region's water crisis by delivering potable and sanitised water with little groundwater use.

Keywords: Water Crisis, Rainwater Harvesting, Rural development.

Change detection in Surface Water Content in TTZ using remote sensing

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ABSTRACT

Biodiversity represents the sum of diversity and the variety of life forms present in a given area or a region. Each species contributes its own function in the ecosystem, which has a positive impact on the sustainability of a healthy ecosystem. Habitat fragmentation is the major issue for the rapid decline in animal biodiversity. Water plays the important roles in any habitat to keep that habitat ecologically healthy.

Taj Trapezium Zone (TTZ), as the name suggest, is the zone around the Taj Mahal which covers an area of about 10,400 km^2. It covers the trapezoid shaped area extending between 26° 45N and 77 ° 15E to 27 ° 45N and 77° 15E in the West of the Taj Mahal and 27° 00N and 78° 30E to 27° 30N and 78°30E in the East. In winters, many migratory birds inhabits this zone for food and shelter.

Data obtained through remote sensing is being used in habitat assessment. Various protocols are available for the extraction of water information from remote sensing imagery, but the most reliable are according to the number of bands used. They are generally divided into two categories, i.e., single-band and multi-band methods. The modified Normalized Difference Water Index (NDWI) is derived from near-infrared (NIR) and Green Channels (G) can enhance features of open water while efficiently suppressing and even removing built-up land / vegetation noise as well as soil noise.

The paper also discusses the best approach for detection of surface water from the Land sat imagery and the standard index values for water in comparison to vegetation and built-up areas using the universal formula.

Keywords: Habitat assessment, NDWI, TTZ, Remote Sensing, water body, land sat.

Effect of Global Air Pollution and Its Prevention

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ABSTRACT

From various studies, we know that, environmental issues are significantly increasing and surprisingly still some of them are unaddressed. With the increasing urbanization, and human activities are one of the main causes for the environmental hazards these days. Eco-efficiency has to be taken into account and more effort are required to made in various sectors. Air pollution is an alarming factor and it plays a pivotal role in majority of the respiratory or asthmatic issues. Carbon monoxide, nitrogen dioxide, sulfur dioxide and particulate matters are some of the main gaseous components that contribute to the environmental polluting. This certainly creates many epigenetic changes and immune dysregulation. Many scientists and researchers using satellite technology have incorporated markers to tract the pollutants. Another threatening problem is water pollution, which is caused by different organic and inorganic toxic contaminants in water. A solution to that is lignin and lignin-derived materials like lignin supported metals or hydrogels which can proficiently eliminate all sorts of toxins from water bodies by catalytic reduction or degradation. Soil contamination threatens the Sustainable Development Goals, so soil mapping is needed. Visible and infrared reflectance spectroscopy(VIRS) based detection methods along with calibration models based on machine learning are used to collect all spectral data and to check the soil contamination levels. Carbon dots (CDs) because of its high optical properties, low toxicity contributes to environmental pollution control, membrane separation and pollutant degradation. However, air pollution seems to be the preventable one. Pathogenesis of asthma is regulated by the T and B cells through epigenetic mechanisms, and it is mediated mainly by DNA methylation and histone modifications. Asthma is incorporated without any changes in the nucleotide sequences of the genomic DNA. Nevertheless, NASA has detected a significant decrease in the NO_2 level through pollution monitoring satellites. A significant decrease in the asthma and COPD patients have shown a marked reduction.

Keywords: Eco-efficiency, asthma, toxic contaminants, Lignin, calibration models.

Anthracyclines in Cancer Treatment

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ABSTRACT

There is an extensive use of Anthracyclines for treatment of Haematological and non-haematological malignancy. As a result of the intercalation of anthracyclines with DNA, they are known to inhibit the enzyme topoisomerase II, causing strands to fall apart. anthracyclines play an important role in the treatment of many neoplastic conditions. Besides stomatitis, nausea, and vomiting, alopecia and "radiation recall" reactions, anthracyclines can also cause other toxicities. Cardio-toxicity caused by anthracyclines can be reduced by administering the drug at rate that produce a low peak plasma concentration. Dexrazoxane administration also offers cardiac protection. Anthracycline dose increase may partially overcome resistance, however it is accompanied with decreased tolerability. The pharmacokinetics characteristics of doxorubicin or daunorubicin are changed by liposomal encapsulation. An improvement in antitumour efficacy and improved tolerance of the anthracyclines may result from an increased distribution in tumours extended circulation, and decreased free drug concentration in plasma. Given that it is approved for the early treatment of node positive breast cancer, the docetaxin, doxorubicin and cyclophosphamide (TAC regimen) three drug combination is given special attention. The TAC combination is frequently linked to febrile neutropenia and its related effects. For the majority of the patients with defused large cell recognised non-lymphomas, Hodgkin's the regimen of doxorubicin, cyclophosphamide, vincristine and prednisone (CHOP) has evolved into the gold standard of care. The combination of doxorubicin with bleomyecin, vincristine and dacarbazine (ABVD) is an efficient and well tolerated treatment for patients with Hodgkin's lymphomas.

Keywords: Anthracyclines, cancer treatment, radiation recall, cardiotoxicity, Hodgkin's lymphomas, TAC regimen.

In vitro Screening of arsenic resistant bacteria by enrichment culture method

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ABSTRACT

Heavy metals have widely spread and accumulated in soil due to various inappropriate human activities, because of which metal pollution in soil has become one of the most serious environmental problems today. Metal contaminated environments pose serious threat to health and ecosystems. Arsenic (As) is a toxic metalloid particle, available ubiquitously in earth's crust. In addition, As is also present in the surface, ground water and atmosphere . Bioremediation is an option that offers the possibility to destroy contaminants or render them innocuous using natural biological activity. There are many ways to cope high levels of arsenic by microorganisms ranging from reduced uptake, adsorption and methylation. In this present study, a total of 37 soil sample and 10 water samples were collected from the arsenic contaminated areas located in and around Raichur and Yadagir district of Karnataka. The samples were analysed for their chemical properties like pH, EC and organic carbon. Totally 29 arsenic resistance bacteria were isolated from the collected soil and water samples using enrichment culture technique and these isolates were used for further screening. In order to screen bacterial isolates for arsenic resistance, a series of As solution was prepared using sodium arsenite. The concentration of the series of the As ranged from 10-500 ppm. The growth of each isolate was determined spectrophotometrically by measuring the optical density at 600 nm at 24h. Among 29 isolates, 12 isolates were able to show resistance upto 500ppm concentration. The highest resistance was observed by isolate ASR-12 followed by ASR- 5 with recording OD value of (1.58 and 1.14 respectively).

Keywords: Arsenic resistance, Bioremediation Optical density and Sodium arsenite.

Carbon dioxide mitigation and generation of high value Products from diatom Algae

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ABSTRACT

The increasing impact of climatic change has severely influenced all the living organism on earth. Algae are among the opaquest photosynthetic microorganism found in oceans, rivers, and freshwaters and they play a major role in reducing global warming as they fix more than 25% of atmospheric carbon-dioxide. They are a reservoir of untapped potential with the multifaceted application including carbon-dioxide mitigation, vital role in the aquatic food web as primary producers, wastewater remediation by quenching pollutants originating from diverse sources like industries, agricultural and human sources. Despite their abundance and diversity in nature, few species are currently used for biotechnologically applications. Diatom Biorefinery has gained importance in recent years as more and more algae are identified and explored as a source for lipids, pigments, and other biomolecules. The diatom biorefinery involves exploiting the diverse roles of diatoms in carbon-dioxide mitigation and generation of high amount of lipids with EPA and DHA, fucoxanthin, and other active molecules with immense potential as new-age drug molecules and providing sustainable solutions towards a circular economy.

Keywords: Algae; Biorefinery; Circular Economy; Carbon dioxide mitigation; Diatoms.

Mineralisation and Decolorisation of Azo Dyes using Microbial Fuel Cells: A Recent Material Perspective

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ABSTRACT

For past few years there has been an increasing interest in the operation of microbial fuel cells (MFCs) for the sustainable management of dye wastewater via degrading azo dyes while generating electricity. To detect and remove the toxic azo dyes from water, become a global challenge in a highly efficient and cost-effective manner, below their permeable level. However, the efficiency of MFCs remains limited due to the lack of appropriate configuration and choice of materials. The past decade has witnessed advances in MFC configurations and materials to improve the power output and achieve complete mineralization of dyes; however, it still needs a holistic approach to harness the MFCs for dye wastewater management. The studies dealing with the complete mineralization of dyes rather than mere dye decolorisation were analyzed to achieve this goal. A critical evaluation of the choice of materials used in MFCs (anode, cathode, cathode catalyst, membrane, substrate and bacteria) and its associated effects on power density and the dye decolorisation efficiency has been discussed in our review study. It further develops a perspective on economic feasibility, the potential of scalability, and offers criteria to achieve sustainability. Finally, a framework is provided to realize the large-scale applicability and complete mineralization of azo dye to achieve a self-sustainable solution for managing azo dye wastewater using MFCs.

Keywords: Dye remediation, Mineralisation, Materials, Power density, Sustainability.

Effects of Microplastics on human health

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ABSTRACT

There is enormous impacts of plastics to every aspect of daily life including technology, domestic appliances, medicines and medical treatments. Most of the used plastics are thrown away by consumers after a single use, which has become a huge environmental problem as they will end up in landfill, oceans and other waterways. The huge scale of plastic waste dispersal in the oceans indicates that microplastics will continue to degrade once they enter the sea. These plastics are discarded in vast numbers each day and the breaking down of the plastics from micro-sizes has led to several other problems. Once the plastic is disposed of, plastic waste is exposed to biological, chemical and environmental elements and will break down into huge amounts of smaller fragments. The possible impacts of microplastics on the human body and the environment are of global concerns. Current environmental measurements and ecological information support the possibility that humans may be exposed to microplastics via oral, inhalation and dermal routes. Humans may be directly exposed to microplastics through the actual ingestion of these particles. Humans may also be exposed to the chemicals that are constituents i.e. monomers adsorbed to the plastics i.e. indirect exposure from microplastics. Several in vitro and in vivo studies have shown that microplastics were able to cause serious impacts on the human body, including physical stress and damage, apoptosis, necrosis, inflammation, oxidative stress and immune responses. Due to the size, chemical composition and physical properties, microplastics can affect aquatic organisms and potentially human health. Adverse effects from microplastics may result from a combination of the plastic's toxicity, chemical composition and ability to adsorb, concentrate and release environmental pollutants.

Keywords: chemical composition, environment, human health, microplastic, toxicity.

Analysis of Physico-chemical and Microbiological characteristics of Surinsar Lake in UT of Jammu & Kashmir, India

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ABSTRACT

Surinsar Lake is Mansar Lake's twin in Jammu and it is 24 km away from Jammu city and 9 km away from Mansar Lake. Lotus blossoms cover its dense mangroves in the summer. This study involved a selection of ten different locations of Surinsar Lake to carry out various physico-chemical and microbiological characteristics of water. Temperature, pH, conductivity, TDS, TSS, DO, BOD5, COD, total hardness, total alkalinity, chloride, sulphate, nitrate, oil and grease, turbidity, and faecal coliform were found to have mean values of 16.2 oC, 7.2, 410 µmho/cm, 215.5 mg/l, 28 mg/l, 5.62 mg/l, 7.68 mg/l, 95 mg/l, 410 mg/l, 202 mg/l, 32.8 mg/l, 0.0019 mg/l, 0.34 mg/l, 0.018 mg/l, 6.4 NTU and 92.6 MPN/100 ml respectively. Findings highlight the lake's deteriorating water quality as a result of human interference, both from visitors and locals, and call for the creation of new conservation policies to preserve it.

Keywords: BOD, COD, MPN index, Surinsar Lake.

Evaluation of Particulate Matter Pollution in surrounding areas of Open and Covered Drains in Delhi

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ABSTRACT

Increased urbanization, population, and population density imply a need for more housing and connectivity, which raises the demand for infrastructure. This led to the colonization of areas near drains and the covering of drains for the construction of roadways. Air pollution has increased as a result of rapid urbanization. The current study was carried out to compare the trend in the amount of particulate matter (PM) in the air near an open and covered drain in Delhi from June 2020 to April 2021. The areas around the largest drain in Delhi, the Najafgarh drain, were used to collect the air samples. For monitoring and analysis of PM2.5 and PM10, the Indian Standard method IS 5182 Part 24:2019 and Part 23:2006 were used respectively. The PM2.5 and PM10 levels were different at Dabri-Dwarka Drain Road (L1) and CNG Filling Gas Station, Sector-5, Dwarka (L2). The variation in PM2.5and PM10 levels was seen in a range of 55.30µg/m3 -118.42µg/m3 and 77.54µg/m3 – 261.99µg/m3 respectively in location L1 which is drained covered by road. The PM 2.5 levels ranged from 23.84µg/m3 -76.94µg/m3 and PM10 concentration were observed in the range of 42.06 µg/m3 – 149.48µg/m3 at location L2 which had an open drain. The findings indicated that seasons, transportation, human habitation, and vegetation cover affect the PM and Air Quality Index.

Keywords: Air Pollution, Air Quality Index, Drains, PM2.5, PM10.

Ground Water: Conservation and Need for an Enactment

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ABSTRACT

It is a well-established fact that Right to Life includes Right to Water in it. Water is necessity for life. Groundwater is a primary source of drinking water and irrigation in India and it is important to conserve ground water. One of the biggest challenge for sustainable management of groundwater comes from overexploitation and overuse, beyond the annual recharge. The level of ground water table has declined drastically due to the over-exploitation of ground water and the time that it takes to recharge the aquifers. The other issues arise from pollution, from natural mineral occurrences such as with fluoride and arsenic and with man-made sources such as industrial effluents, fertilizers and sewage. The Ground Water Model Bill has been proposed and amended several times but has not taken shape of an Act. The Bill sought to make ground water a common pool to reduce the pollution and degradation. This Bill has been foundation for the State Ground Water Laws but it is important to have Central Ground Water Laws. This Paper will discuss the status of ground water in India and analyse the Ground Water Model Bill. Further, the need of an enactment in this regard will also be discussed.

Keywords: Ground Water, Ground Water Bill, Right to Water, Right to Life, Conservation, etc.

Valorisation of Municipal Solid Waste Derived Pellets for Energy Production

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ABSTRACT

Failed management of municipal solid waste by the concerned municipalities as well as rice stubble burning have been creating a menace in most of the northern and north eastern states of India. A lot of solutions have been proposed for tackling these issues. One way of tackling this problem could be the use of this waste for the production of energy. Since the calorific value of rice straw is around 15-16 MJ/Kg which makes it suitable to be utilised as a fuel, rice stubble waste can be mixed or fortified with municipal solid waste for incineration. The calorific value data of municipal solid waste obtained from various urban settings around the world show that calorific value of waste increases with plastic content and organic matter content. Thus, the present study was aimed at determining the optimum concentration of various components of municipal solid waste (organic content, plastic content, paper, cloth etc) produced in the urban areas of Delhi (Okhla, Bawana and Ghazipur landfill areas). The waste was fortified with rice stubble and the mixture was bound using Calcium Hydroxide as a binder. The calorific values of different mixes were determined and the mixtures were densified since the densified mixture is reported to be 4 times higher in calorific value. In the study it was found out that as the amount of rice straw increased in the mixture from 50% to 80% by weight the calorific value increased in linear fashion. The particle size of the mixtures ranged between 5mm to 10 mm and it was found that the strength of the pellets increased as the size of particles decreased for a particular size of pellet. The more the plastic content in the mixture, the higher was the compressive strength of the pellets since the pellets were subjected to a temperature of 70 degree Celsius for 1 hour each. This may be due to the particles of plastic which may have melted and provided additional strength to the pellets. Also, the amount of plastic in the waste led to higher calorific value of the pellets but one major drawback of this could be the amount of dioxins and other harmful gases released from incineration of plastics. The scope of the study thus could be the identification of such pollutants as well as methods of their mitigation.

Keywords: Fortification, rice stubble, MSW, pelletization, calorific value, plastic

A Study of Medication Administration Errors in a Tertiary Care Hospital

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ABSTRACT

Medication errors have important implications for patient safety, and their identification is a main target in improving clinical practice errors, in order to prevent adverse events. Medication errors have significant implications on patient safety. Error detection through an active management and effective reporting system discloses medication errors and encourages safe practices. Objectives: a study of medication administration errors in a tertiary care hospital. The present study was conducted at a North Indian 350bed multi specialty tertiary care teaching hospital for a period of six months during November Jan and July 2022 in inpatient wards. The present study was approved by the Institutional Ethics Committee. According to the NCC MERP taxonomy, the medication administration error types were analyzed. The most common types of errors observed were omission errors (failure to administer(Dose miss) or failure to record the administration, (n=9) and improper dose (over dosage (n=4), followed by wrong time (n=3), wrong strength (e.g. dose was given in noon instead of morning dose (n=21), wrong rate (IV infusion rate was too fast, (n=1), wrong drug (drug other than the prescribed one, (n=2). The system related factors responsible for medication administration errors identified as frequent interruptions and distractions (42%), poor communication among health care professionals (32%), inadequate training (4%) and inadequate staff (5%) and others (11%). Predominant human factors responsible for MAE were identified as performance deficit (57.6%), stress (16.2%) and fatigue and lack of sleep (6.71%) and the list of human contributing factors causing medication administration errors are presented in Types of dosage forms highly involved in medication administration errors were inject able drugs (54.54%) and tablets (39.94%). The findings of the present study concludes that, omission of the dose, improper dose, wrong time, and wrong strength were identified as common medication administration errors. Majority errors belong to NCCMERP category C and interruption and distractions during the work, performances deficit, and stress are the common risk factors contributing for medication administration errors.

Keywords: Medication Administration Errors (MAEs), National Coordinating Council for Medication Error Reporting (NCC MERP) taxonomy, National Patient Safety Agency (NPSA) and Patient Care.

Exploring the valorization routes of sewage and sludge for a circular bioeconomy

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ABSTRACT

One of the major environmental challenges we are facing today is the management of incessant generation of sewage from various urban and rural sectors, most of which either ends up in a sewage treatment plant or is discharged untreated in the receiving water body or soil. During the treatment of sewage in various treatament facilities based on conventional treatment methods, along with the treated effluent, copious amount of sludge is generated as well, proper disposal of which is another issue. Some of the sludge is sold to farmers as manure but the rest keeps accumulating in and around treatment plants. Research has shown that the recalcitrant organic contaminants including Phathalates, polychlorinated biphenyls, polyaromatic hydrocarbons, dioxins, among others, that are unable to biodegrade during the conventional secondary treatment process, often find their way into the treated effluent or sludge and are a source of pollution to the environment. However, through advanced microbial treatments, this source of contamination could be turned into a valueable resource. Sewage and sludge being rich in organic carbon are now being used as substrate for microbes, particularly bacteria, cultures of which are harvested to extract value-added products like polyhydroxy alkanoates, extracellular polymeric substances, biomaterials, and biogas. Therefore, resource recovery from sewage and sludge needs further research and market boost in order to achieve circular bioeconomy.

Keywords: Bacteria, biodegradation, sewage treatment plant, PHA, biogas.

Enzyme Technology in Beverage Industries

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ABSTRACT

We all know that humans and animals cannot exist without food and water, thus in order to meet the demands of the expanding population, these days, the industries that concern with food and beverages have grown exponentially, manufacturing drinks and foods in a large quantity. These industries are huge and consists of numerous sub divisions most of which concern with – dairy, vegetables and fruits, alcoholic beverages, cereal and so on. In all life forms, such as microorganisms, plants, and animals, it is needless to say that enzymes are present in them naturally. In food manufacturing companies or industries, the use of enzymes has a huge role to play. Enzymes are used in converting the unprocessed materials into the final product, and to improvise the processes that the food has to undergo. Amylase helps in increasing the coordination among the other enzymes and in turn there can be seen an adequate amount of increment of the yield in the extraction process. Polysaccharide networks make up the cell wall in plant cells and these include – pectin, hemicelluloses and cellulose. Now these stated enzymes are used in cell wall degradation by performing hydrolytic actions. Pectin structure degradation are done by using pectinolytic enzymes while lignocellulosic substrates are hydrolyzed by two key enzymes namely – hemicellulases and cellulases. These said enzymes are used in various industries such as- extraction of vegetable oil, manufacturing of wine, recuperation of essential oils, and baking process. In addition, large-scale food processing lowers the cost of food due to lower production expenses and higher profit margins for the food processing companies.

Keywords: Enzymes, Polysaccharide networks, Hydrolytic actions, Lignocellulosic substrates.

Arsenic treatment in aqueous solution by modified biochar

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ABSTRACT

Arsenic (As) contamination of the environment is a problem that exists everywhere. The two main ways that arsenic enters the food chain are through drinking water and polluted soils. Since the majority of arsenic compounds are easily soluble in water, they can enter aquatic bodies including rivers, lakes, and ponds as well as by surface runoff. Ingestion of drinking water, consumption of food, and inhalation of air are the three main ways that people are exposed to arsenic. Drinking water has been identified as the primary source of arsenic exposure globally, out of all possible sources. Due to its ease of use and potential for high efficiency, the process of As sorption for the treatment of contaminated waters is regarded as a viable treatment technology method. Carbon-rich porous particles known as biochar are created by heating biomass under low oxygen conditions. Biochar is thought of as an eco-friendly sorbent that can be utilised to remediate different As-containing waterways. However, due to static repulsion between the negatively charged biochar surface and the As oxyanions, unaltered biochar is often a poor sorbent for As species. Treatments utilising diverse physical and chemical activation and modification techniques can significantly increase the As sorption capacity of biochars. In my poster I am going to present how modified biochar could be one of the technique to mitigate arsenic toxicity in aqueous solution.

Keywords: Arsenic, biochar, modified biochar.

Significance of Water Governance in Sustainable Development: The Kerala Scenario

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ABSTRACT

Water is called the raw material of the 21st century. Due to its manifold use in almost all sectors water resources are becoming the most exploited resource on the planet. Rising demands, climate change, pollution, and population growth has made water resources, especially freshwater sources under severe stress. Managing water resources is of particular importance in sustainable development, particularly in developing countries since it is distributed unevenly across nations, regions, and social groups. Referred to as God's Own Country, Kerala is the southwestern coastal state of India with 44 rivers. Despite a strong commitment to decentralized governance, water management in Kerala is fragmented and centralized. Water-related disasters are becoming less predictable and are a regular phenomenon in the state impacting people's productivity and threatening biodiversity. Unplanned development has left the area susceptible to flash floods and multiple landslides. As water runs as a common link in achieving sustainable development, any adverse impact on the management of water may have a profound impact on the sustainability of society as a whole. This study is exploratory in nature. It addresses some of the key challenges related to water governance. The paper argues that a proper understanding of water interdependence can formulate strategies that can address multiple goals simultaneously. The paper also highlights that effective water governance and people's participation can play a key role in ensuring sustainable development. And the paper concludes by highlighting and the need for an integrated framework for governing water resources and possible suggestions to overcome the challenges in water governance.

Keywords: water governance, water management, sustainable development, Kerala, IWRM.

Neurodegeneration by Air Pollution

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ABSTRACT

Ever wondered why these days forgetting things, brain fog, Parkinson's disease, early onset of Dementia and Alzheimer's disease and other neurological disorders becoming so common. Research on the correlation between harmful particles in air and health has been mainly focused on lung and cardiovascular diseases but the effects of air pollution on the central nervous system are not significantly recognized. In this paper we review how air pollution can cause diverse neurological disorders as the result of inflammation of the nervous system, oxidative stress, activation of microglial cells and cerebral vascular-barrier disorders. We look into the results of 14 days of exposure to pollutants during the gestational period in rats, which find deposits of trace elements silica (Si), iron (Fe), and aluminum (Al) in rat brains and a loss of myelin—the insulating sheath around nerve fibers—in the corpus callosum of male rat brain. Electron micrographs of neurovascular unit (NVU) and neural organelles in Metropolitan Mexico City children are also reviewed in this paper showing nanoparticles at the membrane interphase between neurons, also numerous mitochondria with abnormal cristae and neuromelanin structures with nanoparticles are seen. Thus we conclude that air particles can cause severe neuronal damage which can lead to developmental disorders and diseases like Dementia, Parkinson's disease and Alzheimer's disease. We are all at risk and protecting the brain from damage should be a priority.

Keywords: air pollution, dementia, nanoparticles, neurodegeneration.

Hazardous Effects of Water-borne Diseases: Indian Scenario

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ABSTRACT

Waterborne diseases are the major cause of mortality or other co-morbid diseases. The causes of waterborne diseases are Pathogenic microbes and their toxic exudates, different pollutants, and contaminants. Its impact around the globe is that it is a major public health issue as it causes 3.4 million deaths annually and climate change increases the risk. As per the Indian scenario annually, 37.7million people are getting affected by Malaria, typhoid, cholera, etc. which are some of the common waterborne diseases in India. The possible solutions to overcome these diseases can be imposing restrictions on people visiting or carrying out activities like washing around the river, using eco-friendly materials to make festive products, and creating awareness about the hazardous effects of various human activities that contaminate the aquatic ecosystem. This paper highlights waterborne diseases, their causes along with their hazardous impacts around India. The paper also provides possible solutions to overcome the problem of waterborne diseases.

Keywords: Waterborne Diseases; Mortality; Pathogenic Microbes; Hazardous Substances.

Effect of radiation processing on the bioactive (antioxidant, antibacterial, antidiabetic) properties of Moringa leaf powder

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ABSTRACT

Drumstick *(Moringa oleifera Lam.)* is known as "miracle plant" and has nearly all minerals and vitamins, requires for good health by the human body. *Moringa* plant is beginning to gain more popularity as a new "super food" for its highly nutritious profile and powerful anti-inflammatory, antioxidant, and tissue-protective properties among many other health benefits. In India malnutrition contributes to more than one third of deaths in children below five years especially in tribal kids. To prevent the problem of malnutrition, an attempt was made to increase the nutrition value of meals by using locally available material in tribal area i.e. *Moringa* leaves powder. The present study was carried out in Meat Technology Research Group, Bhabha Atomic Research Centre Mumbai, Maharashtra and Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhattisgarh) during 2020-21. The experiment of biochemical assays of *MoringaLeaf* Powder was laid out in two factor factorial experiment under completely randomized design. The data recorded for physical and chemical attributes were analysed statistically, using analysis of variance techniques.

The result revealed that the dried *Moringa* leaf powder is a great source of bioactive compounds such as phenolics, flavonoids and tannins. Phytochemical analysis of MLE showed positive result for total phenolic content, flavonoids and tannin. Irradiation improved the bioactive properties of *Moringa* leaves.1 kGy irradiated dose of Moringa leaf powder had higher antioxidant property as compare to 0 kGy and 2.5 kGy.Moringa leaves showed good anti-diabetic activity due to α-amylase and α-glucosidase inhibitory activity.It showed antimicrobial activity against most common gram-positive food pathogenic bacteria (Staphylococcus aureus, Bacillus cereus).

Keywords: Bioactive properties, Moringa, Radiation processing.

Response of Smriti Van's animals to dietary modification and significance of fruit tree afforestation

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ABSTRACT

The eating habits of the wildlife living in Smriti Van in Jaipur were observed for 15 days in order to determine how they would react when their daily conventional bird feed was changed to include a variety of fruits with varying juice contents. This information was used to further discuss the significance of fruit trees in defending wildlife against the effects of climate change, the environment, and the advantages of fruit trees afforestation. It was noted that the animals arrived in large numbers and preferred fruits over dry grains. During India's hot month of July, the approach comprised placing fruits out for animals at various areas and checking on them every 15, 30, and 45 minutes.

The result of our experiment shows that birds and squirrels tended to congregate at locations with fruits rather than those with only dry grains. In just 15 minutes, birds preferred eating strawberries followed by pomegranates, indicating that they preferred hydrated food over the other options (fruits seeds nuts grain). According to present findings, animals prefer hydrated fruits over dry grains. This behavior demonstrates how much value they place on tasty, nutrient-rich food that is also generally good for their health, and staying hydrated also helps animals cope with the effects of heat waves brought on by climate change and how these parks with fruit trees can impact the ecosystem of cities. The advantages and effects of fruit tree afforestration on human health, cities and ecosystem are also listed in this paper.

Keywords: Fruit tree afforestation, Food preferences, Smriti Van, Urban Plantation, Climate Change, Heat wave, Green Cities.

Enteric Pathogens in Yamuna river water at Allahabad district in U.P., India

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ABSTRACT

Originating from Yamunotri, the holy river Yamuna, is not just fifth longest river of India but home to an enormous number of Microbes, Proteobacteria, Betaproteobacteria and Burkholderiales being the most dominating taxas.

The dominating reasons of polluted Yamuna are the discharges of untreated domestic and industrial flow and solid waste ingress into the river. Further, Yamuna being a prominent spot for pilgrims can pose to be major reason for spread. These activities have promoted the outburst of many fatal diseases especially the enteric one by favoring the growth of pathogens. The major pathogens responsible for water-borne diseases are bacterial like E. coli, Shigella and V. Cholera and viruses like Hepatitis A, Hepatitis E, Polio virus and Rotavirus. A number of parasitic diseases like hookworm and other worm infestations are essentially linked to poor sanitation and hygienic practice.

In the huge mass of microbes, there resides a class of antibiotic resistant 'priority pathogens' posing a great threat to human health. These multi drug resistant pathogens, were listed by World Health Organization in 2017, to be in urgent need of new antibiotics. Certain bacteria's were found that produce Extended spectrum beta-lactamases enzyme. This enzyme is said to help bacteria develop resistance to many commonly used antibiotics. There is also an estimated possibility of rapid proliferation of various antibiotic resistant genes in the bacteria present. The various studies carried out and the number of positive results are enough to take serious action. There is a critical need for implementation of appropriate plans to develop infrastructure for sewage management, as these pathogens are threatening the health of both river and Human life dwelling around it.

Keywords: Yamuna, hepatitis, pathogens, threatening.

A Comparative study of Municipal Solid Waste Management in Rural and Urban Areas of UT of J & K, India: A Questionnaire Based Survey

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ABSTRACT

With increasing population, urbanization and industrialization the quantities of waste generation has increased tremendously. Not only has this but the characteristics of the municipal solid waste also changed drastically with time. MSW management has become a major environmental issue in India. Sophistication in life style, daily use of materials made from synthetic chemicals and changing economic structure in rural areas are contributing factors in already existing environmental problems. These wastes are toxic in nature and when disposed off unscientifically, cause serious risks to environment and human health. Present study has been carried out to evaluate the status of the municipal solid waste management in rural and urban regions of Jammu district, UT of J&K and to explore the perspective of local people about waste management practices adopted by authorities. A questionnaire has been prepared to collect information regarding different aspects of the municipal solid waste, its consequences and management in the study area. Questionnaire contained questions related to the types, sources, government agencies responsible for management of municipal solid waste, methods of collection, storage, transportation, disposal etc. of the waste generated in the study area. The result from present study shows that in urban region (Jammu city) Jammu Municipal Corporation (JMC) is responsible for waste management in the city whereas in rural areas there is no such authority. So in rural areas waste generally ends up in open spaces, water bodies or burnt by residents, which again is responsible for pollution of air, water and soil. In Urban areas more than 84% people are aware about recycling of waste and generation of wealth from it however in rural areas this figure is less than 50%. The issues of improper management of MSW need to be highlighted and discussed so that proper solutions and strategies can be framed.

Keywords: Municipal solid waste, questionnaire, waste collection, waste management, environmental issues.

Biomedical Waste Management: A step towards healthier environment

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ABSTRACT

The increase in healthcare facilities is necessary for the increasing population particularly in developing nations. However, this is also adding to the generation of more amount of biomedical waste. The waste generated from the various healthcare facilities is mainly non-hazardous (85%) while infectious contribute to 10%. The United States and Canada generates maximum amount of biomedical waste (Narendra et al., 2022). Though the contribution of infectious waste is small but due to inappropriate management it possesses adverse impacts on the environment and humans including dreadful diseases. It may lead to the chances of Hepatitis B & C, SARS, tetanus, psychosocial trauma. Also, handling of biomedical waste from unskilled and inexperienced staff enhances the risk of mixing of bio-waste in general waste causing more adverse impacts. It also leads to unsuitable incineration of emissions and ash. Therefore, appropriate technologies should be adopted for the proper management of biomedical waste that should be eco-friendly, safe and reliable. Proper scheduling as well as reconditioning of the waste generated in healthcare facilities is an important task that plays significant role in the global cleanliness, public health and resource conservation. The main pillars of biomedical waste management are the separation of waste at the source and recycling of waste. Also, proper management of illegal trading of used syringes, injection needles and medical tools is necessary for the healthy ecosystem. Also, there is a need for the awareness among the citizens, staff and the workers involving directly or indirectly in the management of biomedical waste.

Key words: Awareness, Biomedical Waste Management, Healthcare Facilities.

Genomic analysis of Methylobacterium sp. ISTM1 for CO2 sequestration and production of biomaterials

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ABSTRACT

Microbial-mediated biological carbon dioxide (CO2) fixation is a common and successful strategy for CO2 emission reduction as well as long-term CO2 sequestration by transforming it into value-added bioproducts. In this investigation, a potential CO2 fixating bacteria, Methylobacterium sp. ISTM1, was isolated from soil sample of Mawsmai cave. CO2 sequestration efficiency of bacterium was investigated by measuring the bacterial growth rate and enzymatic activity of carbon concentrating enzyme in the presence of 50 mM NaHCO3 and it showed high growth and high carbonic anhydrase enzyme activity. The bacterial strain was also tested for the ability to produce biomaterials such as calcite. The characterization of structure and composition of produced calcite was done by XRD, SEM-EDX, and FTIR analysis. SEM analysis of the synthesized calcite revealed a distinct faceted rhombohedral structure of calcite. An XRD analysis indicated significant calcite phase diffraction peaks. Furthermore, whole genome investigation of Methylobacterium sp. ISTM1 indicated the presence of many genes involved in CO2 fixation and biomaterial synthesis. This work demonstrates the potential of an isolated strain for CO2 sequestration and the synthesis of value-added bioproducts that can be used to provide economic advantages in the future.

Keywords: Carbon dioxide sequestration, whole genome analysis, Mawsmai cave, biomaterials.

Influence of AM Fungi and Gram Positive PGPR on Growth and yield of Sorghum from TBP Command area

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ABSTRACT

Plant growth promoting rhizobacteria (PGPR) are the soil bacteria that colonizes on plant root enhance plant growth and live symbiotically with plant. The present study was carried out to isolate and screen the Gram positive PGPR from different Sorghum rhizosphere for their growth promoting characters in vitro and to study their interactive effect along with AM fungi on sorghum under field condition. Forty different colonies of PGPR were isolated from the different samples of Sorghum from which twenty isolates were finally selected for detailed study on the basis of their better growth in nutrient agar medium. The selected isolates were thoroughly characterized on the basis of their response to a number of morphological and physiological tests. Out of forty isolates twenty six isolates were positive for H2S production and NH3 production, Twenty four isolates were positive for IAA production, Twenty eight isolates were positive for siderophore production and Thirty two isolates were positive for P solubilization. All the isolates produced IAA and which ranged from 5.89 to 23.39 µg per 50 ml of broth. The isolate BSS-34 showed statistically maximum production of IAA (23.39 µg per 50 ml broth) is superior over all the isolates. A field experiment was carried out to study the effect of combined inoculation PGPR and AM fungi on sorghum growth parameters at 30 and 60 days after sowing. The maximum plant height of 24.57 cm and 24.80 cm was observed in T4 and T5 treatments where the consortium of AM fungi and efficient strain along with 75% RDF is used.

The effects of straw and straw derived biochar on plant grown in saline soil and assessing their CO2 sequestration capacity

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ABSTRACT

Agricultural society is facing the issue of soil salinization throughout the world. 7.6% of the total terrestrial land area is salt affected with around 75% of cultivated regions being highly degraded. To be exact, after soil erosion, salinization is the second largest cause of soil degradation. This stress the already strained food production system. Therefore, various chemical and organic amendment methods are put forward to reduce this problem, however, these are not sustainable options for long term use, as they often require frequent applications and at high rates. As such, biochar, a solid carbonaceous material, has been proposed as a more viable option in recent times. In the present study, biochars derived from some of the most common agricultural waste (wheat straw and rice husk) are used as soil amendment. The biochar is prepared using an indigenously designed farmer friendly bioreactor, which provides an added advantage for future field applications. In addition to the agronomic benefits, biochar also significantly reduced (43%) the CO2 emissions as compared to their straw biomass counterpart. The positive results (increased plant height, leaf area, fruit weight, soil nutrients, reduced CO2 emissions) shown in this study projects biochar as an attractive sustainable option for remediation of salt stress as well as a means to combat climate change.

Keywords : salt stress, agricultural waste biomass, biochar, indigenous bioreactor.

Diversity and prospective therapeutic option of the aquatic Macrophytes in the freshwater bodies of Canchipur, Manipur, India

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ABSTRACT

Aquatic macrophytes have long since been considered as menace as they are often resulted due to eutrophication. The state of Manipur is endowed with a rich repository of medical and aromatic plants and more over well-known for its diverse culture of human races. This could be due to its climatic condition, perennial rivers, fertile soil and dense forests. Despite of such wide availability of aquatic vegetation, the literature pertaining to the therapeutic utility of these plants is meagre because of their unproductive and impractical nature. But recently, some studies reported various pharmacological properties which are useful for human being, such as, anticancer, antidiabetic, anti-inflammatory, diuretic, hepatoprotective, hypoglycaemic, antipyretic, antioxidant, antifungal, etc. Hence, keeping these facts in mind, the present investigation was formulated to study the diversity of aquatic macrophytes of some freshwater bodies of Canchipur and to document their therapeutic potential prevailing among the local community. In the present investigation, thirty two macrophytes were found to have medicinal value, whereas twenty one species were found to be crop related wild species, nine species belonged to wild edible leafy vegetables, three species were wild edible tubers, two species were wild edible seeds and one species belonged to wild edible fruit. The study also revealed the presence of fourteen invasive species, seven species were identified as exotic plants, nineteen species were found to be perennial herbs, fifteen annual herbs, ten perennial aquatic herbs, four aquatic ferns, one semi-aquatic herb and one aquatic bryophyte. The present work will be of immense help to future researchers in evaluating the therapeutic effectiveness or isolated components of these aquatic macrophytes by applying in the field of medicine.

Keywords: Aquatic macrophytes, therapeutic, freshwater, medicine, eutrophication.

Isolation, Identification, and Molecular Characterization of Indigenous Bacterial Isolates from Textile Effluent and Contaminated Soil using 16s rRNA Sequencing

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ABSTRACT

Textile industry effluent poses a serious environmental threat. Many physical and chemical methods for treating wastewater have been used, but due to high operating costs, a suitable alternative will be required. As a result, the study focuses on the use of biological organisms with bioremediation potential, which leads to the development of cost-effective and nontoxic methods. The present study focuses on the isolation of possible bacterial isolates from textile effluent contaminated soil and effluent. A total of four bacterial isolates were successfully isolated, three from textile industry effluent contaminated soil and one from textile industry effluent. Based on the results of morphological, biochemical and molecular datasets, the current study identified bacterial isolates belonging to three genera: Brevibacillus, Achromobacter and Pseudomonas. The 16S rRNA sequence technique was used to characterize and identify the bacterial isolates. The isolates were submitted to GenBank like Achromobacter xylosoxidans KUESCCHK-6, Pseudomonas aeruginosa KUESCCHK-5, Achromobacter insuavis KUESCCHK-7 and Brevibacillus panacihumi KUESCCHK-8 with accession numbers OM475749, OM475764, OL797980, and OM475766 respectively. Bacteria can survive in contaminated environments because of their metabolic ability to use available resources and ability to find a suitable niche.

Keywords: Bacteria, GenBank, NCBI, Soil and Textile industry effluent.

Role of Potassium Silicate in the Process of Seed Germination and Seedlings Growth of Rice (*Oryza sativa* L.)

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ABSTRACT

Silicon has been considered as the non-essential element for higher plant species, although its application in the form of fertilizer has been found beneficial and aids plants to tolerate abiotic and biotic stress conditions and classify silicon as a beneficial element. Uniformity and synchronization of seed germination are the utmost aspects and important indicators and well-established healthy seedlings make the foundation of high crop yield. The present study has been done to document the effects on seed germination and seedling growth parameters in response to silicon (Potassium silicate) application. The effects of different concentrations (0, 2.5, 4.5, 7.5, 9.5, and 12 mg/ 100 ml) of Si have been studied on seeds of rice (Oryza sativa L.) varieties PB 1121 and Karan bhog-521. In this study, Si treatments have been found quite effective at all the parameters and decrease in 28.54% in MGT and a rise of 39.39% in germination %, 34.52% in MGR, 77.98 % in GI, and 71.62% in G value than control has been observed in Variety PB 1121 and decrease in 4.43 and 6.65% in MGT and rise of 27.76% in germination percent, 6.83% in MGR, 26.54 % in GI and 89.84% in G value in the concentration 12 mg than control has been observed in Karan bhog-521. Similarly, a significant rise in CVt, CVG, MDG, and peak value has been observed than control in Variety PB 1121and Karan bhog-521. The present study suggested that Si can be used as a stimulating agent for seed germination and enhance the growth of rice seedlings, laying a solid foundation for subsequent rice crop growth.

Keywords: Potassium silicate, Rice, Silicon fertilizer, Seed germination parameters.

Toxic effect of an organophosphorus pesticide, methyl parathion on an airbreathing freshwater fish, *Heteropneustes fossilis* (Bloch)

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ABSTRACT

The average median lethal concentration (LC50) value at 24,48,72 & 96 hours of exposures of methyl parathion to *Heteropneustes fossilis* calculated by three different methods i.e. straight line graphical interpolation, Dragasted Behren's method & probit analysis methods have been recorded to be 17.23,12.46,9.16 & 7.46 ppm respectively whereas, as per probit analysis method, the slope values (b) & regression equations(y) were calculated to be b=12.3528 & Y=-10.2922±12.3528X for 24hr; b=12.4549 & Y=-8.7322±12.4549X for 48hr; b=12.7469 & Y=-7.2320±12.7469X for 72hrs & b=12.4549 & Y=-5.8675±12.4549X for 96 hrs of exposures. The toxic value (24/96hr) has been calculated to be 2.310. The fish exposed to different lethal & sublethal concentrations showed irratic & darting swimming movements, loss of equilibrium, became sluggish, restless, & excess mucus secretion on the whole body surface including gills, affecting oxygen diffusion pathway depended on concentrations & exposure periods as these changes were quicker in higher than lower concentrations. These changes may be due to inhibition of an enzyme, acetylcholine estarase (AchE) activity leading to accumulation of acetylcholine in the end bulb of neuron at synapses ending up with higher stimulation.

Keywords: Lethal, parathion, sub lethal etc.

To explore criteria for selecting an efficient dye and its use with reductant in photogalvanic cell for simultaneous solar power conversion and storage

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ABSTRACT

Photogalvanic (PG) device provides a promising method for solar power generation due to its inherent storage capacity. Here, the spectral study of oxazine (BCB and NB) and thiazine (MB, AA, AB, AC, and TB O) dyes solution without and with sodium dodecyl sulphate (SDS), cetyltrimethylammonium bromide (CTAB), and tween 80 surfactants followed by photogalvanic study with fructose/AA have been completed. The spectral results show that BCB has maximum red shifting with SDS, no change with CTAB, and blue shifting with tween 80. MB has the lowest blue shifting with CTAB and tween 80 and maximum absorbance value with SDS as compared to all other dyes. NB, AA, AB, AC, and TB O have either very little red/blue shifting with SDS or large blue shifting with CTAB and tween 80 than BCB and MB. Thus, on the basis of maximum, red and lowest blue shifting in λmax and absorbance value, BCB and MB dyes have been selected as efficient photosensitizers. From the PG results, the order for dye-reductant systems is as: MB-AA>MB-fructose>BCB-AA>BCB-fructose. The literature results for the different dye-AA systems have a lower value as compared to the present MB-AA system. Thus, the dye and reductant having structures like MB and AA are the suitable combination for simultaneous solar power conversion and storage.

Keywords: Dyes/Surfactants/Reductants, Spectral/photogalvanic study, Conversion and storage capacity.

Effect of Ultraviolet-C Irradiation on shelf life of Sapota

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ABSTRACT

Sapota or Sapodilla belongs to the Sapotaceae family and is a tropical evergreen plant. India is among the largest producer of sapota along with Mexico, Venezuela and Guatemala. The main issue with sapotastorage is quick ripening and faster senescence. Fruit is also vulnerable to chilling injury. Ultraviolet-C (UV-C) radiation can extend the shelf life of fruits and vegetables by lowering the microbial population and enhancing their defence mechanism. UV-C can also delay the ripening of a variety of fruits. The current study was conducted to test the effect of UV-C dose levels (2.5–10 kJ/m2) on the physical, biochemical, and microbial characteristics and shelf life of the sapota fruit. The statistical analysis was conducted using a two-factorial completely randomised design and analysis was carried out on weekly basis. The UV-C radiation displayed a significant effect on the physical, biochemical and microbiological characteristics of the fruit. In contrast to untreated fruits, a significant decrease in physiological weight loss and moisture content was detected in irradiated fruits. In comparison to untreated fruits, the treated fruits showed higher firmness during all storage intervals. The biochemical characteristics of sapota fruit such as ascorbic acid, total sugar, reducing sugar, pH, TSS, total phenolic count, total antioxidants, and titratable acidity, were better maintained in treated fruits compared to untreated samples. Compared to untreated fruit, thetreated fruits displayed a significantly lower microbialand decay count. Compared to untreated fruit, all treatments considerably extended the shelf life of sapota fruit.

Keywords: Sapota, Ultraviolet-C, Shelf Life, Total Antioxidants, Total phenolic content.

Understanding the implications of oxidative stress caused by air pollution in human civilization

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ABSTRACT

Air pollution stands at top position in being the biggest world issues today. It has reduced quality of life by more than 50 percent and causes majority premature death. The respiratory and cardiovascular systems are more prone for getting affected by air pollution-induced diseases. Ischemia, stroke, asthma, emphysema, etc. are some such diseases. Many studies connect air pollution with different illnesses, but limited scientific evidence proves oxidative stress may be the cause of it. Many studies conducted in the past two years have shown that peroxides and reactive oxygen species (ROS) are the main causes of particle toxicity. ROS are naturally occurring substances in the body and when they run out of control, they cause serious complications in the body. They bind to biomolecules like DNAs, proteins, etc., and disrupt the normal physiology of a healthy human body. When there is an imbalance between ROS and neutralizing factors like antioxidants, oxidative stress occurs. Superoxide dismutase, glutathione, and catalases are the most common antioxidant enzymes. We can also get antioxidants from food sources like ascorbic acid, vitamin D, vitamin E, etc. There has been a lot of measures taken to control and minimize air pollution but with modern human civilization, it has been proven to be one of the most taxing tasks. It would take years and years to completely eradicate air pollution even with the cooperation of the entire world. If substances like ROS linger in the air we breathe every day, air pollution might even be worse of a problem than we initially thought.

Keywords: Oxidative stress; Air pollution; Humans; antioxidant enzymes

The Human-Monkey Conflict: Behavioral evidences of Rhesus macaques in Urban Ecosystems

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ABSTRACT

Rhesus macaques are the most successful primate species other than humans in terms of range expansion. They are categorized as (LC) in the IUCN Red List of Threatened Species and protected under Schedule III of the Wildlife Protection Act. Deforestation and urbanization have provoked the populations of monkeys to foray towards urban ecosystems. These macaques have an affinity towards disturbed habitats as well. The semi-arid agro-climatic zone of Uttar Pradesh in India is a disturbed habitat. The present study was conducted in seven districts of this zone, viz. Agra, Aligarh, Etah, Firozabad, Hathras, Mainpuri and Mathura. Behaviors and interactions of macaques inhabiting in this zone were observed from April, 2019 to March, 2021. The behavior sampling techniques- focal sampling, scan sampling and ad-libitum sampling for videography were followed. Using behavior coding software, OBSERVERXT and BORIS, precise measurements of the duration of each state/event and time activity budget of all behaviors were done. Significant differences were found in the behaviors and interactions of Rhesus macaques across all selected urban sites. The calculated F-values of behaviors and interactions were 57.86 and 74.50 which were higher than the tabulated F-value of 2.09 at 5% level of significance. ANOVA revealed significant difference in each behavior and interactions as $P<0.005$. Pairwise comparisons of the means using Tukey's HSD revealed significant differences among the seven different areas ($P<0.05$). Both values indicate that Macaca mulatta has become successfully established in this zone. Food provisioning by humans greatly influences foraging, locomotion and other behaviors. It promotes conflict-prone behaviors. However, for future generations of both macaques and humans, strategies to manage conflict are urgently needed.

Keywords: Behavior, Habitat, Interactions, Primate, Rhesus macaques.

A first report on investigation on the behavioural, haematological and genotoxic, effects of pesticide Starchlor on the fingerlings of *D. malabaricus*

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ABSTRACT

In the present study an organophosphate insecticide Starchlor 76% E.C (Dichlorvos) is used, to investigate on behavioural, genotoxic and haematological effects on the fingerlings of D. malabaricus (Jerdon, 1849) in different concentrations (ppm) of Starchlor 76% E.C at 24, 48, 72 and 96 hours of exposure. The behavioural patterns of the fish exposed to different concentrations of found to be 0.055 ppm, for 48 h 0.0275 ppm, for 48 h of exposure 0.0135 ppm and for 96 h of exposure 0.0085 ppm, Starchlor pesticides reveals the effect of pesticide on their physiological processes. The behaviour and swimming patterns of D. malabaricus was observed in the control and pesticide exposed set of population in order to study the behavioural patterns of the fish. The fishes are exposed to the different concentrations of the pesticide Starchlor. During 24 hours exposure at high concentration: immedeate death occour within 24hours of exposure, at median concentration: fish were less active and began to hit the corners of the tank, shows stirling movement,opercular rate is increased, loss of balance, at low concentration: activity is lowered. During 48hrs: At high concentration :100% mortality, decolouration of the scales takes palce. And 96hrs of exposure, At high concentration: 100% mortality within 24hours of exposure,decoloration of the gills,body. At low concentration: less active, shows abnormal swimming patterns,acumulation of chemial on the scales can be seen.

Genotoxic effects showed there is a significant increase of MN, frequencies at 24h to 96 hours. The PCE/NCE ratio was notably affected. Multiple micronuclei appeared at 96h, showing the genotoxic effect of the chemical Starchlor.This indicates, the genetic material is susceptible to the damage induced by the Starchlor. Thus DNA damage is high in much exposed population. The number of micronucleus formed is more in 96 hour of exposure than other exposure hours. The haematological changes in the D.malabaricus the fingerlings were exposed. The haematological changes showed that number of RBCs and WBCs are significantly increases to an increased dose of Starchlor increases.

Keywords: Starchlor, *D. malabaricus*, micronucleus, bioassay.

Biodiversity of the genus Odeogonium Link from Supaul District of N. Bihar

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ABSTRACT

During the survey of algal biodiversity from freshwater bodies of Supaul district of N. Bihar, the present author have encountered several members of green algae belonging to Chlorophyceae growing on aquatic angiosperm as epiphytes. The present communication deals with the description of two species of the genus Odeogonium collected from freshwater body of Supaul district. Out of these, one taxon viz. O. areolatum Lag. var. areolatum f. areolatum is being recorded for the second time from India while another one i.e., O. undulatum Bréb f. undulatum is second record from Bihar.

Keywords: Algae, biodiversity, Chlorophyceae, Odeogonium.

Environmental and Health Impact of Air Pollutants

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ABSTRACT

Mostly air pollutants are originated from man-made sources, including mobile sources (vehicles), stationary sources (factory, power plant, refineries, mining activities). Natural Air Pollutants originate from activities like volcanic eruption and forest fires. Air Pollutants have devastating effect on human health entering in many ways like contaminated Air, Food, Water, Soil etc. Major air pollutants are Carbon monoxide, Lead, Nitrogen Oxide, Ozone, Particulate Matter(PM 2.5, PM 10),sulphur Dioxide, Benzene, Toluene. Their small quantities can have severe effect in human body. Air Pollutant and particulate matters are closely associated with cardiovascular, Respiratory, Hormonal, Neurological disorders. PM2.5, PM 10, Nitrogen dioxide and elemental carbon are associated with cardiovascular diseases. Air Pollutant are the cause and aggravating factor of many respiratory disease COPD, asthma, Lung Cancer etc. Exposure of air pollutant has been reported negatively associated with the level of testosterone. Breathing polluted air can causes the stress hormones to spike. Several Epidemiological studies demonstrate that exposure to ambient levels of air pollutant is associated with low birth weight, intrauterine growth retardation, prematurity, neonatal death and decreased fertility in males. PM 2.5, PM 10 are also associated with Brain Health Ailment. Air Pollutant can cause diverse neurological disorders as the result of inflammation of the nervous system, oxidative stress, activation of microglial cells, protein condensation, and cerebral vascular-barrier disorders. Our future generations may face serious health issues. The need of the hour is to enforce strict rules for violators.

Keywords: Air Pollution, particulate matter, Human Health, Epidemiology.

Cognitive Ethologyof Funambulus pennantii pennantii in diverse manmade habitats

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ABSTRACT

The five striped palm squirrel, Funambulus pennantii pennantii is thriving in diverse manmade habitats of Agra, viz. orchards, residential areas and crop fields. According to the level of urbanization and population size, four selected sites of Agra identified as two distinct types urban and semi-urban. Behavioral data of the five striped palm squirrels was collected during all seasons from both types of microhabitats through2018 and 2019. Time-activity budgets of squirrel populations were prepared through behavior coding softwares BORIS and OBSERVER XT after ad libitum videography. Behaviors were categorized into nine distinct action patterns: locomotion, exploration, foraging, vigilance, grooming, resting, play, mating and conflict. The calculated Z- value was 8.667 and result was significant at 5% level with the value of $p < 0.00001$, indicating asignificant difference between the activity patterns of squirrels in urban and semi-urban sites. Semi-urban inhabitant squirrels were more vigilant, alert and active as compared to squirrels of urban areas whereas foraging, grooming and resting was higher in squirrels of urban areas. Considering the vital ecological role of this species, its preservation strategy should focus on sustained semi-urban habitats which are evidently the optimum habitat for their continued thriving.

Keywords: Behavior, Observer XT, Squirrels, Urban, Semi-urban.

Role of organic manure and mulches on growth and yield of garlic under *Morus alba* L. based Agri-silviculture system

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ABSTRACT

Agroforestry is the sum up name of land use planning and techniques which involve (trees, shrubs, palms, bamboo etc) woody perennials on same land along with agriculture crops / animals in spatial arrangement or temporal sequence It is a dynamic system involving unification of trees along with agricultural crops, showing huge multiplicity in economic yield. This system of intercropping trees along with crops/ livestock is seen to be much productive and highly effective for farmers as they can enjoy huge benefits in terms of food, fiber, etc. Thus agroforestry regarded as an better option for deliberately integrating trees, crops along with livestock on same landscape. The practice also seems to be highly beneficial in mitigating climate and carbon dioxide emission. As a result, there is a need to shift to a modified agroforestry system. The present investigation entitled "Response of organic manures and mulches on growth yield and microclimate of (Garlic) Allium sativum L. under Morus alba L. based agri-silvicultural system" was conducted at the experimental field of the Department of Silviculture and Agroforestry, Dr. Y S Parmar University of Horticulture and Forestry, Nauni, Solan (H.P.) during the month of September, 2021 – May,2022. The result showed that combined effect of organic manure and mulches on growth and yield parameter of bulb was found significant.

Keywords: Garlic, Morus, Agrisilviculture System, Yield.

Effect of Methyl Paraben on Serotonin Levels Governing Autistic behavior In Zebrafish Larvae

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ABSTRACT

Autism Spectrum Disorder (ASD) develops during childhood as a complicated neurodevelopmental disorder that can persist throughout the life of an individual. Serotonin, a neurotransmitter that plays an important role in neuronal growth and brain development. Altered serotonin levels were found in the ASD patients, which indicates that the serotonergic system plays a role in phenotype related to autism. Endocrine Disrupting Chemicals (EDCs) disrupt homeostasis by altering the endogenous hormone activity during the early stages of development leading to neurological abnormalities. Zebrafish, a highly social organism, for studying toxicology and neuropharmacology, for studying developmental disorders has been used as a reliable animal source for its ease of use and economic advantages. In this proposed work, zebrafish embryos were exposed to sub-lethal concentrations of Methyl Paraben (MP): 6.5ppb, 0.65ppb and 0.065ppb. Developmental deficits such as delayed hatching and heart rate were observed in the exposed groups. Anxiety-like behavior as well as depression were observed from light/dark preference and social contact test which is supported by the significant inhibition of Acetylcholinesterase (AChE) activity in the exposed groups. Exposure to MP reduces the serotonin levels which were analyzed using serotonin kit. Upregulation of genes responsible for brain morphogenesis (PTENA and SHANK3a) and neurological disorders (NRXN1a and NLGN3a) were observed in 6.5ppb and 0.65ppb exposure groups. It is concluded that dysregulation of genes involved in brain morphogenesis reduces the levels of serotonin and AChE activity inducing autistic spectrum behavior.

Keywords: Autism Spectrum Disorder, Serotonin, Methyl Paraben, Zebrafish.

Occupational Noise Exposure on Human Health of Mine Workers in Bundelkhand Region India

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ABSTRACT

It has been aptly said that a silent mine is a nonproductive mine as noise is a concomitant by product of mining activities. It is now a well-recognized fact that occupational noise is a potential health hazard if the noise level at the workers ears in not minimized by engineering and administrative control measures and by use of hearing protection devices. The present standards in most industrial countries call for no more than 85 dBA noise exposure over an 8-hour workday. In this paper, the author makes a strong case for a well-well-designed hearing conservation programme for general adoption in the extractive industries throughout the world wherever hazardous noise exists in the workplace.

Keywords: Human Health, Health impacts, Occupational noise and psychological aspects.

Expression study of oxidative stress resistant HUP26 gene in plants like Oryza sativa near mangroves which face hypoxic conditions due to frequent floods caused by global warming

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ABSTRACT

Frequent flooding in the mangroves or low land area causes hypoxic stress in plants like Oryza sativa. Incorporation of a oxidative stress resistant HUP26 gene in plants like Oryza sativa near mangroves which face hypoxic conditions due to often floods caused by global warming may contribute significantly in oxidative stress mangement. HUP26 gene is taken from Arabidopsis. HUP gene were identified that responded to submergence in Arabidopsis, and these genes conferred seedling survival of low oxygen stresses. Similar transcript of HUP are upregulated by low oxygen condition and submergence in HUP26 orthologs such as rice. The simplest way to exploit the ability of Ti plasmid to genetically transform plants would be to insert a desired DNA sequence (HUP26 gene) in T- DNA region .Ti-plasmid and Agrobacterium tumefaciens is used to deliver and insert this gene into the genome of a susceptible plant cell.This cloing vector lack vir genes, they cannot by themselves effect the transfer and integration of T-DNA region into the recipient plant cells. To achieve this cointegrate vector system is required. In this cointegrate configuration the genetically engineered T-DNA region with HUP26 gene can be transferred to cells. Insertion of the recombinant cointegrate vector into the plant is essential. Agrobacterium tumefaciens is attracted towards wound site of Oryza sativa plant by chemotaxis. The vir gene encode a set of proteins responsible for the excision, transfer and the integration of the T-DNA containing HUP26 gene into plant nucleus genome. Salicylic acid and oxidative stress inducer methyl viologen can be used to check HUP26 mRNA levels. Significant increase in HUP26 mRNA needs to be observed to conclude that HUP26 gene in the Oryza sativa that is engineered, is acting in oxidative stress through the regulation of PR1 and ROS accumulation.

Keywords: Oxidative stress, HUP26 gene, Oryza sativa, Ti plasmid, ROS.

'E-Waste Management' A Critical Concern in the Post COVID-19 Era: A Field Study

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ABSTRACT

Introduction: The matter of E-waste management is perhaps the greatest issues crippling the modern human society, especially after the COVID-19 pandemic which increased the demand for latest electronic devices around the world.

Objectives: The objectives of this paper are to assess the level of understanding about E-waste amongst school-going students in UT Chandigarh, hence raising awareness; to analyze the amount of E-waste processed in the Shivalik Solid Waste Management Ltd Unit - 2, Nalagarh, Himachal Pradesh, India and to portray a relation between COVID-19 pandemic and E-Waste generation.

Methodology: This study was conducted in 3 distinct phases. In the first phase, a survey was conducted in August 2022, with 200 students covering 20 government schools randomly in UT Chandigarh with a pre-tested questionnaire. Secondly, to understand E-waste processing, a field visit was undertaken to the E-Waste Management Plant, where E-waste is collected from neighboring states of Punjab, Haryana, and Chandigarh. Thirdly, E-waste collected from schools was handed to an authorized E-waste recycler.

Results & Conclusion: The comprehensive survey illustrated that close to 47% of the respondents donated/passed-on older E-devices to other family members/friends etc., indirectly promoting reuse of old gadgets, thus reducing the generation of E-Waste. The relationship between COVID-19 and E-waste has been analyzed by carefully examining the official records of the E-Waste Management plant, which showed that there was an 85.87% rise in the quantity of E-waste received by the plant from the years 2019-20 and 2020-21.

Way Forward: Towards the end, the role of young people, in mitigating inappropriate and unethical management of E-waste has been emphasized. There is a focus on practical approaches to boost individual efforts for a healthy environment through promoting research and innovation.

Keywords: Authorized Recyclers, COVID-19, E-Waste, Reuse.

Hydroponics – the Future of Agriculture

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ABSTRACT

With the increasing demand of food across the globe, hydroponics emerges out to be one of the most promising pathways to the future of Agriculture. The UN thus has been working on a project, called the UN Sustainable Development Agenda (UN, 2015), that provides a framework of 17 sustainable development goals (SDGs) for countries to manage this growth while meeting the needs of citizens – now and in the future. Hydroponics is the keystone of Controlled Environment Agriculture (CEA), and is defined as the process of growing plants without soil, with sources of nutrient elements either a nutrient solution or nutrient-enriched water and may or may not be accompanied by an inert mechanical root support (sand or gravel). Crops like spinach, lettuce, strawberries, tomatoes, basil, were experimentally grown through this method and have had shown maximum yields, along with the benefits of conservation of water and nutrients, thus making the system economically feasible in high density and expensive land areas. However there still lies distinct evidence of lack of knowledge regarding this science, along with handling and maintenance issues. Hence this poster is aimed to provide better understanding to this subject as well as for its efficient utilization in Agriculture.

Keywords: CEA, hydroponics, sustainable development, UN.

Utilization of Biotechnological Strategies in Wasteland Reclamation

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ABSTRACT

Excessive wasteland formation has become a serious threat to human civilization, which is accelerated by overcultivation, deforestation, commercial timber exploitation, overgrazing, improper irrigation practices, and a variety of other factors. So, reclamation of these wastelands is very necessary to improve the physical quality of the marginal soils and to prevent soil erosion, flooding, and landslides for biological resource conservation. Various biotechnological strategies can be used to reclaim the wasteland. Reforestation through micropropagation using cloned superior genetic stocks (e.g., Casuarina) should be used to develop strong, superior species that can prevent soil erosion. Mycorrhizae enhance nutrient and water uptake by the host plant to improve the soil quality. Nitrogen fixing bacteria like Rhizobium or Actinomycetes genus Frankia can fix nitrogen from the atmosphere by symbiosis process to increase the soil fertility. Several bacteria and fungi produce substances during organic decomposition of soil particles to improve the physical nature of soil. Development of abiotic stress-tolerant plants (e.g., Terminalia bellirica) protects wasteland formation by preventing drought, overheating, flooding, salinity, acidity, etc. In spite of having various advantages, wasteland reclamation has several disadvantages. Wasteland reclamation is associated with some dangers, such as flooding and soil liquefaction. Reclaimed land is expensive and may harm coral and marine life. Lack of financial investment and the scarcity of proper technology-based infrastructure are two of the major difficulties for wasteland reclamation. But still, scientists are trying to cultivate new scientific insights to overcome the crisis of wasteland formation by accelerating the process of wasteland reclamation.

Keywords: Wasteland reclamation, micropropagation, symbiosis, abiotic stress.

Prospects and Challenges in Achieving Regenerative Agriculture-A Way Towards Food Security

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ABSTRACT

Agriculture is in crisis, conventional agricultural system moved towards degenerative farming practices due to intensive and exhaustive resource exploitation, soil nutrient mining increased cost of cultivation, collapse of soil health and GHG emissions from the farming system. These are the major challenges in today's scenario, with this, the world's population growth from 6.7 billion to exponentially rise to around 9 billion by 2050. So, the demands of this population anticipated to require a substantial increase in agricultural productivity, which leads to pressure for sustainable food production. Regenerative agriculture can be a proposed solution towards sustainable food system and a promising approach of conservation and rehabilitation in agriculture ecosystem. It includes various sustainable farming practices that are shaping the future of Agriculture such as carbon sequestration, enhance biodiversity and ecosystem services, and improve resilience to climate change. Also, resolve the issues of water and waste recycling strengthen the soil structure and functions and address the problem of population growth as well as food security. Regenerative agriculture is not only a specific practice but includes conservation agriculture, agroforestry systems, climate smart agriculture, integrated farming system, and the use of ICT tools for precision agriculture, with the adoption of latest artificial intelligence-based technologies for sustainability. It is providing two contrasting approaches to agriculture future; one is resource conservation and second is sustainable intensification. The major challenges in regenerative agriculture can be changing farmers' strategy and their behaviour toward the transition from conventional farming to regenerative. While implementing such a transformation will have its very own challenges. However, it may be the only solution to protect food security and the future of agriculture but farmers cannot do this alone. Governments need to step up their efforts by increasing investments, creating markets and providing support through policies.

Keywords: Food Security, Regenerative Agriculture, Resource Conservation, Sustainable Intensification.

Applications of Plant-derived Nanoparticles in Wastewater Decontamination

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ABSTRACT

Wastewater treatment protects the wellbeing of our ecosystem and all living things, making it an inevitable reality of our times. Due to its ability to affect both living and non-living things, wastewater is recognised as an important contributor to environmental contamination. Multiple physical, biological, and chemical techniques of treatment are used to meet the wastewater discharge requirements set by qualified national authorities for environmental protection. Since the synthesis of plant-based nanoparticles and their application for wastewater purification is an efficient, economical, and ecologically friendly technique, researchers from all over the world have lately been more interested in it. For the creation of nanoparticles, several plant parts and extracts are being investigated. Green synthesised nanoparticles are very effective in recycling hazardous pollutants from wastewater and removing them, making the wastewater reusable in many ways. However, synthesis, regeneration, and reusability are the major obstacles that must be addressed before the technology transferred from laboratory to commercial applications. We have reviewed various methods of plant-based and plant-derived nanoparticle production and their uses in wastewater treatment. Plant derived nanoparticles are bio-degradable natural macromolecules and provide an exciting avenue for the future research.

Keywords: Metal ion reduction, Plant-based nanoparticles, Protein based nanoparticles, Wastewater treatment.

Evaluation of Phytotoxic Effect of Plant Dry Leaf based Vermicompost on Seed Germination, Growth and yield of Fenugreek (*Trigonella Foenum Graecum*)

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ABSTRACT

Phytotoxicity is one of the most critical factors for determining whether any type of compost is suitable for agricultural use and avoiding environmental hazards until it is recycled back to agricultural land. Composting is one among the best economic and environmentally sustainable means of managing different kind of wastes from different origin. The present study involves the plant bioassay test was conducted by using different amount of soil and vermicompost. The treatments prepared are 25%, 50%, 75% and 100% including one control. For each trail three replicates were maintained in order to get the accurate results. The seed used for the study is fenugreek seeds. The mean values were calculated and used for interpretation of the results. From the plant bioassay experiments, various parameters like, total seeds germinated, number of leaves, number of flowers, pods, seeds in pods, length of roots and shoots were counted and measured. From the experimental results, it was found that, overall growth of plants was observed in 25% and 50% treatments compared to the other treatments and control. The plant bioassay tests clearly showed that, soil with 25% to 50% of vermicompost mixing will found beneficial for the growth and development of fenugreek plants.

Keywords: Plant Bioassy, Vermicompost, Earth worms, Germination Index, Phytotoxicity.

Industrial activities impacting the aquatic ecosystems in Vapi-India region: Ground water quality assessment

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ABSTRACT

The purpose of the study was to evaluate the groundwater quality in the Gujarat Industrial Development Corporation (GIDC) Vapi India (CETP) region. Numerous man-made activities, including mining, discharge of sewage waste, and the discharge of industrial effluents into rivers and drains, steadily disseminate a large number of harmful toxic chemicals including heavy metals into the ground water. The rate at which harmful metals percolate into the water, has risen to an alarming level as a result of increased human and industrial activity. Ground water is severely contaminated by human activity and a significant number of companies that discharge enormous amounts of untreated effluentscontaining various hazardous metal ions into the environment. Three samples of ground water were taken from the VapiIndia (CETP) region. Study was conducted to evaluatethe degree of pollution, the acceptability of drinking water, and the long-term detrimental effects on the health of living beings. The observed toxic concentration levels in the study were compared to World Health Organization (WHO) and the Central Pollution Control Board standards (CPCB). In order to prevent pollution, it was determined that all of the effluents needed additional treatment before being released into the environment. The collected results show that water drained from restaurant kitchens and wastewater utilized for irrigation and farming in neighbouring areas were highly polluted and unfit for aquatic life, irrigation, and agricultural purposes.

Key words: Groundwater, Toxicity, Physico-chemical parameters, Heavy Metals. CETP.

Bio-monitoring of the ecological health of Baraila wetland using Benthic-macroinvertebrates as indicator organism at Vaishali (Bihar), India

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ABSTRACT

The ecological existence of the Baraila wetland, of Vaishali, Bihar, is under serious threat due to habitat encroachment, nutrient enrichment, excessive agricultural practices, poor wetland management, and other anthropogenic activities. Benthic-macroinvertebrates are differentially tolerant to different environmental conditions and thus are considered widely for aquatic health assessment. The study has been taken to assess the overall health of wetland using benthic-macroinvertebrates as indicator organisms. Water and benthic samples were collected in triplicate from the 4 sampling locations in April 2022 from Baraila wetland. Qualitative analysis of benthic-macroinvertebrates was performed using species specific identification keys followed by quantitative estimation of abundance, species richness, Shannon diversity index of benthic-macroinvertebrates at each site. Altogether, 20 species of benthic-macroinvertebrates belonging to 11 families, 6 orders and 3 phyla were identified in the study area. Shannon diversity index with an average value of 1.92 ± 0.31 has classified the study area as a moderately polluted wetland. The taxa richness and abundance were noted maximum at site 4, which was visually assessed to be the least disturbed site. The biological monitoring working party (BMWP) Score has varied from 38 to 78 suggesting poor to good wetland conditions. Further, maximum ASPT value has been noted at site 4 (5.57) and the minimum at site 3 (3.45), which revealed slight to heavy pollution status of the wetland.

Keywords: Baraila wetland, Benthic-macroinvertebrates, Shannon diversity index, BMWP Score, ASPT value.

Sustainable Menstrual Management

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ABSTRACT

Improper disposal and use of non-biodegradable menstrual products is one of the biggest concerns with regard to sustainable environment. The lack of enough awareness and the stigma around menstruation contributes to the problems of effective sanitary waste management. The disposable and non-biodegradable properties of the existing menstrual products is one of the biggest concerns that adds up to the landfill resulting in the generation of excess waste. According to statistics an ordinary Women typically uses 6 to 8 sanitary napkins every cycle, which results in 125 kg of menstrual waste produced during the total menstruating period.90% of menstrual pads are composed of plastic, hence it can take anywhere between 500 and 800 years to degrade. Women in rural areas are highly unaware of the variety of menstrual hygiene products available in the market and the negative impact it has had in their health over several years. The best way to resolve this issue is to raise proper awareness and to make use of sustainable alternatives Eco-friendly menstrual products, like cloth pads, menstrual cups, period pants etc, have been introduced in the market in response to increasing sustainability consciousness. Social, economic, cultural, and psychological factors generally have an impact on the selection of different menstrual products available in the market. A lot of online surveys and discussions are being conducted to know about the public opinion and the current state of the prevailing issue. In order to lessen the impact of the existing associated environmental challenges and consequently promote menstrual hygiene, this study will provide a review of the existing literature on studies related to sustainable menstruation management.

Keywords: Menstrual products, pollution sustainability, health, eco-friendly.

Fungus mediated synthesis, characterization and effect of iron nanoparticles on seed germination of wheat

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ABSTRACT

Nanomaterials are playing crucial role in agriculture sector to enhance food production. In field of modern Microbiology nanoparticles can be used as nanofertilizer to enhance growth of plants by the slow and controlled transport of nutrients to the plants. Synthesis of nanoparticles using microbes is an eco-friendly and cost-effective approach. The present work designed to synthesize Fe-nanoparticles using FeCl3 as precursor salts by using fungi. Different fungus were isolated from iron rich sites and screenedfor iron tolerance at different concentrations of Fecl3 (10mM, 20mM, 25mM, 30mM, 40mM and 50mM). Four fungus FEC, HRP 5, F.C 202 and HAM 2 shows higher tolerance at the 40mM concentration. The nanoparticles were synthesized by adding FeCl3to the extracellular filtrate of fungus. Synthesized nanoparticles shows absorbance peak between 200 to 320nm under UV- Vis spectroscopy, FTIR shows the presence of iron and oxides groups, irregular shaped nanoparticles and size range from 1-100 nm shown by SEM and PSA. Further, these nanoparticles (0.1 mg, 0.5 mg, 1 mg, 2 mg and 20 mg) were tested for their phytotoxicity against wheat on soft agar under controlled laboratory conditions. The 1 mg and 2 mg concentration of nanoparticles gave the maximum relative seed germination index 117.5 and 105.2 respectively. Hence, these concentrations of FE N. Pcan be used for effective transport of nutrient to the plants to enhance plant growth.

Keywords: Fungi, Iron oxide nanoparticles, FTIR, UV-Vis, SEM.

Noise pollution from the perspective of Social Problem Socio-personal Health Survey

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ABSTRACT

Undesirable sound is called Noise. In today's world we are so much surrounded by noise that we have almost forgotten the bliss of silence. Whether we are at home or outside, we are exposed to high levels of Noise continuously. Noise not only affects our physical health but also our mental and emotional well being. Reduced efficiency and loss of concentration are common effects of noise that may result in accidents. Most of the people are oblivious about the effects of noise pollution, so it is very important to spread awareness among general masses about Noise Pollution, its effects and control measures.

In the present study, a Socio-Personal / Health survey was conducted to evaluate impact of Noise on human health and awareness among residents of Jammu City about Noise Pollution. During this survey, randomly selected 1000 respondents i.e. 500 males and 500 females were interviewed and their responses were recorded. In the study, it was observed that 47.0 % of the total respondents (i.e. 51.4 % females and 42.6 % males) rated 1200-1800 hours as the most noisy part of the day. 51.2 % of female and 61.4 % of male respondents were found to be aware about the environmental laws pertaining to noise. 57.6 % of the female respondents and 50.4 % of male respondents rated noise level near the road annoying. 35.0 % of female respondents rated noise near the road unbearable. A very small percentage (i.e. 5.7 %) of the total respondents of the study area rated noise level near the road as no effect. 52.6 % of male respondents rated noise level inside houses during festivals annoying but 31.4 % of female respondents rated noise level inside houses during festivals enjoyable. 13.6 % of the female respondents and 15.8% of the male respondents in the study area rated noise level inside house during festivals unbearable respectively. About 47.3 % of the respondents suggested use of loudspeakers with restrictions. About 31.0% of the respondents of the study area suggested ban on noisy crackers, and 44.4 % of female respondents and 34.0 % of male respondents opined that noisy crackers should be replaced with less noisy fireworks. 82.0 % of the respondents rated Deepawali as the most irritating festival in terms of noise. A higher percentage 58.9 % of respondents suggested use of music player inside buses with restrictions i.e. with low volume and about 29.0 % suggested total ban on the playing of music players inside the buses. 25.9 % of the total respondents rated Vikram Chowk as the noisiest place in the Jammu city.51.2 % of the respondents were observed to spend up to 6 hours in a noisy environment. 56.9 % of the respondents rated environment inside hospitals as noisy. 90.5% of the respondents of the study area were observed to be willing to spend more for procuring noiseless machines. 93.0 % of the female respondents and 94.2 % of the male respondents were observed to have a wish to live in a noise free environment.

Key words: Noise, Survey, Health.

Role of Plant Growth Promoting Microbes in Environmental and Agriculture Sustainability

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ABSTRACT

Environmental sustainability will attain only if we keep a balance between available resources and future needs. The World population is increasing and the need for resources as well as the exploitation of natural resources are also increasing drastically. By 2050, food output must double to meet the world's growing demand for food. Extensive production to meet that demand using unsustainable farming methods may address the issue of rising food demand, but are can adversely affect the environment. Search for new Increased agriculture productivity needs to be expanded for feeding the expanded population. Extensive use of Agrochemicals and chemical fertilizers may result in pollution and detrimental environmental impacts. This addition of chemicals into cropping practices can lead to extensive water and soil pollution, leading to ill effects on Human health. In this scenario, alternative plant growth or crop improvement activities need to be adopted. There is great concern and interest among agronomists and agriculture scientists to use eco-friendly plant growth-promoting microorganisms (PGPM) for improving the agroecosystems for crop improvement. Endophytes and rhizospheric microbes are the major microbes that can be exploited for crop improvement aspects because of their potential abilities to regulate plant growth promotion by producing certain plant growth regulators.in addition, they have a specific role against biotic stress caused by pathogenic microbes and abiotic stress due to the recalcitrant compound present in the environment. They have various roles as Biopesticides, biofertilizers and growth regulator activity. More research focus is needed to establish a strong position for the management of agricultural ecosystems in a sustainable manner. A state-of-the-art solution for food security in terms of quality, quantity, and environmental sustainability will be made possible by greater understanding and disclosure of the secret of plant-microbe interactions.

Key words: PGPM Environmental Sustainability and sustainable agriculture.

Role of Microbes in Plant Promotion and regulation- Plant growth promoting Microbes (PGPM)

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ABSTRACT

The unpleasant result is that there is a risk that the world's food supply won't be enough to feed everyone in the near future due to both global increases in environmental damage and pressure from human population growth. Therefore, it is imperative that agricultural productivity rise substantially over the next few decades. Therefore, agricultural practice is shifting in favour of a more environmentally friendly and sustainable strategy. Plant development and growth need precise coordination of the spatial and temporal or A close synchronisation of the spatial and temporal structure of cell division, cell expansion, and cell differentiation is required for plant growth and development. The exchange of signalling molecules between the root and shoot, which can be influenced by both biotic and abiotic influences, is necessary for the orchestration of these activities. In order to create new agricultural applications, it is important to understand the interactions between plants and the microbes that are linked to them. Sugars, organic acids, and vitamins are only a few of the many organic compounds that plants create. Microbial populations can utilise these substances as nutrients or signalling molecules. Microorganisms, on the other hand, emit phytohormones, tiny compounds, or volatile compounds. Plant growth-promoting microorganisms (PGPM), however, have demonstrated potential as sustainable plant growth enhancers and may be able to help with a variety of environmental challenges. Given the long-standing evolutionary connections between plants and microbes, it is likely that there is still more to learn about the potential advantages of bacteria that could be derived through PGPM.This paper discusses how plant-microbe interaction helps in the growth regulation of crops and sustainable production and protection of plant growth.

Keywords: Plant growth promoting Microbes (PGPM), plant growth regulation Sustainable development.

Innovative Waste Management Technologies for Sustainable Development

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ABSTRACT

By 2050, it is expected that the global waste will reach to 4 billion tons. The rapid growing urban populations and consumption culture will be on rise. In last few decades, many countries have developed smart waste management technologies and solutionseither to reduce waste generation or to reduce the strain it is putting on the environment. According to the Environmental Protection Agency (EPA), roughly 75% of the waste stream in the United States is recyclable, but only about 30% of recyclable materials actually get recycled. It is expected that, on an average an individual produce over 2 billion tons of waste each year, that's a lot of unnecessary trash ending up in the world's landfilling and waterways. The traditional waste management systems aren't equipped to deal with the extra trash produced by growing populations, today world needinnovativetrash management system to solve the current problem. To help bridge the gap, communities need to adopt smart waste management technologies that increase efficiency, lower collection costs and divert more trash away from landfills.

This paper will discuss how the latest technology that can identify and resolve the ongoing challenges and step toward creating efficient, sustainable waste management systems in India.

A study on the quality of drinking water, Saran, Bihar

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ABSTRACT

No water no life! So, it is our responsibility to conserve life nector. The current work is an attempt to measure water quality of different blocks of saran district Bihar. Multiple water samples are collected from different blocks to handpumps, taps and tubewells. The result indicate that the quality of water considerably varies from location to location .The pH of sample water ranged from minimum 6.5 to maximum 7.8 to the sampelling points Baniyapur , Jalalpur , Manjhi , Revelganj, Ekma and Lahladdpur. The conductivity ranged from minimum 189 to maximum 457 to sampling sites to Marhauara, Garkha, Amnaur, Taraiya, Isuapur, Mashrakh, Sonepur, Dighwara. The total hardness ranged from minimum 162 to 374 from the different sampling's sites. The calcium and TDS ranged from minimum 82 to maximum 144 and minimum 98 to maximum 550 from the different sites.

The range of pH, conductivity, total hardness, calcium and TDS are in the area in limit. Hence, we can say that the value of all parameters is permissible in all respects. According to this Report the water is saran district is suitable for drinking to human health.

Keywords: pH, Conductivity, TDS, Total hardness etc.

Traditional agriculture for environmental sustainability and food security

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ABSTRACT

In present scenario, India and other developing nations with anaffluenttraditional agricultural system, the words smart agriculturemeans growing high yielding varieties of crops with increasing doses of chemical fertilisers and pesticides. The growing population pressurized modern agricultural practices to enhance food production. Catering the growing population and sustaining the calibre of the environment are the two major challenges of Indian agriculture system. Although, modern agriculture increased the food production several folds with compromising environmental degradationsuch as climate change, environmental pollution, degradation of soil health and biodiversity. Traditional agricultural practices have been an indispensable part of food production in India since human stay. It is characterized as low-input and natural farming system, basically depends on the natural resources and local tools for input. This technique maintains the soil health for future food production and food security. The soil nutrient and water are essential component of soil, because roots of the plant comprise the essential parts for nutrient and water uptake. This scenario will cover three aspects of traditional farming of India: cultivation, biological method of pest management and locally available sustainable practices of crop protection. Double cropping, mixed cropping, crop rotation, agroforestry and livestock integrated agriculture practices, use of local varieties and resources with hostpathogen interaction is some of the prominent traditional agricultural practices in India which must be strengthened in view of the environment and food security. Such practices have a significant role in achieving the sustainability of agriculture by improving nutrition quality. There is a demand to practices such agricultural practices for the sustainability of environment and food production.

Keywords: Environmental protection, Food security, Sustainability and Traditional agriculture.

Effects of Global Warming on Climate Change and Human Health: Issues, Problems, Challenges and Remedies

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ABSTRACT

Major environmental issues caused by Green House gases like CO2, CH4, N2O, etc., rapid industrialization and population explosion in India has raised the rate of carbon dioxide in the environment as per statistics, India is at 10th spot in the Global Climate Change Performance Index (CCPI) 2022 released by Germanwatch. Human health is a primary necessity of living but the emissions of CO2 from the burning of fossil fuels for energy causes threat to human health. To reduce, remove and store CO2 naturally from our atmosphere forest trees plays the vital role but due to deforestation there is a rapid build-up of CO2. Cattle herds produce methane when they pass gas, and this methane is 30 times more powerful than CO2.

Vehicular emissions, industrial waste, crop burning, smoke from cooking, the crop fertilizers used by farmer contain N2O that is nearly 300 times more potent than CO2. So these gases are literally affecting our environment inadequately. Apart from deforestation, India is also suffering from noise pollution as per United Nations Environment Programme (UNEP) Annual Frontier report 2022. Dhaka (Bangladesh) has been ranked as the noisiest city in world followed by Moradabad, Uttar Pradesh.

Based on this, the present study recommends and emphasizes on current scenario in India and some effective method to reduce, reuse and recycle the waste which make CO2 hazardous to human health and climate change.

Keywords: Climate Change, Human Health, Impacts of Global Warming, Green House Gases, Carbon Capture.

Impact of Water Polution on Human Health

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ABSTRACT

All living being especially human health is directly affected by polluted water. It causes many serious health problems which create ultimately death. Polluted water is major source of microbial pathogen. It estimated that 9 out of 10 children become dead due to this polluted water in developing countries. Many of the factories leads to water pollution like Sewage water, Agricultural water, Radio Active substance plastic wastes and oil spill reduce oxygen supplies within water environment. Polluted water having negative impact on human health. It develops water borne disease like Cholera, Typhoid, Diarrhoea, Ulcers, Hepatitis, Arsinocolysis, kidney damage respiratory, tract infection. This toxic waste affected all food chain in ecosystem. So many fishes and other small aquatic animals killed all over the world due to polluted water. So this risky all living being and community this can be cured by proper meditation and treatment. Human being avoid drinking unfiltered water, and applied processes for removing the contaminants like filtration, disinfection, coagulation biological processes like slow sand filtration.

Keywords: Disease, Health, Disinfection, contaminants.

The Indigenous Women: The Custodian of Life, Liberty And Green Economy

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ABSTRACT

Like the ancient oral tradition of Vedic India, the indigenous people specially the Santhal Tribe too nursed and preserved the inextricable link between cultural and biological diversity in the domain of traditional knowledge of indigenous society of Jharkhand, particularly and India as a whole which transmitted orally from the ancestors since centuries. It tends to be collectively owned and takes the form of stories, songs, folklore, beliefs, rituals, cultural values, community laws, local languages and cultural practices includes the development of plant species and animal breeds and life system of the universe.

Not only that the reflection of the varying moods of the population to which they belongs to and function as a rich evidence upon which we can build our knowledge of their heritage, culture, politics of green economy and ecology. The indigenous society has their own way of social, political, moral and cultural system of their governance. The feminist cloth of their maternal power in the divine presence reflect their antiquity with the signification of tradition of natural conservation and environment. Mrs. Archana Soren, Indian climate activist experienced in advocacy and research, is working to document, preserve and promote traditional knowledge and cultural practices of indigenous communities. She tells "Our ancestors have been protecting the forest and nature over the ages through their traditional knowledge and ancient practices. Now it is our duty to be the front runners to shape these ancient wisdoms of alternative knowledge systems to develop all the practical model and future oriented practices for the green economy of the universe".

Keywords: Ancient knowledge, Biological Diversity, Indigenous society, Cultural Practices, Ancestors.

The Future-Oriented Kerala Re-Build Initiative: - An Anticipatory Flood Risk Management

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ABSTRACT

This paper analyses the future orientation of flood risk management and the Kerala Rebuild initiative after the 2018 flood. The Kerala Flood 2018 and 2019 educate us on how a climate phenomenon can spiral into a tremendous environmental disaster. In the Present situation Post Disaster rebuilding process initiated in the state reveals, the necessity of minimizing the environmental burdens over the whole life cycle of the newly constructed building and tells that the state has a limited geographical area to explore and exploit. According to the Kerala State Disaster Management Policy, physical reconstruction must take into account the hazard of the particular location, resources, etc. involved in the rebuilding and the adoption of designs that offer resilience against flood. In flood and landslide-affected areas, there is a need to shift from dependence on a supply-driven solution to demand-driven solutions through multi-stakeholder engagement and consultations, especially with disaster-affected communities. A systematic review identified how land use regulation and resource protection are relevant for future flood risk in Kerala. The study determined that it's important to understand the spirit of nature while focusing on social, cultural, and economic needs. The risk reduction measures of Kerala advanced from a broader policy of flood control toward integrated flood risk management. The new design standard is to manage our limited resources for the welfare of the people without sacrificing sustainability, the proliferation of large-scale flood retention, etc. Kerala's rebuilds program has the characteristics of an anticipatory, forward-looking management approach to cope with the future stress off flood risk. The study identified that it is imperative to additionally mainstream and integrate disaster risk management into various sector development strategies that help to maintain the ability to adapt to changing future conditions.

Keywords: Disaster Management, Rebuild Initiative, Development Strategy, Anticipatory Approach, Environmental Burden.

Sediment pollution analysis of the Dahej coast, Gulf of Khambhat, Gujarat

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ABSTRACT

In order to estimate the sediment pollution and degree of contamination in the coastal system, the metal level in sediments is considered a marker. Domestic sewage and industrial effluents released in the water courses in untreated or partially treated form result into a mixture of pollutants including toxic heavy metals and metalloids. Sediments are preferred as a monitoring tool, since concentration of contaminants are higher in sediments than that in water, and show less variation with time and space. Therefore, heavy metal contamination and physico-chemical parameters along with the coarse fraction analysis of sediment samples have been studied from the Dahej coast of the Gulf of Khambhat, Gujarat. In this study, sediment samples were collected from the areas of upper, middle and lower intertidal zone, air dried and analysed for various physico-chemical parameters like pH, Electric Conductivity, TDS, Na+, K+, Ca & Mg Hardness, Chloride, Sulphate, Phosphate, Total Organic Carbon and Total Organic Matter. Also, to examine the metal pollution, concentration of various heavy metals like Cadmium, Chromium, Cobalt, copper, Iron, Nickel, Zinc, Manganese and Lead were analysed using Atomic Absorption Spectrometer (AAS) and coarse fraction analysis using wet sieving method. Results of the current study shows that all the heavy metals have higher concentration in the lower intertidal zone as compared to the upper intertidal zone, which indicates heavy flow of metal contamination getting disposed into the sea waters and increase the stress on fragile marine ecosystem of lower intertidal zone.

Keywords: Sediment pollution, Heavy metal contamination, physico-chemical parameter.

Catalytic Hydrothermal Liquefaction of Algal Biomass for bio-oil production using Fe (0) nanoparticles

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ABSTRACT

The reserves for conventional fossil fuels are limited and exhaustible. Non judicious and over exploitation of fossil fuels has resulted in serious environmental concerns. The use of renewable fuels is a major alternative to the use of conventional fossil fuels. Transforming biomass into biofuel through hydrothermal liquefaction (HTL) has emerged as one of the promising approaches. In this process biomass is subjected to high temperatures (250oC to 320oC) and pressure (5 to 30 MPa) for 1 to 2 hr. HTL is gaining increased attention due to its rapid reaction time and the ability to use wet feedstock. Consequently, these characteristics have made HTL an ideal technology for converting algal biomass into bio-crude oil. The advantage of algal biomass is that they are fast-growing, contains high amount of lipids, and don't compete with food crops. One of drawback of conventional HTL is that the biocrude oil produced is rich in oxygenated organic compounds which decreases the higher heating value (HHV) of the oil. Several catalysts both heterogeneous and homogeneous catalyst have been reported to improve biocrude oil yield. In this study hydrothermal liquefaction of algal biomass was performed in presence of Fe (0) nanoparticles. FT-IR was used for bio-oil characterization as well as for catalyst characterization. The bio-oil yield (20 wt.%) was observed higher in the case of catalytic liquefaction bio-oil compared to the non-catalytic reaction bio-oil (14.23 wt.%). With higher amounts of bio-oil and lower amounts of bio-char, improved performance was achieved. The results suggest that catalytic liquefaction has potential for increasing the yield of bio-oil.

Keywords: Renewable energy; Hydrothermal liquefaction; Algal biomass; Catalyst; Sustainable growth.

Changes in Glycogen Contents in freshwater fish *Channa punctatus* due to effluents of sugar and wine industry

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ABSTRACT

In the modern era of industrialization, pollution is the most serious problem which every living being is facing today. Pollution is not only harms human but also causes drastic changes in flora and fauna by changing the physical and chemical parameters of water and air.

A major part of highly contaminated effluents reached to aquatic animals by bioaccumulation and cause serious health hazards by entering in the food chain through fish as it has been reported that freshwater fish accumulate various toxicants and heavy metals allowing them to enter in food chain.

The impact of mixing of effluents of sugar and wine industries in river khannaut passing through Shahjahanpur district of Uttar Pradesh, was studied on Glycogen contents in freshwater fish Chhana punctatus. The fish were collected from three respective sites (Mishripur, Roserkothi and Daniapur) of river Khannaut. Out of these three sites water sample collected from Mishripur was prior to mixing of industrial effluents, while the water collected from to next two sites i.e.,Roserkothi and Daniapur were polluted due to mixing of effluents from sugar and wine industries.

The freshwater fish Channa punctatus from these sites were brought to the research lab in plastic containers and sacrificed to determine the amount of glycogen in their muscles.

Data obtained from these three research sites indicated that glycogen contents in freshwater fish Channa punctatus were decreased due to industrial pollution and variation in fish collected in different months showed that this reduction was also dependent on seasonal variations.

Keywords: Channa punctatus, industrial effluents, glycogen.

An Examination of Relationship Between Water-Intensive Crops and Groundwater Depletion in India's Semi-Arid Agroecosystem in Osian, Rajasthan

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ABSTRACT

Groundwater depletion in arid and semiarid regions globally is a critical problem fueled by unsustainable irrigation water withdrawal for water-intensive crops. In Osian block in Jodhpur, Rajasthan − a semi-arid agroecosystem − decline of groundwater is distressing at 1.96 myr-1 and stage of groundwater extraction is 434%. The only source of irrigation is groundwater and 87% of total water withdrawal is for irrigation. Alarmingly there is risk of all wells going dry in Osian by 2050. The present study is based on the analysis of cropping pattern involving 15 crops in 41 villages, irrigation water requirement estimated using FAO's CROPWAT 8.0 model, and groundwater table examination of 12 observatory wells (triannual readings in mbgl) in Osian between 2002-03 and 2011-12. Between 2003-04 to 2006-07, water requirement grew at a CAGR of 7.71% on account of rise in net sown area of Groundnut (CAGR: 37%) and Arandi (43%) in the Kharif. Whereas between 2006-07 to 2011-12 the rise was much higher (CAGR: 12.51%) due to rise in area under Jeera (47%) and Wheat (11%) in Rabi. In 2011-12, 74 % of total water requirement came from Jeera (25%), Groundnut (17%), Wheat (16%), and Raida (16%). Analysis shows that Jeera, Groundnut, and Wheatare water-intensive crops. As per our estimates average rate of groundwater decline in Osian is 3.09 myr-1 which is alarming. The relationship between annual water requirement and groundwater depth was estimated using Pearson's correlation coefficient (highly correlated at .99) which is significant at $p<.0001$. It must be noted that water withdrawal in Kharif itself is greater than the monsoon recharge, leading to a consistent rise in groundwater depth, except for post-monsoon reading in 2006-07. Results show that tweaking cropping pattern by curtailing the area under water-intensive crops can prove to be single-handedly the most dynamic demand-side management strategy.

Keywords: Groundwater depletion, Irrigation water demand, Semiarid agroecosystem, Sustainable agriculture, Water-intensive crops.

Green synthesis of copper nanoparticles using Parthenium (White congressmen) leaves extract and their antioxidant activities.

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ABSTRACT

Nanoparticles "nano" is referred to a Greek word sense "small" or something very small that depicts the manipulation of materials that lies within the range of 1 thousand millionth of a meter (10 -9 m). The study of structures and molecules on the scales of nanometers starting from 1 - 100 nm is termed as nano science and thus the technology that utilizes its approaches and applications is understood as Nanotechnology. They have numerous applications in the different fields of technology such as nanodevices, semiconductors, optoelectronics, Nano sensors, catalysis, solar cells etc. There are a number of methods by which nanoparticles synthesis can be performed. These methods include physical, chemical and green synthesis. A wide range of harmful and toxic chemicals are used in the chemical amalgam of Nano Particles (NP). These chemicals result in the increase of toxic stress on the environment. Our main aim is to synthesis the copper nanoparticles through Parthenium hysterophorus leaf extract and this approach could be stated as the Green Synthesis of CuNPs, it's the most widely accepted method and its cost effective and eco-friendly. In the process of synthesis of Cooper Nanoparticles, the leaf extracts of parthenium weed (Asteraceae) shows the Bio-reduction behaviour. After the formation of CuNP they were investigated and characterized by employing the different techniques which include UV/VIS Spectrophotometry, particle size analyser and Fourier-Transform Infrared Spectroscopy (FTIR), X-ray diffraction techniques etc.

Keywords: Bio-reduction, Characterization, Copper Nanoparticles, Green Synthesis, toxic.

Impact of Dairy Effluent on Germination and Early Growth of *Solanum lycopersicum* L. (Tomato).

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ABSTRACT

The study was conducted to find the impact of different concentrations of untreated and treated effluent on germination, seedling growth parameters, vigour index and tolerance index of Solanum lycopersicum L. It was observed that average percent germination was 80% (10% concentration) in untreated effluent and 93.33% (50% concentration) in treated effluent whereas percent inhibition was 75% and 100% (No germination) in untreated and 55% (100% concentration) in treated effluent. The average shoot length (8.12 cm), root length (6.9%) fresh weight (0.52 g), dry weight (0.06 g), vigour index (1401.86), tolerance index (90.78) were maximum at 50% treated effluent concentration and minimum at 50% untreated effluent as there was no germination at 75% and 100% untreated effluent.

Key words: Effluent, Germination, Seedling, *Solanum lycopersicum* L, Treated Effluent.

Holi Festival (Biomass Burning and Chemical Colours): Diversion of Natural Instinct of the Holi Fest and Safety Issues

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ABSTRACT

In March 2022, sub-micron particulate matter (PM1) was collected at an urban site in Agra, on the Holika Dahan (a biomass burning event) day, a day before and a day after Holika Dahan. The mass concentrations were 19 µg/m3 on the day before Holika Dahan, 206 µg/m3 on the Holika Dahan day and 249 µg/m3 on the day after Holika Dahan, respectively and the same trend was observed for PM2.5. The morphology and elemental composition of individual aerosol particles were examined using a field scanning electron microscope (FESEM) coupled with energy dispersive X-rayspectrometry (EDS).A day before Holi C, Si, K, Al, Na and Ca were detected as main elements. Holi powder (Gulal) contains asbestos or silica used as base materialdue to which high concentration of Si and C is observed on the day before Holika Dahan. Higher concentration of Silica can lead to health risk like cancer, asthma, skin diseases and temporary blindness. As a result of biomass burning, the C content was 1.7and K content was 2.1 higher on the Holika Dahan day attributed to burning of wood, cow dung cakes, coal, agricultural wastes burnt. The Holi colours used for playing have a high organic carbon content, such as Malachite green, which contributes to the release of organic carbon content. The source of Aluminium Bromide rich particlesbe from pastel silver colour. In Holi colours, rhodamine dyes are doped with silica which further increases concentration of silica. Powdered glass gives shiny colour to Gulal and get deposited in the kidney, liver and bones. Adverse health effects, i.e., skin and ocular irritations as well as respiratory problems may be the consequences.On the day after Holika Dahan PM1 particles exhibited spherule formation as a chain-like aggregate of carbon, these are soot particles composed ofO>Si>Ca>C>Al>S>Ba>P>Fe>K>Mg in decreasing order of elemental composition.An additional particle with elemental composition O, Si, C, Na, Al, Fe, K, and Ca showed irregular, flaky, and layered structures.As a result of this study, we have attempted to explain how Holi fest (a biomass burning event) greatly disturbs the atmospheric chemistry and poses a risk to health. Based on the FESEM EDS analysis, this inference was drawn.

Some Epidemiological Aspects of Lymphatic Filariasis and its Prevention by Using Fish Predators

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ABSTRACT

Out of 20 studied districts, the highest frequency of patients found in Lalmonirhat and Thakurgaon followed by Gaibandha. In the present study, 69.2% patients were found in north zone and 30.8% patients in south zone. 89.81% patients were found in endemic area (17 districts) and 10.18% patients were found in non-endemic area (3 districts). There was no patient in age group (0-10), the highest number of patients was found in age group (41-50); the highest number of patients goes to healer for treatment rather than doctor and health complex; 90.5% patients are suffering in leg swelling, hand swelling (7.6%), 0.7% and 1.2% patients are suffering in breast and scrotum swelling respectively. The most patients of endemic districts are illiterate having knowledge gap. More effective breeding grounds for Culex quinquefasciatus was higher in north zone. Pit surrounding the tube well harbored the highest concentration (75.07%) of Culex quinquefasciatus, followed by abandoned pond (20.68%) and ditches (4.25%); peak population of Culex quinquefasciatus was rom November to April. Out of eight different predators, *Clarias batrachus* were found in most of the breeding grounds. Fishes were allowed to feed upon different instars of Culex quinquefasciatus to determine their predation capacity; *Clarias batrachus* consumed the highest number of larvae (24,372.76/ day) followed by *Oreochromis mossambicus* (4,915.48/ day).

Keywords: Lymphatic filariasis, epidemiology, vectors, prevention and predators.

Urban farming approaches to achieve Sustainable Development Goals: Case of Indian cities

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ABSTRACT

A growing number of individuals are residing in urban areas. Worldwide, people are becoming more and more concerned with issues of health, community, the environment, and morality. The importance of urban food production and its effects on socioeconomic and environmental factors is rising. Food insecurity and environmental degradation have been identified as major urban concerns that can be addressed by Urban farming. Growing food in a city as an individual, expanding access to nutritious food, and linking consumers and growers are all motivated by the social aspects of Urban farming.

The study aims to determine the degree to which Urban farming practices are pertinent to achieving the Sustainable Development Goals (SDGs). This study uses a qualitative methodology, and information was gathered through a review of the literature, emails, and semi-structured interviews. Urban farming uses a variety of food-producing spaces, stakeholders, resources, and policies that enhance local communities' health, and social, ecological, and economic well-being. Urban food self-sufficiency is achieved through the decentralised, local food production system known as Urban farming. This paper emphasises its role in fulfilling the 17 Sustainable Development Goals (SDGs) established by the United Nations General Assembly as a framework for sustainable food production. In the future, Urban farming must be a key player in ensuring food security in cities. To localise and realise the Sustainable Development Goals, particularly SDGs 2 and 11, the study identifies a knowledge gap and the significance of strategic policy planning. The study outlines the best course of action for promoting Urban farming in urban areas through Outreach initiatives, Capacity building, and Policy changes.

Keywords: Environmental deterioration, Food insecurity, Sustainable Development Goals, Sustainable food production, Urban Farming.

Impact of in-vitro gastrointestinal digestion on high value carotenoids extracted from industrial fruit peel waste

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ABSTRACT

Carotenoids are lipid soluble bioactive compounds having variety of functions in human health. Dietary carotenoids are associated with reduced risk of cardiovascular diseases, age-related macular degeneration, diabetes, aging and various cancers. Being potent natural antioxidant carotenoids effectively scavenge singlet molecular oxygen and its efficiency to reduce diseases is related to its antioxidant property. The aim of this research was to check the impact of digestion process on the carotenoids extracted from juice processing unit waste i.e. peels of Citrus reticulata. Solvent mixture containing petroleum: acetone was used to extract maximum amount of polar and nonpolar carotenoids from peels. Solvent extraction resulted in 0.287 mg/g of carotenoids having89.7% of antioxidant potential as monitored by2,2-diphenyl-picryl-hydrazyl-hydrate (DPPH) assay. o/w nanoemulsion of carotenoids was prepared by using ultrasonic wavesat amplitude of 70%, pulse of 25s on and 5s off cycle. Ultrasonication resulted in nanoemulsionformulation ofsize159.8.0 nm, PDI 0.199 and -52.2 zeta potential. In-vitro gastrointestinal studies were done and after undergoing gastric and intestinal phase the target compoundsi.e.total carotenoids were investigated by LCMS. Asignificant decrease in carotenoid content was observed succeeding digestion process with value of 0.044 mg/g.After digestion most of the reported carotenoids were α/β cryptoxanthin, lutein, phytofluene, phytoene, 5,6-epoxy-β-carotene, violaxanthin or neoxanthin.

Keywords: Citrus reticulata, carotenoids, solvent extraction, nanoemulsion, gastrointestinal studies, LCMS.

Improvisation in wicking property of Flexible Polyurethane foams by adding bamboo and gelatin fillers

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ABSTRACT

PU foam is one of the softest, most easily accessible, and affordable mattress materials. In PU foam, wider pores and a more open-cell structure have both advantages and drawbacks. Despite having fewer cells PU foam does not control airflow very effectively and commonly faces criticism for causing body heat and for retaining moisture. A warm, humid climate because of stored body moisture and sweat functions as a haven for bacteria and germs and encourages the proliferation of dust mites contributing to excessive odor and allergic reactions. This study aims to investigate the impact of bamboo and gelatin filler dosage or loading on the wicking property of the foam by using a discontinuous foaming process. Foams with gelatin and bamboo fillers were prepared at 2, 4, and 8% by weight concentrations, respectively, along with a standard 32-density foam without filler. A comparative study was conducted on the effect of increasing filler content on the wicking and mechanical properties of the foam. The wicking and porosity levels of bamboo-filled foam were higher than standard foam and gelatin-loaded foam. With increasing concentrations of bamboo filler, a rapid increase in foam wicking by 7–10 mm was noted. However, an increase in gelatin filler concentration resulted in an increase in foam porosity and elongation with a slight improvement in wicking ability. Improvisation in the wicking property of the foam was observed with an increment of bamboo filler. According to this research findings, the bamboo powder can be utilized as a filler to enhance wicking properties in flexible polyurethane foam.

Keywords: Flexible polyurethane foam, Filler, Porosity, Wicking.

Role of Acridotheres ginginianus (Bank myna) in Smart cities' Ecosystems

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ABSTRACT

Biodiversity conservation in smart cities presents an opportunity for sustainability and harmony between humans and wildlife. As smart cities are developing and growing, they are using a lot of glass for skyscraper windows. While glass looks nice, it poses a challenge for birds, which cannot visualize the reflective glass. Therefore, birds may die or have an injury when they collide with such windows. Urban infrastructure poses a hazard to natural populations of many bird species. Scarcity of food and nesting resources adds to the continuing trauma. The Bank myna (Acridotheres ginginianus) is native to South Asia and is widely distributed throughout India. Its conservation status is Schedule IV of Wildlife Protection Act, India and Least Concern category according to the IUCN Red List of Threatened Species, 2018. A conscientious urban planning policy is the need of the hour. Digital data collection, monitoring and management are the tools that can assist smart city plans by holding spaces in form of conserved, restored and artificially created microhabitats for native bird species. Smart cities should use digital technology and data collected through videography, photography, behaviour coding softwares, iNaturalist App and Citizen Science App. Data collected through software is analyzed by the behaviour coding software BORIS, Observer XT and distribution is noted by Citizen Science App. The overall goal is to improve operational efficiency and allow government to offer better service and citizen welfare. City planners need to understand the importance of suitable urban green spaces, small lakes, ponds and canals. To improve the quality of life, merging the urban planning, ecology and ICT is required. The integration of nature and cities for sustainable urban ecosystems is bound to expand in future.

Keywords: Acridotheres ginginianus, Bank Myna, biodiversity, softwares.

Determination of microbial load in the bioaerosols collected from different urban- settings in New Delhi, India

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ABSTRACT

The deteriorating air quality particularly in closed indoors is more harmful to the public health by prolonging the exposure of antibiotic-resistant bacterial strains. Among the diverse bacterial infections caused by Staphylococcus spp. the human and animal health are majorly affected owing to their increasing antimicrobial resistance. Recently, the prevalence of resistant coagulase negative staphylococci (CoNS) in the air and their potential infection has attracted attention worldwide. Therefore, the present study focuses on the microbial indoor and outdoor air quality and the prevalence of Methicillin resistant CoNS in the different urban settings in Delhi region.

Bioaerosol samples were collected, isolated and biochemically tested from different sites in Delhi (Vasant Vihar Urban Slum, Munirka Apartment, Munirka market complex and Sewage Treatment Plant, JNU) during the winter season.

The total bacterial load in indoor and outdoor air of the studied sites ranged from 653 to 1611 CFU/m3 and 188.5 to 3222 CFU/m3 respectively. While, the total staphylococcal load in indoor and outdoor air ranged from 1466.6 to 16266.6 CFU/m3 and 1200 to 17600 CFU/m3 respectively. Biochemical tests showed that all the isolates were CoNS. Further, Oxacillin susceptibility test showed that 22.68% of the suspected biochemically staphylococci isolates (71 out of 313) were oxacillin resistant, out of which 7(9.85%) isolates showed high level-oxacillin-resistance with MIC value between 8 to 128 µg/mL. The present study showed that indoor and outdoor air of studied area are contaminated with resistant CoNS which is of major concern.

Keywords: Bioaerosol, airborne-bacteria, Staphylococcus, Antibiotic-resistance, Coagulase Negative staphylococci.

Impact of Climate change and Landuse on Eastern Himalayas

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ABSTRACT

The Himalayan region has shown consistent warming trends during the past 100 years (Yao et al. 2006). However, little is known in detail about the climatic characteristics of the Eastern Himalayas. Both the climate and land use changes have considerable impact on the water balance of a basin and sub-watersheds influencing various parameters such as water yield, surface runoff, evapotranspiration (ET) (Kundu S, 2017). The present study is an effort to predict the water availability and perform water accounting in reference to ET under the rapidly changing land use in fragile mountainous ecosystems. The study area is the north-eastern state of Arunachal Pradesh in India. The MODIS satellite product is used for ET and is further partitioned into Interception, Transpiration, and Evaporation to understand its contribution extent in land use classes. The ET is also computed using a hydrological model setup from SWAT model. The model is simulated (2005 – 2030) for different years of landuse and with future climate data. The model for year 2010 and 2017 is calibrated and validated with observed discharge data obtained from central water commission. The model is also simulated for year 2030 to understand the near-future water balance for focusing on water policy in native forest region such as Arunachal Pradesh. The results shows that the model is predicting well and is close to 75% of significance. The results also highlights the water changing water regime due to changing climate change and landuse, while also addressing demand and supply in the region.

Keywords: Climate Change, Eastern Himalayas, SWAT, Water availability.

Comparison of Oxidative Potential of Size Segregated Particulate Matter in the Dust/ Non-dust periodat a Urban Site in the Southern Asia

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ABSTRACT

The ability of particulate matter (PM) to induce oxidative stress is assessed by several acellular oxidative potential (OP) assays. Size-segregated PM samples were collected at urban siteof Agra during dust and non-dust periods of the year 2021. The samples were analysed for OP by 2′,7′-dichlorodfluorescein (DCFH) assay and for elemental composition. Additionally, Satellite remote sensing observations of air quality were also utilized with the wide range parameters. Applications of these satellite observations like aerosol optical thickness (AOT) andaerosol optical depth (AOD) were also studied to depict the period of intense dust, with the goal of determining the PM sources that most influence the oxidative characteristics of atmospheric dust. The mean concentrations of PM10were 790.4 ±143.6 µgm-3 in the non-dust period and 252.5±12.6 µgm-3 in the dust period, while PM2.5concentrations were 129.9 ± 75.6 µgm-3191.1 ± 111.4 µgm-3 in the dust and non-dust periods, respectively, exceeded the air quality standards proposed by WHO, 2021 and NAAQS, 2019. The oxidation potential (OPDCFH) of PM in the non-dust period (PM10: 0.57±0.20 nmol H2O2 m−3; PM2.5: 0.87±0.61nmol H2O2 m−3) was higher than in the dust period (PM10: 0.51±0.14 nmol H2O2 m−3; PM2.5: 0.59±0.16 nmol H2O2 m−3), indicating OPDCFH values were variable with time. The source dependence of the PM oxidative potential is more pronounced for PM2.5 particles than to PM10 particles.

Keywords: Oxidative Potential (OP), Dust and Non-dust period, DCFH assay, Metals, AOD and AOT.

Behavioural Indicators of Optimum Habitat Conditions for Pavo cristatus

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ABSTRACT

Agra is situated in the semi-arid agro-climatic zone of India. The river Yamuna runs around and through Agra thereby sustaining a riparian habitat (the interface between river and land). The present study was carried out to assess the seasonal variations and social cognition of the Indian Blue Peafowl (Pavo cristatus). To conduct the study, three sites were selected. All three populations of peafowls were videographed regularly, videos were uploaded and run on the behavior coding software, OBSERVERXT. All action patterns were duly coded as the software tool precisely measured the duration of each state/event and generated the time activity budget of all behaviors. Data was then processed for statistical analyses. The calculated values of F-test (ANOVA) for seasonal variations at 5% level of significance were 0.47, 1.15 and 0.04 for three riparian sites: Dayalbagh, Sikandra and Shahjahan Gardens respectively. These values were lower than the tabulated value of 2.57 for F-test which indicated the three riparian sites can thus be considered as a candidate model habitat for proper conservation and management research of peafowls. Change of season mostly affected foraging and locomotion. Both activities decreased in winters as the BMR reached a low level when the temperature plummeted below the minimum range, because the peafowls would switch to energy saving mode under extreme conditions. Social cognition is crucial for communication and survival. Peafowls mostly foraged in groups due to potentially hidden predators in the dense riparian vegetation. Social learning was found to be critical for juveniles. They followed their parent's instructions and learned to negotiate the habitat, forage, predate and communicate. Different types of vocalizations were identified. A new call, the 'Pe-kow' call is being reported for the first time.

Keywords: Behaviour, cognition, habitat, peafowls, riparian, software.

Socio-Economic Analysis of Agroforestry in District Saharanpur

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ABSTRACT

The purpose of this study was to evaluate the socioeconomic conditions and marketing practices of agroforestry farmers in 10 different villages located in the Saharanpur district of the Uttar Pradesh state in India. This evaluation focused specifically on tree and crop sales. By using random sampling, the impact of agroforestry on socio-economic conditions was estimated (in 2021-2022). For the study, a random selection was used to choose the 10 villages. 10 farmers were chosen at random from each community to participate in the interviews. Among the observations made was the number of trees, grain yield, and straw yield. A structured questionnaire was used to interview 100 farmers from 10 different villages in the study area to assess the fulfilment of rural needs. In addition, trees and agricultural crops were analyzed to determine whether they were economically viable. For market linkages, 1 paper mill and wood traders were surveyed for the study.

Traditional agroforestry regions were driven by fuel wood, additional income, and shade, while commercial agroforestry regions were driven by the additional income. In Uttar Pradesh agroforestry is being practised by the farmers on a large scale. The most common agroforestry system which is accepted by the farmers of western Uttar Pradesh is poplar and eucalyptus-based agroforestry. Farmers grow trees with different crops like wheat, paddy, and maize on boundaries or as block plantations. The farmers' livelihood is also affected by traditional agroforestry, despite the fact that it is believed to be less promising than commercial agroforestry.

Keywords: agroforestry, farmers, market survey, socio-economic.

Isolation and characterization of Xenobiotic tolerant microbial consortium from selected lands of Mysore

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ABSTRACT

As the heavy metal rich sites pose a serious problem in the current situation it is important to know about the removal of the same without more risks. Huge number of conventional methods for heavy metal removal are known including chemical precipitation, coagulation, flocculation etc. These methods are not cost effective and also, they toxify the environment. Hence it is important to look into the microbial mediated remediation of heavy metals. An investigative attempt was carried out to estimate the microbial load in heavy metal contaminated selected agriculture lands around Mysore, and studied there morphological and metabolic characteristics against different heavy metal salts.Observation after plating of serially diluted heavy metal contaminated soil samples on B11 (Algae isolation medium), Potato Dextrose agar (Fungi isolation medium) and Luria Bertani Agar(Bacteria isolation medium) reveals the variations in abundance of different microbial communities. In our investigation samples were majorly loaded with bacteria followed by fungi, but no yeast and algae were recoded. Due to their abundance, the bacterial cultures were selected on selective pressure hypothesis. Eighteen morphologically different cultures were selected from LBA plates and marked as BC-1 to BC-18 (Bacterial Culture). Among them, 13 cultures were cocci in nature and rest of them were bacillus.All the eighteen cultures were positive to Gram's and catalase reaction, and also the response of bacterial isolates against other biochemical tests. The isolates BC-01 to BC-18 were subjected to estimate their metal acceptability against mercury, lead and cadmium, it was observed that each isolate behaved unique against specific metal salts.In addition, all the 18 isolates were tested to determine their resistance against different antibiotics Isolates BC-01, 04, 05,12,14,17 and 18 exhibited resistances against Ampicillin.Isolates BC-12, 16 have exhibited resistance against Kanamycin and BC-16 alone have attained resistance against Kanamycin and Gentamycin too.

Keywords: Soil, Biological methods, Heavy metals, Remediation, Environment.

Impact of GMOS and pesticides laden food on human health

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ABSTRACT

Pesticides are ubiquitous in nature as they can be found all around us and are generally used to kill or repel animals or plants. They are present at low levels in, any of our diets since they are employed in agriculture and food production. Many people use pesticides around their houses and might also on their skin which is a fact but less known to the people, to take an example of the pesticide in our houses can be none than an insect repellent. Looking more into the impacts on health caused by pesticides, according to the National Institutes of Health (NIH) it is still not clearly expressed or understood leading to more research on it. Side effects may include cancer, and harm to the neurological, reproductive, and endocrine systems. However, GMOs or Genetically Modified Organisms are leading a way in agriculture as on how they can be resistant to the pesticides or to manufacture insecticides themselves. Also, sustainable agricultural development is immensely required these days because of the rapid growth in the population rate and for the severe food shortages in the world now. Biological agriculture which is becoming chemical-free is achieving more favor but is yet to meet the demand for generating great amounts of food. Pesticides and other agrochemicals are widely used particularly in tropical areas and developing nations. In affluent nations, it is now illegal to use chemicals like DDT, HCT in agriculture; nonetheless, these are still used in underdeveloped nations. As a result, lingering traces of toxic pollutants contaminate food and spread throughout the ecosystem. Therefore, the study regarding GMOs and how it has an impact on agriculture and the effects of pesticides in the food industry is getting into the light.

Keywords: GMOs; Pesticides; Food; Human Health.

Evaluating the land use land cover dynamics of Loktak Lake, A Ramsar Wetland of International Importance in North East India

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ABSTRACT

In fragile transitional freshwater ecosystems, such as wetlands, the increasing anthropogenic and natural pressures including climate change, and industrialization have impacted the Land Use/Land Cover (LULC). Loktak Lake, situated in the Indo-Biodiversity Hotspot is one such case as evident in its inclusion under Montreux Record in 1993. The present study aims to identify the lulc changes occurring in Loktak Lake, a Ramsar Wetland of International Importance during the period 2009-2020 through LANDSAT imageries. It specifically looked at timeline years (2009, 2011, 2017, 2020) corresponding to past management interventions carried out in the lake. To quantify the lulc and detect the change, Maximum Likelihood Classifier and Change Detection was carried out in Arc GIS 10.8.1. A total of 6 classes were classified viz open water body, athaphum, phumdi, settlement, agriculture and barren area. It has been observed that there is an overall decline in phumdi, athaphum, agriculture and open water body at the rate of 5.92 %, 14.31 % 110% and 0.92%. Meanwhile, built up and barren showed an overall increase at the rate of 18.31 %.and 31.25 %. These lulc changes observed have been primarily on account of anthropogenic factors such as increase in aqua cultural practices. These in turn, are threats to an already fragile ecosystem. The study brought out indirectly, the effectiveness of past management actions carried out by relevant organization as remotely sensed information requires ground validation. The absence of baseline data information on land classes such as phumdi emphasizes on integrating present, past and future landscape modelling for management purposes.

Keywords: Land Use/Land Cover, Loktak Lake, Montreux Record, Floating Island, Ramsar.

Diversity of Snake Species in and around Sahyadri College Campus, Shivamogga (D), Karnataka (S)

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ABSTRACT

Sahyadri College campus is located on the Shivamogga city's outskirts with an area of 85 acres. It is the oldest and one of the largest institutions in Shivamogga. The campus has thick greenery and a wide variety of flora and fauna. A preliminary survey on snake diversity was carried out between September 2021 to February 2022 and It was revealed that the 13 species of snakes from 5 families were recorded. Out of all identified species, 3 were venomous and 10 were belongs to non-venomous. Among the species, the Colubridae family is more dominant than other families. Spectacled cobra (Naja naja) and Indian rat snake (Ptyas mucosa) were the two predominantly reported venomous and non-venomous snakes, respectively. When compare to all 6 months, we got a highest number of individuals in the month of September and a lower number of individuals in January. The rich diversity in the campus is the main reason for the variety of species. According to IUCN population trend, Brahminy Worm Snake (Ramphotyphlops braminus) population trend is increasing. The major threats observed in the study area for snake fatality are accidental deaths, fear of snake bite and by the workers while weeding and trimming roadside grass as well as weed plants.

Keywords: Colubr0069dae family, IUCN, Sahyadri College, Shivamogga, Snake Diversity.

Genetic Engineering and Mutant's Analysis in Bioremediation

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ABSTRACT

India being a developing country, pays high attention to economic growth and people's welfare and due to this, environmental problems started rising to the peak of concern. Environmental biotechnology encapsulates a wide range of topics which contains bioremediation, phytoextraction, phytoremediation, management of waste and biofuel production, etc. It plays an essential role in eliminating pollutants and detoxifying the contaminated toxins, industrial effluents, and environmental elements from the environment and acting as a valuable benefit in the empire of environmental protection. Bioremediation can be made successful by ensuring the fare of implementing, constructing infrastructure, and location of working as it does not disturb the natural and normal ongoing microbial activities. Bioremediation is profitable as it works on solar energy and faster than natural exhaustion, can become a solution to India's increasing problems due to waste and contamination. This paper analyses and investigates the implementation of genetic engineering in bioremediation and its usage as a future prospect to remove contaminants from the environment which can further lead to a chain of toxicity through food, air, water, etc. It also presents a straightforward methodology for the stabilization of the ecosystem and how to prevent these upcoming contamination-related issues.

Keywords: Environmental Biotechnology; Bioremediation; Waste Management; Industrial Waste; Biofuel; Solar Energy; Genetic Engineering.

Sustainable Development Goals: A new lens for Environmental Challenges

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ABSTRACT

In the developing times of rapid innovations, data generation, technological revolutions and upgradations, the economy has become the front runner of any activity. At the same time, the loss of biodiversity, increase in GHG emissions, increasing episodes of climatic despairs, pandemic, consolidation of environment related disaster's, alteration in agriculture patterns and drastic discrepancy in seasonal parameters has caused a havoc in achieving Sustainable development in all the sectors of society. Although the development has taken great pace for the betterment of mankind, it has caused huge damage to environment not by degrading it but by making deterioration and changes in it. While mankind would never cease in its chase to achieve economic gains and development it becomes of utmost importance to find a balance between all the three sectors of society that is inclusive of economic benefits with the preservation of environmental parameters to provide the society to live in better place. Hence, the emerging environmental issues encourages a sustainable investment for overall development of society highlighting the importance of different frameworks like Paris Agreement, COP26, Inter-governmental Panel on Climate Change (IPCC) etc. The article reflects and highlights the importance of an integrated approach of Sustainable Development Goals (SDGs') and other frameworks towards emerging environmental challenges and sustainable tomorrow.

Keywords: Climate Crisis, Environmental and sustainability frameworks, Environmental Challenges, Sustainable Development Goals.

Impact of Land-Use Changes on urban warming in Chandigarh City: Causes and resilience measures

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ABSTRACT

Nowadays, more than 50% of people live in urban areas with some 3.5 billion people having settled in cities throughout the world (UNFPA 2009). Nowadays, more than 50% of people live in urban areas with some 3.5 billion people having settled in cities throughout the world (UNFPA 2009). Urban warming has come up as an indicator of climate change. Studying the causes of climate change and coming up with resilience strategies are now crucial to the survival of species since the development of urban heat islands is an example of how it is caused directly by human activity. Increased built-up regions and population density leads to increase in energy demand along with pressure on natural resource. Urban heat can be attributed to mainly two streams, firstly tonnes of megawatts of electricity is brought into cities via transmission lines and consumed and contributes towards heat island (HI) impacts. And secondly, Direct sun light over grey infrastructure causes HI effect. In order to lessen the impact of heat waves, this study has identified the factors that lead to cities becoming heat islands, resilience measures, and has assessed their efficacy in urban context. Thus, in this paper an effort was made to correlate the UHI status over urban grey infrastructure as well as green area for a period of 20 years. To complete the work LST maps were made using the thermal band of Landsat 5 and 8 for the year 2001 and 2021 respectively. The work was completed in ArcGIS Desktop as well as ENVI software. The data created were further exported to excel sheet and used for further analysis. The final result was interpreted using maps, charts and graphs. According to the findings of the study the temperature gradient, the amount of grey infrastructure that is immediately exposed to the sun has a substantial impact on the city's heat index. As a resilience mechanism to lessen the heat island impact, "Shadow-based city planning" is therefore urgently needed. Paper also tries to delineate the key strategies of resilience against urban heat challenges, with reference to Chandigarh city.

Keywords: Climate change, Urban warming, Thermal images, Heat Island, GIS.

Species diversity of benthic invertebrates in Chandloi River (District Kota) Rajasthan

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ABSTRACT

Chandloi River is a small, semi-perennial left bank tributary of Chambal River. Its location is 25.23 Latitudinal and 75.99 Longitudinal near Kota City, Rajasthan, India. Benthic invertebrate communities colonize almost all fresh water territories. Present study was conducted between October 2018 to September 2020. The benthic invertebrate's diversity was studied in a segment of Chandloi River from its origin up to Kaithoon village, district Kota, Rajasthan. Samples were collected using D-net and bottom kick net. A total of 22 species of benthic invertebrates were recorded - 9 species of Mollusca, 6 species of Annelida, 5 species of Nematoda and 2 species of Arthropoda. Among these benthic invertebrates Mollusca was found as the dominant group throughout the study period. Nematodes were available round the year. Seasonal variation in species diversity of benthic invertebrates was also studied. The highest diversity was recorded in winter while lowest was observed in rainy season. Group Mollusca (41%) was dominated over Annelida (27%), Nematoda (23%), and Arthropoda (9%).

Keywords: Annelida, Arthropoda, Benthic invertebrates, Chadloi River, Mollusca, , Nematoda, , Semi-perennial.

First report of Garlic Virus C infecting shalot in India

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ABSTRACT

Shallot (*Allium cepa* var. aggregatum) which is also known as small onion/multiplier onion is a culinary herb. It is mainly grown in China, Southeast Asia, and Europe. In India it is cultivated in Tamil Nadu and other southern states. Numbers of viral diseases are known to infect shallot which results in heavy losses as they are often propagated vegetatively. Deterioration in quality and losses in crop yields due to viral infection are common problems encountered by growers. Viruses belong to the genera Allexivirus (Garlic Virus A, B, C, D, E, X and Shallot virus X) are the most important pathogens affecting the yield. The aim of the present study was to test the presence of Allexivirus infection in Shallot cultivar from Kerala through RT-PCR. Samples that showed characteristic symptoms were collected. Based on symptoms and Reverse transcription polymerase chain reaction (RT-PCR) result, the Allexivirus was found to be the casual agent. In-silico analysis revealed that it shared 79.48 % identity with a garlic isolate from Australia (JN019814) and 77.58% with an isolate from Japan (D49442). The sequence comparison confirmed the identity based on similarity percent with homologous isolates available in the GenBank indicating the infection of Garlic Virus C in Shallot.To the best of our knowledge this is the first report of Garlic Virus C infecting Shallots in India.

Keywords: Allium cepa var. aggregatum, Garlic virus C (GarV-C), In-silico analysis.

Biosorbent from agricultural residue: A cost effective technique for heavy metal removal in wastewater

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ABSTRACT

Environmental pollution is one of the biggest problems in the world, especially because of the heavy metal ions in the wastewater due to recent industrial growth. It is very challenging to remove heavy metals from the atmosphere since they are highly toxic and non biodegradable in nature. The removal of heavy metal ions has so far been accomplished using a variety of conventional techniques, including ion exchange, chemical precipitation, coagulation, membrane separation, reverse osmosis, and adsorption methods. To remove various heavy metal ions from wastewater, particularly those that have been harmful to living organisms, a wide range of adsorbents have been developed. Adsorption technologies are less expensive than conventional techniques while still having a high removal efficiency of heavy metal ions, even at trace levels. Therefore, it has been essential to create easily available, low-cost adsorbents for the adsorption of heavy metal ions from wastewater. It's possible to collect the adsorbents from agricultural waste. By their intrinsic nature, all adsorbents possess functional groups that are essential for metal ion adsorption. Adsorbents that have been chemically altered often have increased surface areas and have a higher adsorption capacity. The removal of different metals from potable water and wastewater has been assessed in this paper using a variety of agriculture waste materials and their modified forms. The main emphasis has been on gathering in-depth knowledge regarding the utilisation of inexpensive adsorbents for the removal of heavy metal ions.

Keywords: Adsorption, low-cost adsorbents, agricultural waste, removal of heavy metal.

A way forward in blue revolution using eco-friendly feeds

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ABSTRACT

Fish is the main source of protein for billions of people worldwide. Recently, there is an increased demand for fish and fish products in the market due to the increased awareness on the health benefits of consuming fish. The future fisheries production would be contributed mainly by the aquaculture sector, which is the farming of aquatic organisms including fish in a controlled environment. Water is a basic human need and more than 50% of the population has no access to safe drinking water.At this juncture, the conservation of water is of prime importance. On the other hand, fish need water for all their physiological activities. The water quality decides the success or failure of the aquaculture operation. With the current culture techniques and usage of chemicals and fertilizers, the waste may pollute the environment with higher nutrientconcentrations. India has initiated the "Blue revolution" withthe main objective to increase the overall fish production responsibly and sustainably. It is recommended to adopt new technologies like Recirculating Aquaculture Systems (RAS). RASis one of the environment friendly aquaculture systems where the used water is re-circulated back. It is a fully controlled system growing fish at higher stocking density with increased biosecurity there by reducing the dependency on location and climatic conditions. They have the potential to reduce the impact of aquaculture on the environment with reduced wastewater emissions. Feed is a common factor that impacts both fish production and effluent load originating from aquaculture operations. Hence, feed management in RAS would be considered an important tool to improve feed utilization and reduce nutrient loading. At the same time, the application of low-polluting or environmentally friendly feed ingredients that are highly palatable and digestible with all required nutrients and stable enough to withstand the circulating water is essential in RAS.

Keywords: Blue revolution, Sustainable aquaculture, Recirculating Aquaculture Systems, wastewater management, Feed management.

Relevance and Future of Traditional Medicine

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ABSTRACT

Medicare system of traditional communities is getting worldwide attention today due to the emergence of novel diseases viz. NIPA, COVID-19, Monkey pox and so on. The traditional communities of the world such as the tribal and folk communities, from time immemorial have been utilizing plants, animal products, minerals, metals etc. for treating a variety of ailments, the knowledge which were transmitted from generation to generation mainly by word of mouth, which gradually paved the way for the development of codified systems of medicines viz. Ayurveda, Siddha, Homeopathy Unani, Amchi and Modern medicine / Allopathy. Presently a trend is seen to sideline traditional systems of medicine by the modern systems of medicines including the said codified traditional systems of medicines. The reason from my point of view is that the real traditional medicine is ethical, cheap, non profit motive and curative with less or no side effects if treated by expert healers/ vaidyas. The modern physicians find fault with traditional medicine to cover up the sanctity with the fact that they are unscientific deliberately forgetting that the science of traditional medicine is entirely different from their scientific approach. Moreover all the present systems were evolved from the leads obtained through traditional medicine. What I mean is that we have to encourage all systems of medicine and the patients should have the freedom to select the mode of system of their interest. In some cases, multiple systems will be useful to cure certain dreaded diseases. Always remember that "Today's modern is tomorrow's traditional". With this background, the present communication focus on the relevance of traditional medicine and the need to conserve them for future as briefed above.

Keywords: Abstract, Template, Traditional Medicine, Novel diseases, Relevance, Conservation, Future.

Necessity of Awareness about the Impact of Electromagnetic (EM) Radiations in the Brain

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ABSTRACT

Electromagnetic (EM) radiations are a form of energy, exhibiting wave like behavior, travel through the space and present in whole environment. The concerns about the possible adverse health effects resulting from exposure to electromagnetic frequency radiations (EFR), such as those from mobile and telecommunication devices is growing unabated. Mobile communication is where signal is transferred via electromagnetic wave through radio frequency and microwave signals. This signal produces electromagnetic radiation in the form of thermal radiation that consists of harmful ionizing radiation and harmless non-ionizing radiation. While using mobile phone, the electromagnetic waves are transferred to the body which may cause health problems especially at the place near ear skull region where they are known to affect the nervous system. The researchers have reported that mobile radiations affect human brain and GSM (Global System for Mobile communication) operated mobile phones have a higher effect on brain activity as compared to CDMA (Code Division Multiple Access) operated mobile phones. Neurodegenerative diseases have been observed masking several natural neuroprotective effects. Notably, it is being stated that the 900 MHz EMF cause a damage in the neurons, structural and functional unit of our brain. There are ample reports of mobile phone exposure which increases oxidative stress and conversely decreased the level of antioxidants (GSH) in the brain physiology. The EMF data have shown a comparatively deeper penetration into the brain of children and young people, and thus children absorb more energy than adults from the same phone. Therefore, it is necessary to be aware about the harmful impact of the mobile phone and electromagnetic radiations as we are incorporating them in our day-to-day lifestyle.

Spatial Assessment and Associated Sources Apportionment of PM2.5 at an Urban Residential Site in Lucknow

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ABSTRACT

Most urban residential sites are encircled with roads and other activities which consequence to adverse the breathing air and health risk to residents. Lucknow, Uttar Pradesh state capital is declared as one of the non-attainment cities with respect to continually breach of ambient PM2.5 than national standard. Therefore, present study evaluated the contribution of associated air emission sources to PM2.5 for a residential site which is surrounded by a loop of road corridors in Lucknow. Samples collected for 8-days during mid-winter 2020-21 with 12 hour sampling interval for PM2.5 at four near-road-locations (L#) of a residential site in Lucknow (i.e. L1:DIET-college, L2:DCP-office, L3:Colvin-College, and L4:State-Police-Force-Training-Centre). Further, samples were processed for PM2.5 chemical speciation by ICP-MS and IC for 25-elements and 4-ions respectively. Spatially, PM2.5 levels are found high during day-times (8AM-8PM) than night-times (8PM-8AM) as multiple local sources and urban activities are functioning during day than night. PM2.5 was recorded highest at L3 and lowest at L4 with 184µg/m3 and 52µg/m3 respectively as a consequence of diversity in local sources emission. ArcGIS-IDW (Inverse Distance Weighted) simulations identified PM2.5 propagation range up to 200m–500m over the study area. Input of PM2.5 chemical species to a receptor modeling technique of PMF (positive matrix factorization) resulted with five-factors which have correlation with sources like vehicular exhaust, road and construction dust, cooking combustion, DG sets and waste burning. Further, PMF model outputs ascertained the highest apportionment by different sources as vehicular exhaust-31%, cooking combustion-26%, DG sets exhaust-22%, road and construction dust-19% and waste burning-17%. Besides, maximum of 21% contribution was evidenced from unrecognized sources which mainly include trans-boundary secondary aerosols like SO42-. The present study outcomes qualify the significance of site-specific associated sources and in need of regulators attention for abatement of such prominently affecting air pollution sources on urban residential sites.

Keywords: Air Pollution Assessment, PM2.5 Particles, Source Apportionment, PMF, Urban Residential Site.

Assessment of zooplankton diversity of new constructed reservoir Bisnoor Pachdhar reservoir in Betul district, MP

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ABSTRACT

The status of healthiness of any freshwater ecosystem is basically dependent relative on the diversity and density of zooplankton inhabiting the freshwater resources. Zooplanktons are considered to be the largely fundamental primary consumer in any aquatic environment. Which influence to a greatest scope in decisive the total productivity of an firewater body. The present study is an endeavour to assess the diversity and density of zooplankton and to observe the richness, evenness, of the Bisnoor pachdhar reservoir. The study was carried out during August 2021 to January 2022. The whole assessment was divided into four major seasons viz monsoon, post monsoon, winter and summer. The compilation of the zooplankton samples and their qualitative and quantitative was through followed the standard procedures limnological analysis. During the study period sequence of dominant groups Rotifera > Copepoda > Protozoa > Cladocera > Ostracoda was observed at dam site and mid site of all season. On another hand at tail end site major dominant group was Copepoda > Protozoa > Cladocera > Rotifera > Ostracoda noted during monsoon, post monsoon and winter and during summer the order of dominant group Copepoda > Rotifera > Protozoa > Ostracoda > Cladocera was recorded in Bisnoor Pachdhar reservoir.

The current investigation provide quantitative and qualitative data regarding the zooplankton diversity of reservoir and the data can be significant to help out in the fisheries management and inform environmental protection related to diversity.

Keywords: Bisnoor Pachdhar, zooplankton percentage contribution, seasonal, new constructed reservoir.

Quantification Analysis of Herbicide Clomazone by HPLC-UV Method Development in the tissues of *Channa punctatus* (bloch)

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ABSTRACT

Several herbicides and pesticides are being used by farmers to increase crop yield. These pesticides contaminate the groundwater and nearby water bodies affecting the non-target organisms. One such herbicide is clomazone. Clomazone is widely employed in the fields of cotton, soyabean, tobacco, and rice, to control broadleaf weeds. The present study shows the accumulation of the herbicide clomazone in the tissues of the non-target organism, i.e., fish, *Channa punctatus*. After determining the LC50 of clomazone, different doses were calculated for the treatment of the fish. The fish were treated with three different concentrations, i.e., high, mild, and low doses of the herbicide. The fish were regularly exposed to all three concentrations for seven days, 14 days, 21 days, and 28 days. The tissues, i.e., gills, liver, and kidney, were extracted from the fish by sacrificing the fish at the end of the seven days, 14 days, 21 days, and 28 days respectively. The tissues extracted from the treated *Channa punctatus* were analyzed using HPLC. HPLC method development was done to quantify the presence of herbicide in the tissues. The limit of detection and quantification were 0.004 and 0.015 ppm, respectively.

Impact of climatic changes on fish biodiversity and their conservation (India)

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ABSTRACT

India, having numerous rivers, is enriched with varieties of flora and fauna in and around it. The total catchment area of the river basin is about 2.5lakh km2 or 81%of the total geographical area of India. All over India, there are remarkably diverse ranges of aquatic life. 950 freshwater and 1570 marine fish species, a total of 2500, are found which occupies 1.5% of the world's total fish species. Fish is full of nutrition and a prime source of aquatic food. But in this fast-developing urbanization era: anthropogenic activities, industrialization, population, elevated air temperature, global warming, drought, flood, pollution, and monsoonal ups and downs equally put pressure on the climate, ecosystem, society, and economy, increasing pressure on all livelihoods and food supplies, including those in the fisheries and aquaculture sector. The actual properties of climates are being changed very rapidly. Fish availability in the monsoonal season is more than in the summer season. Therefore, the present study aims to determine the present status of fish biodiversity of river Gandak and the significant role of climate change on them. The study was conducted from January 2022 to August 2022 in Gandak river. Overall, 25 individuals of fishes were recorded and characterized which belonging to 12 families, Cyprinidae (32%) was most abundant, followed by Channidae (12%), then Bagridae, Siluridae, Cobitidae, Ambassidae with 8%; Notopteradae, Heteropneustidae, Claridae, Belontidae, Belonidae, Nandidae occupied only 4%. families. Aspidoporia morar and Puntius species, *Labeo calbasu* and Labeo bata were in good quality while *Labeo rohita* and *Catla catla* were not found in good amounts. A good number of ornamental fishes were also recorded. But after these surveys, it was seen that there was a significant decline in their population that also affect other depending organisms along with local fishermen directly or indirectly. So, the need of the hour is conservation which involves restoration of habitat, cleaning of rivers, sewage treated water, mass awareness program to people for water conservation, sustainable use of river water and its resources and these will help the fishermen in livelihood and earning along with the nutritional need of the society.

Keywords: climatic change, fish biodiversity, Gandak river, restoration, conservation.

Hydrogeochemistry of the groundwater in Rohtak district, Haryana, India: a detailed study

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ABSTRACT

Groundwater quality is prime concern and integral issue for inhabitation of mankind in Rohtak district, Haryana. A total (N = 620) groundwater samples were collected from 82 villages. Groundwater samples were taken from two years or a total of four monsoon seasons, which were analyzed for 14 (physicochemical) and 10 (metals) under strict procedure of QAs and QCs from APHA. Fluoride, depicts 49.7%, 58.6%, 55.4%, and 57.3% with POM-2017, PRM-2018, POM-2018, and PRM-2019 respectively, exceed permissible limit (1.5 mg/L) of BIS 2012. Three villages Vasant Kunj, Sampla and Katesra have been identified to have fluoride concentration greater than 10 mg/L.Katesra, Asan, Lahli, Gugaheri, Kharawar and Jassia villages are comparatively more prone to heavy metal contamination in the groundwater of study area. Fluoride as well as some other constituents; TH, Mg2+, B, Fe and Pb were found to be at comparatively high risk for drinking purpose. So the study results shows more than 50% of the samples were found mediocre for drinking purposes, therefore, need must be given to serious attention to health purpose. The major trend are reveal such as; Na+> Ca2+ K+> Mg2+cations and HCO3->SO42->Cl->NO3->F- anions. Piper's diagram is determined type of groundwater characteristic such as Ca2+- Mg2+- Cl- - SO42- type water. ArcGIS 10.5 software was used for spatial distribution map. Moreover, the study also evaluates relation between concentrations of parameters with depth in groundwater. Multivariate statistics (PCA) were used to indicate the source of contaminants and relation between sources of groundwater with parameters.

Keywords: Groundwater, Fluoride, Groundwater Sources, water quality, Principal Component Analysis (PCA).

Does spatial co-occurrence of *Hyptis suaveolens* (L.) Poit. with other non-native plant species lead to invasion meltdown?

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ABSTRACT

Globalization, increased international trade, and intensive urban development lead to global spread of invasive alien species (IAS). IAS, anthropogenically introduced out of their natural ranges, cause alteration of natural ecosystem structure, extinction of native species, biodiversity loss, and threats to ecosystem services. Hyptis suaveolens (L.) Poit. (Lamiaceae) is among such notably emerging plant invasive species in India. However, comprehensive studies of its spread and negative impacts on natural ecosystems are scarce. In the present study, we conducted field studies in H. suaveolens abundant areas of Vindhyan plateau, Uttar Pradesh, India. Reconnaissance surveys of the study area showed that H. suaveolens exhibits high abundance in sunlit areas. During the field study, plant species richness and diversity were assessed in sun (high light) and shade (low light) environments. Plant biomass of H. suaveolens individuals was also estimated. Results revealed that the species richness and diversity of other resident species decreased drastically with the increase in H. suaveolens's abundance in sunlit areas. This negative impact of H. suaveolens is a function of its vigorous biomass generation that leads to the masking of other neighboring species' growth and expanse in high light environments. Furthermore, studied plant species were categorized into native and non-native species. Interestingly, the diversity of non-native species was comparatively high as compared to native species in areas with a high abundance of H. suaveolens. Observed spatial co-occurrence of this dominant invader with other non-native plant species adverts to invasion meltdown (IM) which states that IAS directly or indirectly promote the growth and spread of other non-native and/or invasive species in invaded areas. The current study calls for further investigations to decipher the mechanism behind H. suaveolens astounding ability to suppress the growth of native plant species and consequently its negative impacts on native biodiversity in natural ecosystems.

Keywords: Invasive alien species, Hyptis suaveolens, Native biodiversity loss, Invasion meltdown.

Vector Borne Disease Proliferation in India: A Sequel to Climate Change

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ABSTRACT

Inter-annual and inter-decadal climate irregularity have an immense impact on socioeconomic conditions across the globe, as it directly influence the epidemiology of vector borne diseases. According to WHO, one-sixth of the illness disability are the effect of vector-borne disease, which puts more than 50% of the world population risks. In only India, every year more than 70,000 people die from VBD including malaria, chikungunya, Japanese encephalitis, dengue. Climate changes influence arthropod vectors, their life-cycle, resulting changes in both vector and pathogens' distribution. The present study tries to assess how the climate affects the transmission dynamics and geographic spread of VBD and potential use of intervention tools to control vector borne diseases in epidemic areas in reducing the risks of climate change impact.

Keywords: Vector Borne Diseases, Climate Change, Intervention, epidemics.

A review on Industrial effluents as major source of water pollution in Jaipur, Rajasthan

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ABSTRACT

These reviews investigate the level of water pollution caused by industrial effluents in Rajasthan with a view to provide useful information to the authorities on the management, control and investigation of pollution cases especially at Bagru industrial area. Literature on the subject matter was accused through all prior writers whose work studied agreed that anthropogenic activities are several point source of water pollution. Industrial wastes are discharged into receiving water bodies without treatment and the consequences of this include among others river pollution, loss of aquatic life, deceases burden. It is recommended that Federal, State and local authorities should ensure that industrial waste, particularly effluent, are pre-treated before discharging then into the environment.

Keywords: Bagru, Industrial area, Rajasthan, Literature, River pollution, review.

Studies on spatio-temporal hydrological parameters of dandiganahalli lake, Karnataka

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ABSTRACT

Dandiganahalli Lake is roughly a circular depression formed by Deccan basalts that erupted on the Indian peninsular cratonic rocks and is located at the coordinates 13° 30' 34" N and 77° 39' 29" E in the Chikkaballapur District of South-East Karnataka. It is a perennial lake feeding the neighbouring agricultural farms and a site of sport fish. The present investigation is a pioneer study intended to assess hydrological parameters to evaluate the feasibility of the lake for potential fisheries. The study was carried out during 2021-22 for 36 different hydrological parameters (using standard methods prescribed by APHA, 23rd edition) during covering pre-monsoon, monsoon and post-monsoon seasons. The physico-chemical characteristics of the lake showed slightly alkaline pH ranging from 7.75 to 8.13 during monsoon, high electrical conductivity recorded was 319.5 S/m during summer months, TDS ranged from 133.56 to 306.17, total hardness was recorded between 56.01 – 88.56 mg/L, DO values were between 5.02 to 7.28 mg/L and incidence of heavy metals was in fractional amounts. Average free carbon dioxide recorded was 4.62. The carbonate level ranged from 735 ppm to 1022 ppm during the study period. Dandiganahalli lake appears to have an isolated water body amidst the mountains showing qualifying value of (CPI=0.54) Comprehensive Pollution Index.

Keywords: Spatio-temporal studies, Physico-chemical parameters, Dandiganahalli Lake, Chikkaballapur.

Corn and rice starch based bioplastics:an alternative to packaging material

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ABSTRACT

Plastics have now become an important part of our daily life and are widely used for various purposes. However, there are numerous harmful impacts of synthetic plastics as its manufacturing, usage and disposal causes huge amount of soil, water and air pollution. Therefore, development of biodegradable plastics is extremely crucial for our environment.

The main purpose of this study is to determine whether corn and rice starch-based bioplastics are a suitable alternative to packaging material.

For the preparation of bioplastic film, corn and rice starch was extracted manually and plasticizers like glycerol and other substances like gelatin, citric acid was added to the mixture and poured into a Teflon-coated glass plate and allowed to dry for few days. Films with different concentration of rice and corn starch was prepared in a similar way. Then properties such as tensile strength, thickness, water solubility, biodegradability and others were analyzed. The results revealed that the biodegradability rate and tensile strength of these bioplastics are indeed much better than the synthetic plastics and the overall results obtained for various properties analyzed proves that the corn and rice starch-based bioplastics can be used as packaging material.

Hence using bioplastics instead of synthetic plastics as packaging material will be an eco- friendly and cost-effective initiative and will be an important step towards sustainable development.

Keywords :Bioplastics, Corn-starch, Glycerol, Plasticizers, Sustainable.

HPLC method development to detect clomazone in *Channa punctatus* (Bloch)

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ABSTRACT

Clomazone is widely employed in cotton, soyabean, tobacco, and rice fields to control broadleaf weeds. The present study shows the accumulation of the herbicide clomazone in the tissues of the non-target organism, i.e., fish, *Channa punctatus*. After determining the LC50 of clomazone, different doses were calculated for treating the fish with the herbicide. The fish were treated with three different concentrations, i.e., high (0.5 ppm), mild (0.25 ppm), and low doses (0.08 ppm) of the herbicide. The fish were regularly exposed to all three concentrations for 7, 14, 21, and 28 days. The fish were sacrificed at the end of the 7, 14, 21, and 28 days respectively. The herbicide clomazone was detected and quantified in the gills, kidneys, and liver extracted from the fish by HPLC using the mobile phase (methanol: water) with a flow rate of 1 ml/min measured at 220 nm. This study found RSD to be less than 1%, reflecting the method's precision. The standard curve was linear in the range of 0.1 -0.006 ppm. The limit of detection and quantification were 0.004 and 0.015 ppm, respectively. The study showed that accumulation of clomazone occurs in gills after every fixed interval and at every dose. In contrast, kidney and liver showed accumulation only when exposed for longer, irrespective of their dose.

Keywords: Clomazone, Gills, HPLC, Kidney, Liver.

Assessment of Microplastics and Associated Ecological Risk in Hirakud Reservoir, Odisha

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ABSTRACT

Microplastic has emerged as a major global threat owing to its persistent and bio-accumulative nature. Microplastics' small size expedites their ingestion at each trophic level leading to biomagnification and bioaccumulation, which coupled with its chronic ubiquity in the environment, has raised public concerns. Yet, studies on microplastic in reservoirs and the ecological risks associated with it are obscure. The present study aimed to isolate, quantify and characterize the abundance, shape, size, colour and chemical composition of the microplastics from the Hirakud reservoir water and sediments through Scanning Electron Microscope and ATR-FTIR. Further the ecological risk associated with the microplastics was assessed using the species sensitivity distribution (SSD) method to derive Predicted No-Effect Concentration (PNEC) value and risk quotient (RQ). The abundance of microplastics in the surface water and sediments of Hirakud Reservoir was estimated at 82-89 particles/m3 and 159-163 particles/kg, respectively. Fiber dominated as shape in both surface water (46.21%) and sediment samples (44.86%). Small sized microplastics (50 µm–300 µm) prevailed in both surface water and sediment samples. Transparent and white microplastics were copious. Chemical characterization indicated dominance of polypropylene (38%), followed by high density polyethylene, low density polyethylene and polystyrene. Calculated PNEC value was 3954 particles/m3, and the RQ was estimated to be 0.023 indicating negligible ecological risk to freshwater species in all the sampling sites. Data obtained in this study could provide a baseline for monitoring and assessing the microplastics in future, and facilitating future policies to overcome microplastic pollution in the Hirakud reservoir region.

Keywords: Freshwater pollution, Hirakud Reservoir, Microplastics, Risk assessment.

Attitudes of Farmers towards Organic Farming in Kumaon Hills of Uttarakhand

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ABSTRACT

Organic farming appears to be the best substitute for conventional farming that is entirely dependent on chemicals. It is an exclusive production management system, which promotes agro-ecosystem health including biodiversity. Organic farming primarily aims at cultivating the land and raising crops in a way to retain the soil alive and in good health by use of organic ingredients and beneficial microbes. It is performed with an intension for maintaining diversity of crops, keeping soil healthy for future years, producing high quality products and reprocessing nutrients. Compared to conventional methods, organic methods consume less fossil energy and cause less soil erosion, but have mixed effects on soil nutrient status and grain protein content. Organic farming is increasingly popular among the farmers of kumaon hills of Uttarakhand. Uttarakhand was the first and only province in the country to implement a comprehensive organic farming policy in the year 2000. Uttarakhand Government passed the Organic Agriculture Act (2019). However, the organic growers have been facing issues in production, organic certification, and product marketing. This study aimed to explore the status of organic farming, attitudes of farmers towards organic farming, suggestions for improvement, and strengthening the value chain of organic products. Face-to-face interviews were conducted in Kalsi block of Dehradun district during June 2022 with 120 organic growers directly or indirectly involved in organic farming. The results showed that organic growers face challenges in marketing and institutional recognition. Most of the respondents (43.33%) had neutral attitude towards organic farming. Challenges in product certification and marketing were reported by 45.95% of the total interviewed organic growers while following organic practices. Our study suggested that reducing the cost of production through easy access to organic inputs like organic seeds, fertilizers, and biopesticides are extremely desired by the growers. The findings of the study will be useful to extension workers, research workers and administrators as it provides them with the adequate knowledge about the existing gap in organic farming technologies used by the farmers and will enable them to improve their approach of working with the farmers. Sustainable agriculture employs ecological principles and use of environmentally friendly and renewable strategies in agriculture to protect biodiversity.

Keywords: farmer's attitude; marketing; organic certification; organic products.

Relationship between Indoor and Outdoor PM2.5 at a Residential Site of Agra

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ABSTRACT

There is increasing awareness that the quality of the indoor environment affects our health and well-being. Indoor air quality (IAQ) in particular has an impact on multiple health outcomes and as majority of people stay indoors for about 90% of their time, measures to improve the quality of air has become a necessity. In this regard, the present study investigated the impact of outdoor and indoor sources of particulate matter (PM) collected in a residential home located in an urban areain Agra (Uttar Pradesh). PM2.5 samples were collected inside the living room (indoors) and at the rooftop (outdoors) using Envirotech APM 821.

The results indicate that the daily mean PM2.5 concentrations measured in the ambient air (outdoors) was under the WHO guidelines (PM2.5 ≤ 15 µg m-3) except for the indoor PM2.5 concentration. The mean PM2.5 concentrations were found higher indoors as compared to outdoors. FESEM analysis indicated presence of Na, K and Cl indoors in great amount while in outdoors they were absent. The mean I/O ratios for both indoors, outdoors and during cooking came out to be more than 1.0 indicating cooking as one of the significant indoor emission sources. Higher indoor levels of PM compared to outdoor levels, were consistently reported reflects multiple sources of indoor, out of which cooking activities has shown a major contribution. Despite of getting higher PM2.5 mass concentrations indoors there is not a significant difference between the mass concentrations of two (indoor and outdoor) thus people spending a major proportion of their time in a closed environment have same air quality as that on their home's rooftop.

Keywords: IAQ, Indoor PM2.5, I/O ratios, Outdoor PM2.5.

Noise pollution scenario in Mumbai Metropolitan Region-Impact of unplanned development on ambient noise environment

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ABSTRACT

Local and state governments should take noise pollution into account when making plans for metropolitan areas. The negative effects of excessive noise on people's physical and mental health are becoming increasingly urgent. This study aimed to examine the ambient noise levels in the nine cities that make up the Mumbai Metropolitan Region (MMR): Bhiwandi-Nizampur, Kalyan-Dombivli, Mira-Bhayandar, Mumbai, Navi Mumbai, Panvel, Thane, Ulhasnagar, and Vasai-Virar. The noise levels in four distinct areas (industrial, commercial, residential, and silence zones) were measured and analysed in terms of equivalent continuous sound pressure levels (Leq), day-night noise levels (LDN), and noise limit exceedance factor (NEF) during daytime and night time on working days and non-working days. Based on the results of this study, silence zones followed by residential and commercial areas are most affected by noise pollution and NEF indicates excessive violation of permitted noise limits due to unplanned, congested, and disorderly spaces for developmental and commercial operations. As compared to cities where industrial and commercial areas are located near or overlapping each other, those with more physically distinct areas tend to have quieter neighbourhoods. Thus, it follows that proper boundaries and urban planning are crucial in limiting people's exposure to noise pollution. Various control measures, including awareness campaigns and rigorous compliance with the rules and regulations, are urgently required to address the growing problem of noise pollution in the Mumbai Metropolitan Region (MMR).

Keywords: Leq, Noise limit exceedance factor, Noise Pollution, Unplanned development, Urban Noise.

Molecular Docking Simulation of Flavonoids for Preventing Alzheimer's disease using Citrus sinensis Peels

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ABSTRACT

Naturally multifunctional hesperidin has a great variety of biopharmaceutical activities, e.g., anti-cancer, anti-inflammatory, antioxidant and antitumor; however, the influence of the molecular structures of hesperidin in particular, the structural properties such as flexibility and dynamic features of protein on the biological activities of this bioactive compound remains ambiguous. The aim of this study is to explore the possible pharmacological effects of fruit waste that may have a key role in converting the fruit waste into pharmaceutical agents. Citrus sinensis (Orange) belonging Rutaceae family revealed the presence of flavones glycoside; is an important commercial citrus fruit crops used by juice processing industries. C. sinensis peels are perishable waste material, which creates a big challenge in juice processing industries. Initial pharmaco-chemical profile of peels' extracts revealed that the ethanol extract (ClPs) has promising anti-inflammatory activity and rich in hesperidin content.

In vitro study of pharmacology using molecular docking display the effect of hesperidin on the protein 3D models of beta amyloid (Alzheimer's disease). Conformational changes after ligand binding and their effect on the substrate-binding pocket of the proteases were investigated.

Based on our results, we observed that hesperidin comprises a chemical structure that can be serves as a starting point molecule to develop a potent inhibitor to combat Alzheimer's diseases by inhibiting the amyloid beta proteases, although further in vitro study should be conducted.

Keywords: Alzheimer's disease, Citrus sinensis, Hesperidin, Molecular Docking Simulations.

Characterisation of Marine Litter and Major Contributors

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ABSTRACT

The coastline supports several economic activities that are vital for economy like ports & harbours, power plants, fishing, and tourism that affects our coastal environment. The anthropogenic stresses and climatic change resulting from over urbanization, ill-planned development, habitat fragmentation, overexploitation of resources, pollution from industry as well as anthropogenic sources are adversely affecting the ecological balance and has contributed to increased marine litter along the coast. The issue of the marine litter raises concerns globally over environmental imbalance and impact on the human life in the coastal regions. The marine litter covers sources ranging from multiple activities on land as well as at sea.

Impetus on Blue economy by the Government of India and formulation of Vision on Blue Economy very clearly bring out the increased focus on ocean based economic activities, which is also aligned with the UN Decade of Oceans Science for Sustainable Development (2021-2030). As an outcome of growing marine activities, exponential increase in marine litter has been a major environmental concern. There is a need to identify the sources of marine litter to understand the efficacy of the system and define policy initiatives to address the problem of marine litter.

The paper would aim to analyse the data collected along the coast of Goa for characterisation of marine litter based on sources and identify major contributors towards making effective policy decision and implementation plan to address the environmental concerns of marine litter.

Keywords: Coastal Development, Environment, Marine Litter, Blue Economy.

Antimicrobial activity assessment of Bacillus spp. derived Silver Nanoparticles against MDR Salmonella and *E. coli* pathogens isolated from Sewage samples.

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ABSTRACT

Several multi drug resistant pathogens, like E. coli, Salmonella, Klebsiella, Enterococcus, Pseudomonas etc. have gained a lot of attention these days due to their prevalence in water bodies, which is one of the most frequently used environmental source consumed by humans in day-to-day life. As these microbes can resist various antibiotics, it is need of the hour to implicate novel strategies in order to combat them, as they are responsible for multiple infections especially in children and old age people with poor immune system. In the present study we have tried to implicate the use of Bacteria derived silver nanoparticles as an alternate to the antibiotics to which the pathogens were resistant. The pathogenic strains of Salmonella and E. coli were isolated from 51 water samples, that were collected from various effluent sources in Greater Noida. The isolated microorganisms were subjected to the antimicrobial susceptibility test for identification of antibiotic spectra and prevalence of drug resistance amongst them. The Silver nanoparticles were biosynthesized from the soil microbe, Bacillus megaterium, and was tested against the isolated pathogens from the effluent. The crystallite size of the synthesized nanoparticles had a diameter of 39.06 nm and the surface plasmon resonance activity was observed at 420 nm on UV-Visible spectrophotometer. Large zones of inhibition measuring 18 and 22 mm was noted respectively against Salmonella and E. coli on MHA indicating a strong antimicrobial activity of the nanoparticles against these pathogens. The result thus indicated that the Bacterial Nanoparticles can be used as an alternative approach in order to combat the infection caused by these pathogens.

Keywords: Effluent, Silver Nanoparticles, Salmonella, Drug Resistance, Surface plasmon resonance.

Biochars characteristics and effectiveness for neutralizing acidic red soil and maize plant growth

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ABSTRACT

Low-cost potassium (K), calcium (Ca) and sulfur (S) enriched biochar (B) &composites Bwere produced through co-pyrolysis of different biomass wastes i.e., banana peduncle (BP), paddy straw (PS) and fertilizer industry wastes phosphogypsum (PG) in decentralized Rotatable Covered Cavity (RoCC) kiln. The BP and PS biochars (BPB &PSB) and composites biochars with PG i.e. [(BP+PG)-B& (PS+PG)-B] were used as soil amendmentswith different application rates 2, 4, 8 t ha-1. Influence of these biochars application on selected acidic red soil (pH 4.91) for improving its characteristics and maize plant (Zeamays) growth were conducted through field trials experiments. The characteristics of control and biochars treated soils analysed for pH, electrical conductivity (EC)and nutrients. Results revealed that B type, application rate and their interaction showed significant effects ($p < 0.005$) on pH, EC and nutrients concentration. The neutralised pH (6.56) for maize plant growth was found in BPB-PGB with 8 t ha-1 along with relatively higher EC (3677.7 µS/cm) than control (127.6µS/cm). The K, Caand S concentration in soils increased up to 10, 35 and 38 times over control with BPB+PGB 8 t ha-1. In plants, K and Ca concentrations found to be more in root (619, 167 mg/kg) followed by fruit (540, 145 mg/kg), whereas S concentration was observed higher in leaf (0.8 %) over control (0.36 %). Besides plantbiomasses increases upto 716 g/plantover control 638 g/plant at same BPB+PGB 8 t ha-1. Overall, application of biochar composites (BP+PG)-B 8 tha-1 were more effectivein neutralizing and improving the physico-chemical properties with better maize plant growth& productivity.

Keywords: Acidic red soil, Biochar, Biomass, Plant growth, Nutrients.

Screening of saline tolerant rhizobacteria for their plant growth promotion potential traits under in vitro saline condition

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ABSTRACT

Soil salinity has emerged as a serious threat for global food security. Salinity is predicted to harm around 62 million hectares, or 20% of the world's irrigated land, at the moment. The deposition of an excess amount of soluble salt in cultivable land directly affects crop yields. Traditional means of reclaiming saline soil, such as scraping, flushing, leaching, or applying an amendment (e.g., gypsum, CaCl2, etc.), have limited success and have a negative impact on agro-ecosystems. In this context, developing sustainable methods which increase the productivity of saline soil without harming the environment are necessary. Breeding saline-tolerant plants and engineering saline-resistant crop varieties have been attempted, but these and other conventional strategies have failed to tackle the problem. Exploitation of root adherent plant growth promoting rhizobacteria (PGPR) inhabiting hyper-saline circumstances has recently drawn attention as an eco-friendly microbiological approach to enhance crop output from saline affected areas. The present study totally eight saline tolerant rhizobacteria of two different genera (Bacillus and staphylococcus) were used for screening for their plant growth promotion potential traits like siderophore production and Phosphate solubilization qualitatively (CAS agar assay and Pikovaskya's medium supplemented with Tri-calcium phosphate, respectively) and quantitatively by Spectrophotometrically (UV visible spectrophotometer, Biomate, China). Among the eight isolates, Bacillus subtilis GAN-4 and Staphylococcus cohnii MAN-3 were able to produce maximum siderphore under salinity (23 % NaCl) stress conditions. Staphylococcus cohnii MAN-3 and Bacillus subtilis GAN-4 exhibited maximum phosphorus solubilization under both stressed (23 % NaCl) and unstressed conditions. Bacillus subtilis GAN-4 and Staphylococcus cohnii MAN-3 were discovered to have higher PGP potential.

Keywords: Salinity, PGPR, Saline tolerance and Solubilization.

The impact of water scarcity in Ukhrul Town, Manipur

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ABSTRACT

Purpose: Access to safe drinking water is taken for granted in the world these days. Water scarcity is one of the greatest challenges in Ukhrul town since decades and has appeared a major issue in spite of adequate monsoon shower in the region. During dry season begins by January, majority of the spring water and ponds in Ukhrul town dry up and people face acute water scarcity. Urbanization, poor infrastructure and deforestation are together exacerbating water scarcity in the region.

Method: The present research was carried in three localities: Naphang, Meizailung, Khararphung. Field observation was undertaken and questionnaire was prepared. The respondents were selected using simple random sampling.

Results: The population is provided with inadequate supply of water as there are only two public pipelines from PHED (Public Health Engineering Department) Government of Manipur. Collecting 6-8 buckets of water per family has become a nightmare due to the lack of clarity regarding the duration and timing of water supply, which is only available for 2-3 hours twice a week. While thirty five percent of the population depend on the public pipeline, the remaining sixty five percent of the population primarily depend on natural pond, rainwater, and hand pumps.

Conclusion: The situation has turned grave with drying up of ponds and hand pump. As water is not piped to the houses, the burden of fetching water falls on women and children which considerably shortens the time women have to spend with their family and other house hold activities. The issue of water shortages, water pollution requires stakeholders and policy makers to work holistically, as water is a unique resource, essential in every aspects of life and water has no substitute.

Keywords: Deforestation, Ukhrul Manipur, water pollution, water scarcity.

Superoxide dismutase is an effective antioxidant playing a pivotal role in the pathogenesis of aging-related diseases

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ABSTRACT

Overwhelming consumption of tobacco and alcohol, air and water contamination, environmental pollution, radiation i.e. UV, ionizing radiations, heavy metals, certain drugs, industrial solvents, and a diet particularly rich in carbohydrates leads to free radical production. ROS can cause damage to vital organs that pose deleterious effects on biomolecules, grants the way to aging, and may ultimately cause death, if not overlooked. Aging is an assured natural phenomenon, which influences every cell, tissue, organ, and organism. With progression in age, noxious changes occur at the molecular as well as on cellular level, which causes a decline in normal physiological functions. Superoxide dismutase (SODs) accounts for an especially important primary level antioxidant defense mechanism against oxidative stress that neutralizes the excess production of ROS in the body. This enzyme has the potential to act as a therapeutic agent against reactive oxygen species-mediated diseases. The present review aims to describe the pivotal role of SOD in the pathogenesis of aging and the different hallmarks of aging and age-related diseases.

Keywords: Superoxide Dismutase; Antioxidant Pathogenesis; Aging-Related Diseases.

Role of Chemistry in Reduction of Greenhouse Gases for Environmental Sustainability

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ABSTRACT

Climate change caused by the accumulation of greenhouse gases in the atmosphere has become one of therapidly arising issues that need to be taken care of for environmental sustainability. Greenhouse gases such as CO2, methane, chlorofluorocarbons, nitrous oxide, and water vapor contribute to the trapping of heat from the atmosphere through a process called the greenhouse effect by absorbing infrared radiations from sunlight that would have been re-emitted back to outer space if not because of the presence of greenhouse gases. The greenhouse effect can be reduced by adopting modern technologies that use no or fewer fossil fuels to avoid the emission of CO2 and methane into the atmosphere. Furthermore, it is advocated that industries must adopt modern machinery that can recycle CO, CO2, and CH4 gas so that they can be reused for further production processes. Government policies should be strictly enforced on the release of smoke, deforestation, bush burning, and other activities that may lead to the release of greenhouse gases. This paper is centered on how chemistry plays a vital role in the reduction of greenhouse gases by CO2 and methane capture using porous materials such as Metal-Organic Frameworks (MOFs) and Zeolites due to their large pore sizes, ultra-high surface areas, green synthesis, and adsorbent/adsorbate ratio. These properties make MOFs and Zeolites better materials for CO2 and methane capture as a possible way of maintaining environmental sustainability.

Keywords: Zeolites, Metal-Organic Frameworks (MOFs), Greenhouse effect and Environmental sustainability.

Foliar application of chitosan-elicited defense responses against mosaic virus in tomato crop

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ABSTRACT

The control of plant diseases by inducing plant resistance to avoid yield losses due to the incidence of diseases by various pathogens. As a result, there is an increasing demand for interactions between host, pathogen, and molecules to induce defence mechanisms in crops. Hence, in this study, we report the efficacy of chitosan-elicited defence responses in Solanum lycopersicum against tomato mosaic virus. Chitosan was applied via foliar spray 10, 20, and 35 days after transplantation as a preventive treatment against the natural viral infection. At the time of harvesting (70 days after transplantation), virus accumulation, photosynthetic performance, as well as gene expression for proteins affecting resistance responses were studied. It was observed that there was a significant reduction in virus accumulation in chitosan-treated plants compared to untreated plants. Similarly, a positive effect of chitosan on chlorophyll fluoresce, gas exchange dynamics, total phenol, total sugar, ascorbic acid, lycopene, and beta-carotene was observed in chitosan treated plants. The analysis of gene expression suggested the occurrence of chitosan-induced, systemic acquired resistance-related responses. Our data indicate that treatment of chitosan by seed treatment and 10 to 30 days after transplantation elicits defence responses in tomatoes to control viral disease incidence and prevent deleterious symptoms by mosaic virus.

Keywords: Chitosan, tomato, tomato mosaic virus, hydroponic, disease resistance.

Merkel Cell Carcinoma: A review of pathogenesis, diagnosis and treatment

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ABSTRACT

Merkel cell carcinoma is a rare, aggressive neuroendocrine carcinoma, accounting for <1% of all cutaneous malignancies, found in white populations and risk factors include advanced age, ultraviolet exposure, immunosuppression, such as AIDS/HIV infection, haematological malignancies or solid organ transplantation, and Merkel cell polyomavirus infection. It has poor prognosis and with its extending incidence, it becomes vital for dermatologists to remain updated with recent updates in this malignancy's pathogenesis and treatment. In past few decades MCC's pathogenesis, more specifically its relation to the Merkel cell polyomavirus, has sparked more interest in study of this carcinoma. Most cases are attributed to malignant transformation secondary to Merkel cell polyomavirus, with a minority derived from DNA damage due to ultraviolet radiation. 26% of cases presenting lymph node involvement at diagnosis and 8% with metastases. Five-year overall survival rates range between 48%-63%. There are 2 subsets of MCC, characterized with distinct molecular pathogenetic pathways: ultraviolet-induced MCC versus virus-positive MCC, which carries a stronger prognosis. In both subsets, there are alterations in the retinoblastoma protein and p53 gene structure and function. MCC usually manifests as a red nodule or plaque with fast growth, especially on sun exposed areas. Histopathology and immunohistochemistry (CK20 positivity and TTF-1 negativity) confirm the diagnosis. Baseline whole body imaging is encouraged to clear out regional and distant metastasis. For localized MCC, primary treatment is surgical excision with postoperative margin assessment followed by adjuvant radiation therapy (RT). Sentinel lymph node biopsy is suggested in all patients with MCC without clinically detectable lymph nodes or distant metastasis. Adjuvant radiation therapy alone, eventually combined with complete lymph nodes dissection is recommended in case of micrometastatic nodal involvement. In case of macroscopic nodal involvement, the standard of care is complete lymph nodes dissection potentially followed by post-operative radiotherapy. Immunotherapy with anti-PD-(L)1 antibodies should be provided as first-line systemic treatment in advanced MCC. Chemotherapy can be used when patients fail to respond or to tolerate anti-PD-(L)1 immunotherapy or clinical trials.

Keywords: Cutaneous malignancies, MCC, Merkel cell, Neuroendocrine, Sentinel lymph node biopsy.

Isolation, characterization and identification of endophytic bacteria from the roots of Cynodon dactylon (*Bermuda grass*)

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ABSTRACT

Endophytes have gained interest because of their various bioactive metabolites, particularly those that are found from hyperaccumulator plants. Many researchers are interested in studying plant-microbe interactions and using them for agricultural and medical purposes because of the harmless invasion of endophytic microflora in plants and their ability to synthesize a variety of valuable compounds. Cynodon dactylon commonly called as Bermuda grass were used for isolation, identification and characterization of bacterial endophytes via morphological, biochemical and molecular examinations. Six different endophytic bacterial isolates were screened from root sample of C. dactylon. The characterization of bacterial isolates was done by morphological and biochemical methods. One of the bacterial isolate was identified using 16S rRNA partial gene sequencing method for molecular identification. Identified isolate demonstrated antibiotic susceptibility with minimum inhibitory concentration value of 1µg/mL against clarithromycin. The bacterial isolate was resistant to amoxicillin and tetracycline but sensitive to clarithromycin, erythromycin, ampicillin and azithromycin. The extract revealed DPPH scavenging activities with increasing inhibition with concentration range of 0.5 to 2 mg/ml, respectively. The current study of screening endophytic bacterial isolates provides the opportunity to further exploit them as a potential source of novel bioactive metabolites as well as for prospective phytoextraction and phytoremediation processes.

Keywords: Cynodon dactylon, Endophytic bacteria, Biochemical Characterization, Antibiotic susceptibility.

Computational Gastronomy: The Digital Food World

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ABSTRACT

The rapidly growing amount of publicly available data on food chemistry can be analyzed using data mining methods and network analysis. These approaches can bring new insights into both sensory perception and anthropology of culinary practice. Food science is likely to be one of the next large-scale beneficiaries of data analysis, opening opportunities for fields such as "computational gastronomy". Food has a profound impact on human survival, identity, religion and culture. Food computing can connect food and humans to improve health, understand their needs and behavior. The huge amounts of food data from various sources, advances in informatics and other principles viz., neuroscience and cognitive science have given us unprecedented opportunities to solve many food-related problems through food computing. In this paper, we provide a comprehensive overview of the most important works on data sets, analysis of food-oriented data, their perception and recognition basis which the prediction and monitoring for various applications and services are discussed.

Keywords: Anthropology, Computational Gastronomy, Neuroscience, Cognitive Science.

Impact of Indole-3-Butyric Acid and Naphthalene Acetic Acid on Rooting of Firethorn Cutting (*Pyracanth crenulata* M. Roem.)

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ABSTRACT

Purpose
Pyracantha crenulata is very important species in the forest ecosystem of Uttarakhand Himalaya. It is used in Ayurvedic medicines and commercially harvested from forest areas for different medicinal preparations. Recently it has been seen that modernization and climate change drawing adverse effect on its habitat. So it appears to be important to develop its propagation techniques. The present investigation was therefore carried out to find out the effect of growth regulators on propagation technique of Ghingharu (*Pyracantha crenulata*) through semi hardwood cuttings under polyhouse during 2019-2020.

Research Method
The experiment was allocated with nine different treatments of IBA and NAA (2000 ppm, 4000 ppm 6000 ppm 8000 ppm) and control with three replications, and each replication contained 25 cuttings under a completely randomized design.

Result
In the present investigation, most of the shoot and root characters of cuttings were significantly influenced by the different treatments of IBA and NAA as compared to control. The result obtained in present investigation showed that IBA 6000 ppm gave highest rooted cuttings (72.53%) and exhibited best results with respect to all root and shoot characteristics.

Conclusion
From the result of present investigation it was concluded that cuttings treated with IBA 6000 ppm were showed the best result with all the aspects.

Keywords: Cuttings, Ghingharu, Growth regulators, Propagation.

Status and Performance of Sustainable Development Goals in India

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ABSTRACT

The concept of Sustainable Development emerged in the 1980s as a response to the negative social and environmental effects of the prevailing approach to economic growth. The major emphasis was on the maintenance of ecological processes, the sustainable use of resources, and the maintenance of genetic diversity. Since the Brundtland Commission Report, a number of events and initiatives have bought us to the wide-ranging interpretation of Sustainable Development, which set the agenda of the Sustainable Development discourse both in developed and developing countries. As a result of a proliferation of sustainable development strategies and policies etc., innovative technologies, scientific and educational initiatives, and new legislative regimes and initiatives have emerged. In 2000, the General Assembly of the United Nations in the Millennium Summit passed the 'Millennium Development Goals (MDG)' and set the agenda to achieve these goals by 2015. However, these MDGs could not be achieved to the level of satisfaction. Therefore, a new strategy for sustainable development was formulated and 17 sustainable development goals were set to be achieved by 2030. These goals are: End poverty in all its forms everywhere; Ensure healthy lives and promote; End hunger, achieve food security and improved nutrition, and promote sustainable agriculture; well-being for all at all ages; Ensure inclusive and quality education for all and promote lifelong learning; Achieve gender equality and empower all women and girls; Ensure access to water and sanitation for all; Ensure access to affordable, reliable, sustainable and modern energy for all; Promote inclusive and sustainable economic growth, employment and decent work for all; Build resilient infrastructure, promote sustainable industrialization and foster innovation; Reduce inequality within and among countries; Make cities inclusive, safe, resilient and sustainable; Ensure sustainable consumption and production patterns; Take urgent action to combat climate change and its impacts; Conserve and sustainably use the oceans, seas, and marine resources; Sustainably manage forests, combat desertification, halt and reverse land degradation,halt biodiversity loss; Promote just, peaceful and inclusive societies; Revitalize the global partnership for sustainable development. The present paper is aimed to analyze the status and performance of sustainable development goals in India on the basis of the performance of different states and UTs of India from 2018-19 to 2020-21. The data indicate that there is substantive progress in cases of some states. However, some states are either stagnant or lagging behind.

Keywords: Sustainable Development; MDGs; SDGs; Environment.

Advantages and Challenges of Urban and Peri-Urban Agriculture

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ABSTRACT

Urban and peri-urban agriculture (UPA) is the production, distribution, and marketing of food and agricultural products in and around urban areas. Globally, investments in this sector are rising to enhance self-sufficiency and quality of life in towns and cities. UPA shows a great potential in contributing to food and nutrition security by making effective use of land, green architecture and spatial planning. Additionally, it contributes to recycling of urban waste, water and energy conservation, reduction of air pollution and soil erosion, urban beautification, climate change adaptation and resilience, disaster prevention, and urban social and ecological sustainability. Thereby food production sites are being established within spheres of urban hubs using various innovative techniques such as vertical farming, landscaping, urban farms, hydroponics, rooftop gardens, edible walls, urban livestock, etc. Shifting the paradigm of extraction-based agriculture, UPA also provides a control over market fluctuations and employment opportunities in urban sector. However, still at the outset phase, UPA faces various challenges such as land, labour and resource scarcity to be effectively implemented to its full potential. Present work discusses scope, advantages and challenges of urban and peri urban agriculture which is pushing forward the development of material and resource cycling in cities, beyond sustainability, into resilience.

Keywords: urban and peri- urban agriculture, food security, employment, green architecture, sustainability.

Evaluating Remediation Potential of Bacillus licheniformis DAS 1 for Cr (VI) toxicity by the application of Orthogonal experimental design

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ABSTRACT

In our previous work, strains of Bacillus licheniformis DAS 1 and DAS 2 have been isolated and characterized. The purpose of this study is to detoxify the soil and water contaminated with toxic Cr (VI). Modulation in pH was done between 4-10, to optimize the maximum growth of DAS 1. At pH 8, DAS 1 showed its maximum growth and at the same pH, remediation potential of DAS 1 was 85% by reducing Cr (VI) to Cr (III).The reduction of Cr (VI) to Cr (III) from growth medium was enhanced to 90.4% by immobilized bacteria. The effect of glucose ranging from 0.5 to 2.5 g/l was examined. Maximum growth was observed at pH 8 with 2g/l glucose concentration. The remediation potential further enhanced up to 96% containing 200 mg/l Cr (VI) with 2g/l glucose in growth medium. The value of ks (0.434 g/l) showed the affinity of substrate to bacteria was in agreement with Monod equation and μmax (0.090hr-1) showed that 11.11 hr was required for maximum growth of DAS 1. Mixed culture of DAS 1 and DAS 2 in the ratio of 1:1 was examined by orthogonal experimental design and it was concluded that combination X3Y2Z1 was most appropriate for complete remediation of Cr (VI) from spiked growth medium. Impermeability of cell membrane is not responsible for Cr (VI) resistance in DAS 1 as assessed by creating pores using Na2EDTA. The enzyme activity was found inductive and not constitutive which could be inferred from delayed lag phase.

Keywords: Immobilization, Monod equation, mixed culture, orthogonal experimental design.

Technological Innovations in Effluent Treatment Plant: An Integrated Approach Towards Suitability

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ABSTRACT

In recent decades, government and other organizations have elaborated a wide range of technological solutions to recover water, energy, fertilizer and other products from municipal wastewater treatment plants. Drivers for this work range from low resource recovery potential and cost effectiveness, to the high energy demands and large environmental footprints of current treatment-plant designs. However, only a few technologies have been implemented and a shift from wastewater treatment plants towards water resource facilities still seems far away. The article presents new trends in the treatment of municipal wastewater. The development of new technologies for nitrogen removal, pharmaceutical residues removal and the possibility of using membrane processes in wastewater treatment are presented. The state of research on innovative wastewater treatment processes at the level of pilot-scale tests and their implementation in full technical scale has been described. These technologies can allow the application of new, economical and environmentally friendly wastewater treatment processes based on biological, chemical and physical methods.

Keywords: Municipal Wastewater Treatment Plants, Municipal Wastewater, pilot-scale tests.

Rice field herbicide 3-(4-Chlorophenyl)-1,1-dimethylurea regulates diazotrophic performance in cyanobacteria by modulating gene expression of crucial enzymes

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ABSTRACT

The goal of this study was to look into the effects of the commonly used rice field herbicide 3-(4-Chlorophenyl)-1,1-dimethylurea (Monuron) on different aspects of diazotrophy in a cyanobacterium Nostoc muscorum Meg 1 isolated from a rice field in Cherrapunji, Meghalaya, India. The effects of monuron exposure on the functioning of nitrogenase and glutamine synthetase enzyme activities, heterocyst frequency, and protein production in the cyanobacterium were studied in a range of monuron doses (20 ppm to 100 ppm) to assess the herbicide's effect on N2-fixation and, ultimately, net biomass production.

Under western blot analysis, the total amount of nitrogenase (enzyme responsible for reducing atmospheric nitrogen to ammonia) and ammonia assimilating enzyme glutamine synthetase (GS) contents indicated interruption of new protein synthesis and breakdown of their existing enzyme molecules when exposed to higher monuron concentrations. Under low dose monuron treatment (20 ppm), all parameters studied showed increased expression, indicating induction of hormetic effect in the exposed organism. When cultures were treated with higher doses, the expression of monuron toxicity on various parameters of N2-fixation was immediately visible (40-100 ppm). Scanning and transmission electron microscopy studies revealed undesirable changes in the morphology and ultrastructure of the organism as a result of herbicide treatment, which could be linked to compromised N2-fixation.

Keywords: Monuron, Nostoc muscorum Meg 1, RT-PCR, Western Blot, TEM, SEM.

Arsenic toxicity modulated by pH in Bacillus stratosphericus

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ABSTRACT

Arsenic toxicity affects soil health in 18 districts of contaminated regions in Bihar (N25° 11′, E85° 32′) India.12 million of people of the state are completely dependent on agriculture for their livelihood and use underground water for their drinking and irrigation of crop fields. They suffer from various arsenic caused diseases like leukemia, lung cancer, skin cancer, kidney cancer etc. Arsenic resistant bacterium was isolated from Maner, Patna, Bihar (N25°40.997′, E84°52.288′) and was identified as Bacillus Stratosphericus (Accession Number-OM841514-15) through 16s r RNA sequencing. Bacillus Stratosphericus was efficient in uptake/removal of both arsenite (MIC 10mM) and arsenate (MIC 250mM) from LB growth media. The potential of uptake and removal by Bacillus stratosphericus was determined in laboratory condition in LB broth medium at different pH ranges (pH 4-12) by method modified by tripti et al (2016).It was observed that pH 8 was most suitable for the growth of Bacillus stratosphericus. The uptake/removal potential at lower concentration of arsenite(2mM) was complete (100%) and at higher concentration (8mM) it was only 42%.In case of arsenate also, the complete removal (100%) was observed at lower concentration(50mM) and at higher concentration(200mM) it was declined to 45% at pH 8. 65% of arsenate was reduced to arsenite at lower concentration (50mM)which was declined to 13% at higher concentration (200mM) at pH 8. The uptake/removal of both the arsenic species was almost similar. The Bacillus stratosphericus was able to remediate almost 100% arsenite and arsenate at lower concentration but not much effective at higher concentration. Removal content in case of arsenite was lower than that of arsenate.

Keywords: Arsenite, Arsenate,Bacillus stratosphericus, Remediation.

Assessment of Potential Antimicrobial Activity and Phytochemical screening of *Saussurea lappa and Lavatera cachemiriana* extracts

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ABSTRACT

Plants have been used as source of natural remedies and medicine since many years. Plants are recently being used in several pharmacologically activities due to their efficacy to medicate the diseases. More than 21,000 products from plants have been reported to treat various diseases. The present study entails the antimicrobial efficacy and phytochemical screening of the two medicinal plants from Kashmir valley viz. Saussurea lappa and Lavatera cachemiriana. These two medicinal plants were obtained from Kashmir valley and tested against Escherichia coli, Bacillus spp. Pseudomonas putida, and Staphylococcus aureus. It was observed that Petroleum ether and aqueous extracts of S. lappa exhibited better results in terms of antibacterial activity against Bacillus spp, Pseudomonas putida, Staphylococcus aureus except in case of methanol whereas in case of L. cachemiriana, aqueous extract exhibited no activity against any of the four tested pathogens. The preliminary screening of the tested plants revealed the presence of various phytochemicasl like stannins, saponins, flavonoids, terpenoid, phenol and carbohydrates. Steroids, tannin, starch, and napthoquione were absent in all the extracts of S. lappa and L.cachemiriania. Thus S. lappa and L. cachemiriania can be used as a potential source of treating different diseases due to their significant antimicrobial and biological activity.

Keywords: Antimicrobial- efficacy, Diseases, Extracts, Phytochemical.

Assessment of Mercury pollution in water, sediment and fish of River Ganga at Patna (Bihar), India

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ABSTRACT

Increasing mercury concentration in the river water has emerged as one of the leading concerns across the globe. This study aimed to estimate the level of mercury in the abiotic and biotic components of the River Ganga at Patna, Bihar. Triplicates of water, sediment, and thirteen fish samples were collected from the four sampling locations of River Ganga in the pre-monsoon month of April 2022. The samples were then subjected to mercury estimation using the cold vapour atomic absorption method in the Motras Scientific HG-100 mercury analyser. The river water mercury concentration has ranged from .0008 mg/L to .005 mg/L, which has surpassed the permissible limit of mercury in drinking water of 0.001 mg/L prescribed by the World Health Organisation (2011). The concentration of mercury in the sediment of River Ganga has been varied between 0.200 mg/kg to 0.387 mg/kg. Enrichment factor (EF) has revealed a low degree of mercury concentration in sediment and the Geo-accumulation Index (Igeo) has classified sediment of River Ganga as "unpolluted" with mercury contamination. The result of Bio-accumulation factor (BAF) has shown a greater mercury accumulation pattern in the bottom feeders than the surface feeders. The average Estimated Daily Intake (EDI) value was found to be 0.16 x 10-3 in bottom-dwelling fish species and 0.072 x 10-3 in the surface to column feeders, which are below their RfD value of mercury (0.0003 mg/kg/day). Further, Target Hazard Quotient (THQ) has been calculated to determine the potential health risks associated with fish consumption of River Ganga.

Keywords: Mercury, River Ganga, Geo-accumulation Index, Estimated Daily Intake, Target Hazard Quotient.

Evaluation of the Physico-chemical characteristics of the middle stretch of River Ganga in Patna District Bihar

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ABSTRACT

Freshwater ecosystems are rapidly deteriorating after several decades of anthropogenic interventions. Physico-chemical attributes of any aquatic ecosystem give a comprehensive indication of its quality. The present study was conducted to determine the current Physico-chemical characteristics of the middle stretch of River Ganga from Digha to Fatuha in Patna district, Bihar. Four sampling sites were selected in the 36 km stretch of Ganga based on significant anthropogenic disturbances, including sand mining, domestic sewage disposal, and Flyover construction. The samples were collected during the pre-monsoon period (April-May) of 2022 in triplicates. They were analysed for 23 physico-chemical parameters (pH, EC, Water Temperature, TSS, TDS, Transparency, Turbidity, Chlorophyll a, DO, BOD, COD, Total Alkalinity, Total Hardness, Ca2+, Mg2+, Na+, K+, Cl-, SO42-, NH3, NO3-, PO42-) following the standard procedures. The result revealed river water as alkaline with moderately hard to hard in nature. The major dominant cations were Na+ and Ca2+, and anions were HCO3- and Cl- in River water. The DO values ranged from 7.0 to 7.8 mg/L, while BOD varied from 2.2 to 4.6 mg/L. The NH3 value of River water ranged between 0.7-1.9 mg/L, with an average value of 1.5 ± 0.54 mg/L, indicating toxicity to aquatic organisms.

Keywords: River Ganga, Physico-chemical parameters, Ammonia, Monitoring.

Effect of climate change on crops variation and flexibility of cultivating framework

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ABSTRACT

In many ways, agriculture and climate change are tied to one another because the former is the principal driver of the biotic and abiotic pressures that are harmful to a region's agriculture. Variations in yearly rainfall, average temperature, heat waves, changes in weeds dynamics, insect-pest and disease incidence as well as worldwide changes in atmospheric carbon-dioxide or ozone level concentration and changes in sea level are only a few of the ways that climate change is affecting the land and its agriculture. Scientists have been increasingly concerned about the threat posed by changing global climate since these changes are having a negative influence on agricultural productivity and jeopardising global food security. Agriculture is thought to be the activity most at risk from climate change, according to some forecast reports.The two issues that worry the world's people the most right now are food security and ecological resilience. The only method to prevent climate changes from having a significant detrimental influence on crop adaptability is through climate-smart agriculture. Three major objectives serve as the framework for climate-smart agriculture. A rise in productivity (sustainably intensifying agriculture).improved resiliency (adapting to climate change). lower emissions (mitigating greenhouse gas emissions). Farmers already employ a number of climate-smart farming techniques, such as conservation tillage, cover crops, nutrient management, and agroforestry, which help to cut greenhouse gas emissions.

Keywords: Agroforestry, Cover Cropping, Nutrient Management, Climate-Smart Agriculture.

Performance assessment of Kalmegh on growth and yield attributes supplied with three nutrients combinations under nutrient film technology to facilitate water conservation.

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ABSTRACT

This study was conducted to examine the performance of Kalmegh under Nutrient Film Technology by supplying varying concentration of nutrients. Three nutrient solutions were prepared by modifying the standard Hoagland nutrients by increasing the percentage of NPK at 10%, 20% and 30% The experiment was laid out in Factorial randomized Block design (FRBD) with three replications at High Altitude Plant Physiology Research Centre. The observations viz., yield(kg/plant), leaf area (cm2), Leaf area index (LAI), Leaf area duration (LAD-days), leaf chlorophyll content (LCC-SPAD Value), Specific leaf area (SLA-cm2g -1), Net assimilation rate (NAR-gg-1day-1), relative growth rate (RGR-gg-1day-1), Crop growth rate (CGR-gm-2day-1) were determined. The nutrient quantities were computed for 100 litre of water and were given through fertigation. The pH 6.50-6.8 and EC around 2 dS m-1 was continuously maintained throughout the trial period. It was concluded from the study that 20% increased NPK solution recorded the highest measurements for yield and growth parameters such as Leaf area, NAR, RGR, CGR, LAI when compared to other treatments. Lowest yield and other growth attributes was recorded in 10% increased NPK solution.

Keywords: Nutrient Film, Kalmegh, water conservation, NPK, yield.

Water, Climate Change and World Peace

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ABSTRACT

Water and peace are two wheels of a cart in contrast to other natural resources. Water play a pivotal role in human existence. For maintaining a good health, one has to take 3 to 4 l of safe drinking water everyday. If water balance in our body is perfect then it helps us to stay away from many diseases like the dehydration, diabetes, acidity, blood pressure, skin diseases. Further it slows down the aging process, stop wrinking in the skin, regulate body temperature, prevent constipation, help in digestion and carrying nutrients and oxygen to our cell. Good health brings peace of mind. It also brings content less to family which ultimately bring peace in the family, society and Nation. Better access to clean water, sanitation services and water management creates tremendous opportunity and is a progressive strategy for economic growth. Economic growth ultimately leads to peace. According to the WHO around 8,29,000 people are estimated to die each year from diarrhoea, as a result of unsafe drinking water and sanitation. If access to safe drinking water is provided across the world it can save lives and will lead to peace and harmony. Efficient management of water resources brings more certainty and efficiently in productivity across the economic sector and contributes to the health of the ecosystem. Taken together these steps bring long term economics social and environmental benefit which bring peace. At present 3.6 billion people live in an area that suffer from water scarcity. According to UNESCO the water shortage faced by human being is the most distressing social issue. The aberrations of the climate change are further adding up to the miseries of the water scarcity. Even the economically privileged population is facing the problem of water scarcity. Moreover, squander of water is adding up to the miseries of the world population and is knocking down the world peace so proper measures must be taken to save water during the monsoon by recharging ground water and controlling flood. Rainwater harvesting, storage in reservoirs and conservation in soil with its efficient underwater management in agriculture and other sectors are extremely important for augmenting the much-needed production in rain fed areas. Mushrooming of slum in the Mega cities is the cause for worsening the water quality and quantity. Mismanagement and abuses are the chief causes of manmade water crisis. The Himalayan Glacier feed seven of the Asian greatest river-Ganga, Indus, Brahmaputra, Salween, Mekong, Yangtze and Huange Ho. The Rapid melting of the Himalayan Glacier increases the volume of the water in the river causing the wide spread flood. If these scenarios aren't changed, then it poses a serious threat to the Welfare of the mankind which will ultimately destroy the world peace. Human have certain basic need for survival and food is the primary need. Water is the key to food security. Agriculture requires large quantity of the water for production of crops. In 1948 the universal declaration of the Human Rights affirmed that the right of every one to adequate food. But access to adequate food in the rural areas of the developing countries depend on certain natural resources like water. So, in those areas scarcity of food leads to inflammation thus destroying world peace. Of the total water resources at the global level 97.5% is the saline water and is in the ocean and only 2.5% is fresh. Only 1% of the world's fresh water is available for human use. World average annual precipitation is about 1100 mm marked with a wide variation. The share for fresh water for industries power and domestic structure is expected to increase from 10.7% in 1990 to 22.5% in 2025. Moreover by 2025 2.8 billion people in 48 countries and by 2050 roughly 7 billion people in 60 countries are expected to face water scarcity. The competitive demand for water is creating conflict among different countries, states, society etc. Often these conflicts turn violent, create war like situation and adversely affect the world peace. Due to Climate change, heavy rainfall occurred during 1st week of September, 2022 in Bengaluru, created severe artificial flood. Everywhere there were 2 to 3 feet water on the road causing severe traffic congestion and flood inside houses. As a result, School, College and Offices use closed and six people also died unfortunately. Moreover, some years back due to polluted derbies and foam in the sewage & drainage water in some parts of Karnataka State, safe drinking water was not available to the people. In recent past Bhubaneswar, Tamilnadu, Bombay, Rajasthan and many other cities in the world faced severe problems like Bengaluru City. Proper drainage and City planning is urgently needed to save people from these miseries and allow them to lead a peaceful& healthy life. Due to low pressure, there was heavy rainfall during 2nd and 3rd week of August, 2022 in Odisha, severe flood occurred in 24 districts. As a result, different crops in 1.26 Lakh hectre was fully damaged, 5036 hector land was destroyed due sand. In the process 14235 houses were damaged and 126.62Crores of public property were destroyed. For repair &settlement, State Government had to bear the burden of 8715.51 lakhs of funds. This is also due to impact of climate change and lack of proper water management planning in the state. During flood, people suffered from shortage of food, clothes, safe drinking water and lack of safe shelters thus losing their peace of life. Flood, Cyclone, drought are allowed almost every year due to Global warming, Environmental degradation and Climate change. Thus in order to sustain and enhance world peace we should manage Water efficiently. Beside the step taken by the government to save water, we should save Water at our level by encouraging practices like rainwater harvesting, drip irrigation, check leaks at our home sprinkler and organising rally's for creating awareness. The regulatory policy intervention along with appropriate provisions, incentive for conserving water and also disincentive for practices leading to wastage and pollution of water hold tremendous promises. Any misuse of water, abused or lack of implementation of programs will accentuate the gravity of the present dismal situation and will spell out irreversible damage, for which alarm Bells are already sufficient loud and clear through media, internet etc. Managing water, combating climate change and massive plantation are essential for world peace and this is the need of the hour.

Keywords: Water Management, Climate Change, Global Warming, Environment, World Peace.

Removal of hazardous dye from wastewater using fabricated nanocomposite

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ABSTRACT

Chitosan based nanocomposite was synthesized in laboratory through hydrothermal method. It was characterized using SEM, EDS, TEM, XRD, FTIR, TGA, zeta potential, surface area in order to find out the surface morphology, particle size, functional groups etc. Further, it was applied as an adsorbent for the decolourization of anionic dye i.e. Congo Red (CR) from an aqueous system. The effect of various process parameters viz. Effect of pH, initial concentration, adsorbent dose, contact time, temperature were studied to find out the percent removal and adsorption capacity of the adsorbent. The optimum pH for maximum removal of Congo Red was found to be 7. The highest percent removal and adsorption capacity at pH 7 were 100% and 150 mg/g respectively. The optimum conditions for the removal of CR in batch mode were found pH = 7.0, conc. = 30 ppm, dose = 0.2 g/L, time = 4 hr, temp. = 27 ◦C and rpm = 180. The reusability of the nanocomposite was examined upto three cycles. The Langmuir, Freundlich and Redlich-Peterson isotherms were studied to find the adsorption behaviours. The kinetics was studied by applying pseudo first-order and pseudo second-order models. The experimental data were found to fit well with the pseudo second-order kinetics and the rate of adsorption was found to be controlled by intra-particle diffusion. Thus, the nanocomposite under study could be used as an effective adsorbent for the removal of CR dye from aqueous solution. This could be a promising solution for the removal of dyes laden wastewater from textile industry.

Keywords: Congo Red, Nanocomposite, SEM, Wastewater, XRD.

A Spatial Analysis of Waterlogging sites in Kolkata

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ABSTRACT

High-rise structures have crowded Kolkata's environment and altered the city's natural flow. Kolkata's disorganized land use is clogging its sewers and drains. The city's population grew from 14.1 million in 2011 to 15.1 million by 2022. The Kolkata metropolitan region will have 20.1 million inhabitants by 2025. Located in the lower Ganges Delta in eastern India along the east bank of the Hooghly River, it has an elevation range of 1.5-9 meters (5–30 ft). Tidal flats and mangrove forests may extend into the city. In June and September, when the Bay of Bengal branch of the South-West monsoon is active, the city receives 1,836.5 mm of rain (72.30 inches). July and August had the most rain of the monsoon. Urban planning and development in one of the world's fastest-growing nations is put into question by this issue. It's vital to continually analyses these challenges and find solutions. This inquiry has these aims. Using a GIS platform and Geoinformatics change detection tools like LULC change, NDPI, NDBI, NDWI, etc., this research explores how flood-prone regions of Kolkata have changed over the previous 20 years. Final results show how various places observed an increase in flooded areas between 2000 and 2021. The study shows a link between waterlogging and urban expansion, with the latter contributing to the escalation of the issue as populations rise and settlements get denser

Keywords: Change Detection, flood hotspots, Metropolitan, NDWI, NDBI, Water logging.

Agronomic Benefits of *Azolla-anabaena* Symbiosis

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ABSTRACT

Anabaena azolla is a nitrogen-fixing cyanobacterium which forms heterocyst in Azolla pinnata, an aquatic pteridophyte. The cyanobacterium grows symbiotically in the leaf cavity of the fern. This symbiosis has gained attention in recent decades due to its potential as an effective biofertilizer and animal fodder. It has the capacity to fix atmospheric Nitrogen in high content. Other uses include rendering high productivity, high protein content and a negative influence on both aquatic weeds and NH_3 volatilization, improve soil texture and inhibit plant pathogens. Its biofertilizer is highly eco-friendly and cost effective, unlike the synthetic biofertilizers. Azolla has been employed as a potential biofertilizer for rice cultivation, based on a number of past studies. Azolla is either produced as a dual crop with rice or is integrated into the soil before rice is transplanted.Azolla biomass can be used in rice fields as partial or complete replacement of synthetic fertilizers because of its ability to provide 1.5-2.0 million tons of nitrogen whereas the requirement of urea for same amount of crop production is 3.3-4.0 million tons. The purpose of this abstract is to give a concise overview of the significance and recent advancements in the application of the Azolla-Anabaena system to agriculture, namely rice production.

Keywords: *Azolla anabaena*, endosymbiosis, cyanobacteria, rice production, nitrogen fixation.

Effects of Industrial Pollution in India: An Integrated Approach Towards Sustainable Development

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ABSTRACT

Industrialization in India started in 1854 with the first cotton mill in Bombay and since then India hasimproved a lot in the industrial sector making it a developing country from the underdeveloped. Backthen, we weren't thinking of the potential impact of burning coal and other fossil fuels To power ournew equipment and machinery we were thinking of growing as much, as fast, and As far as possible. It'sonly in recent years that we've started assessing the kind of impact that We've had on the environmentas a direct result of this exponential growth of pollution The significance of industrial pollution as one ofthe contemporary issues and accelerating factors that propel climate change in both developed anddeveloping countries cannot be overemphasized. The problem of industrial pollution has seeminglybecome intractable with the incessant failure of both global and local environmental policiespurportedly emplaced to address its devastating trend, particularly in growing megacities of the world. This study examined the effect of industrial pollution on Air, Water, and soil in the India Area. Data forthe study was extracted from various Environmental Organizations. The method of data analysisadopted was graphical data analysis and visual Data analytics. The study also utilized consciouslyselected and current works of literature on the subject matter. The study showed that the rate ofpollution due to the industry is very high.

Keywords: Air Pollution, Water Pollution, Noise Pollution, Exponential Growth, Environmental Policies.

Solid Waste Management challenges in Bhadarwah town of Doda District Jammu Kashmir UT

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ABSTRACT

The Solid Waste Crisis has become an issue of concern worldwide and it is increasing at an alarming rate. It is expected that global annual waste is expected to jump upto 3.4 billion tonnes per year by 2050. The world produces about 2 billion tonnes of municipal solid waste every year which is quite difficult to manage. The incomplete and inefficient solid waste management has caused the alarming increase of solid waste worldwide. Most of the solid waste generated is not recycled even in developed countries (30-35%) and one third is mismanaged either through open burning or dumped everywhere in the cities. The widespread plastic particles and their disposal are posing a significant challenge to the environment affecting soil, water and life on earth. Much of the plastic ends in landfills where it takes thousands of years to decompose leaching potentially toxic substances to soil and water and further degradation into micro-plastics (< 5mm) and nano-plastics (<0.1mm) badly affects the both aquatic and terrestrial ecosystems by entering into food chain. The dumping of solid waste in the water bodies will decrease the dissolved oxygen resulting in suffocation and disrupts physio-metabolic activities of aquatic living organisms.

With a population of 1.37 billion, and urban population of India is more than 31% of its total population (census 2011), the municipalities are facing high rate of urbanization putting a significant impact on socio-economic and environmental prospects owing to migration and depletion of natural resources. The per capita waste generated has increased that resulted in 80-90% of waste being disposed off in landfills resulting in air, water and soil pollution. This increased waste generation has created challenges for the municipalities and as a result it has been a serious problem everywhere. The use of plastics has become a global threat as it is biodegradable and it mixes with water polluting water bodies. The presence of micro-plastics has disturbed the aquatic life and has resulted in extinction of many species from the planet. The generation of hazardous chemical wastes from hospitals and industries leads to health problems and premature deaths. Improper disposal of solid waste attracts rodents, snakes, insects, vultures and scavengers causing spread of vector borne diseases. Municipalities are focusing mainly on collection whereas recycling and advance treatment techniques are missing which are important for management of solid waste. Even at the collection level it is not handled holistically and enforcement of centralized/decentralized treatment system are missing resulting in mismanagement of solid waste. Waste generated by informal sector is 40-50% organic waste, 30-40% is inert and construction and demolition waste and remaining is recyclable waste.

This huge amount of solid waste generated all over India has created many serious environmental, health and socio-economic and financial issues for both government and environment as lack of proper and effective strategies which has resulted in solid waste not being properly and effectively managed sustainably. The improper implementation of government policies, shortage of financial resources and manpower and land available, lack of public awareness etc. has created a challenge of solid waste disposal and management.

A study on the Environment Sustainability Development-through the "True and Thrift Accounting Model"

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ABSTRACT

Environmental Changes have become a global issue, and the situation is rapidly deteriorating, directly affecting global economic growth. One current argument is that manufacturers are unconcerned about the environment, so policymakers revise the accounting model and include green accounting. A Green account system ensures that environmental costs are correctly reflected in the price of goods and services. Conventional accounting may lead to environmentally unsustainable policy decisions. The paper focuses on a practical model. It will be based on Truth for helping renew and reposition accounting, recovering the morality of accountants and the morality of the whole society, which leads to restoring the harmonious relationship between human beings and nature and between ourselves, fundamentally solving the issues including the environmental issue will be the natural result of this restoration. The paper study the meaning, need, and importance of green accounting and the development of green accounting in India. Many organizations incorporate environmental costs as operating expenses because of the events underlying the incurrence of the obligation related to an entity's operations green accounting in their business. The study explores the application of the "True and Thrift Accounting Model". "True" means to keep books with clarity and integrity. "Thrift" is to reduce unnecessary consumption. The fundamental duty of accounting is to keep books with proficiency honestly. It reflects morality – the soul of accounting. This model aims to make people less dependent on materials, transfer people's high-energy consumption lifestyle to a low-carbon lifestyle, recover the moral virtue of the whole society, including accountants, and finally, rebuild a vertical relationship with True, restore the harmonious relationship with nature and between people. The study firmly believes that it is not the time to do addition any longer in terms of the cost. Instead, we need to do subtraction. We should look at accounting as a whole instead of accounting for everything separately, e.g., social and environmental accounting, biodiversity accounting, carbon accounting, health and safety accounting, ecological accounting, and sustainability accounting. We feel in my country. We make so much waste. We buy and throw away, buy and throw away, buy and throw away and yet will not share with the needy. Even when we have more than enough, we are afraid to share, and we are afraid to let go of some of our wealth. The study focuses on rebuilding a relationship with Truth, recovering the morality which makes people see the integration of everything. We can restore a harmonious relationship with nature and between ourselves. The commitment to the environment should be substantial and enduring. Daly's notions "Do not convey that natural capital may be consumed and transformed into other forms that may, in turn, be sustainable."The layout of the paper is the following. Section 1 provides an Introduction, Purpose, objective and literature review. Section 2 Outlines the scope & methodology, Need and importance of Green Accounting, Sustainability Development and Green accounting in India. Section 3 Renew and Redefined model of accounting. Section 4 offers concluding remarks. Finally, the study also highlights some limitations& suggestions.

Keywords: Truth, Green Accounting, Environment Sustainability Development and Thrift.

Sponge City: Sustainable Approach Towards New Urban Construction Model for Flood Management

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ABSTRACT

Sponge City design will reduce the frequency and severity of flooding, improve both water quality and water supply and help to fix environmental problems as well as Ecological restoration. This project will reduce water waste while also improving air quality and reducing the urban heat island effect. It is also used to tackle urban water management issues such as purification of urban runoff, attenuation of peak runoff and water conservation. This concept is a beautiful example of water conservation with lots of benefits and is safe to apply in urban areas. Concept of eco-sponge city envisages drainage infrastructure design to act like a sponge such that during rainstorms surfaces throughout the city absorb as much as water possible, Hence this project can apply in the every region of urbanization. Sponge city is a city that is designed to passively absorb, clean and use rainfall in an ecologically friendly way that reduces dangerous and polluted runoff, and mostly it is targeted at coastal areas as well as urban areas. The integrated design proposed is limited to water engineering and architectural design and the report addresses roughly the structural feasibility, construction and economic consideration underlying the proposal.

Keywords: Water Quality, Urban Runoff, Air Quality, Eco-sponge City, Water Management.

Environmental Impact of Socio-Economic factors: Need of Time for Sustainable Development"

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ABSTRACT

The role of socio-economic factors in environmental development cannot be negated. Education, economic growth, institutional quality, ethnic diversity, and energy consumption have a substantial impact on environmental performance and post-materialism. Understanding and establishing the relation between the socio-economic standards of a country and environmental impact is imperative for policy makers. An analysis of various documented studies and research papers has yielded this relationship. Education has been a demonstration of positive influence on environmentalism and heightens individual environmental concern by enhancing environmental knowledge. Contrary, economic growth increases consumption capacity, industrialization, and urbanization of the country resulting in environmental degradation and increased CO2 emissions; moreover, industrialization demands an increase in energy consumption. Increasing energy consumption results in unhealthy environmental conditions. In contrast, the willingness to pay for environmental quality is enhanced by economic growth as environmental quality is often viewed as a luxury good that people with high incomes can afford. The role of institutional quality is principal in determining environmental growth. Institutional quality establishes the framework to impose environmental policies in the country and a weak institution fails to do so. Institutions also encourage technological development to reduce the cost of production and increase profit margins which might help reduce CO2 emissions. In regards to ethnic diversity, it has a negative impact on greenhouse emissions which further results in environmental degradation. Ethnic fractionalization in a society result in individuals with a more creative and active approach towards economic problems in the country including environmental concerns. Socio-economic factors have a contingent relationship with the environment resulting in positive or negative influences on environmental quality.

Keywords: CO2 emissions, environmental impact, ethnic diversity, Ethnic fractionalization, Greenhouse Emission.

The Assessment of Changing Balance of Reactive Nitrogen Emission and Deposition Budget in Northern India

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ABSTRACT

In this era of increased energy demand to meet higher economic growth targets, there is an increase in reactive nitrogen emissions into the atmosphere, that require adequate attention to achieve sustainable development targets. This study focused at three sites of Northern India which are densely populated, the CAMS global emission inventory data was used to estimate reactive nitrogen emissions at deposition sampling sites. The total emission and deposition was calculated and measured respectively for April, May, June, July, August and September months of year 2018. The aggregate anthropogenic and natural emission of NH3 and NOx was calculated as 95.8 kg-NH3 ha-1 in Delhi, 66.8 kg-NH3 ha-1 in Jaipur and 55.6 kg-NH3 ha-1 in Mathura. Similarly, the NOx emission values were 395 kg-NOx ha-1 in Delhi, 42.2 kg-NOx ha-1 in Jaipur and 33.6 kg-NOx ha-1 in Mathura.

The wet and dry deposition samples were collected using a plastic funnel and bottle unit. Samples were analyzed using Schimadzu TOC/TN analyzer for total nitrogen (TN), spectrophotometer was used for NH4+ analysis and NO3- was analyzed using ion chromatography (IC) anion column. The wet and dry deposition of total nitrogen (TN) was observed to be 17.68kg-N ha-1 in Delhi, 17.41 kg-N ha-1 in Jaipur and 18.52 kg-N ha-1 in Mathura.There is a gap in estimation of organic nitrogen emission, which needs to be addressed to achieve more accurate nitrogen budget estimates, a large gap between emission and deposition values iterates the need of more comprehensive estimation of reactive nitrogen species.

Keywords: CAMS, emission inventory, TOC/TN analyzer, wet and dry deposition.

The Rights Side of the Environment: Operationalising the Human Right to a Clean, Healthy, and Sustainable Environment

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ABSTRACT

The present study investigated the composition of physicochemical parameters, major ions and trace metals in monsoonal rainfall events during 2018 at Ghatsila (copper mining area), Adityapur (industrial areas) and Kiriburu (iron mining area) of Singhbhum, India. A total of 102 rainwater samples were analyzed using standard methods for pH, TDS, major anions (F-, Cl-, HCO3-, NO3- , SO4 2-), cations (NH4+, Ca2+, Mg2+, Na2+, K+) and trace metals (Cu, Fe, Mn, Ni, Pb, Zn). The pH values varied from 4.64 to 6.71, 4.58 to 6.95 and 4.02 to 5.48 in Ghatsila, Adityapur and Kiriburu, respectively. The observed pH values of rainwater samples indicate that they are acidic in nature. The pH of the rainwater was found well above the reference pH (5.6), showing alkalinity during the early monsoon season. The rainwater chemistry of the Ghatsila, Adityapur and Kiriburu showed high contribution of HCO3- (59%, 49% and 50%) followed by SO42- (27%, 31% and 28%), Cl- (7%, 8% and 10%), NO3- (6%, 7% and 7%) and F- (1%, 5% and 5%) in anionic abundance, respectively. In case of major cations, Ca2+ (75%, 67% and 41%) was the dominant followed by Mg2+ (8 %,9% and 15%), NH4+ (7 %,16% and 33%), Na+ (9%, 6% and 7%) and K+ (1 %,2% and 4%) in Ghatsila, Adityapur and Kiriburu, respectively. The average metals concentrations were found well within the desirable limits of drinking water quality standard in all the samples. The ratio of Cl-/Na+ in the rainwater samples was found to be almost equal to sea water. Higher enrichment of Na+ and Cl- concentration may be due to marine contribution. The EFs were found to be high for F-, Cl-, SO42-, Ca2+-, Mg+, NH4+, and K+ indicating sources other than sea; i.e., mining, soil dust and other anthropogenic activities. The principle component analysis for ionic source identification, synthesized into three factors with eigen values cut off at greater than unity and explaining about 70.2 %, 74.4% and 73.2% of the total variance in Ghatsila, Adityapur and Kiriburu, respectively. The principal component analysis suggested both geogenic and anthropogenic sources for analyzed ions in the rainwater samples. Thus, the rainwater quality of the study area is mainly influenced due to mining activities, vehicular pollution and industrialization.

Keywords: Rainwater quality; Major ion chemistry; Enrichment factor; Principle component analysis; East Singhbhum.

The influence of anti-hail net installation on fruit quality of apple

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ABSTRACT

Apple is the most important cash crop of temperate regions especially Himachal Pradesh, contributing about 13.5% to the state's GDP, apple dominates the fruit production of the state. The ever-changing climate scenario has affected the apple production to a great extent, major issues concerning the apple production are frequent incidents of hail storms, heat damage etc. In order to protect the crop from damages, anti-hail nets are being installed by the farmers, which is by far the most effective and economic way to reduce damages and enhance overall production. But anti-hail net installation also alters the microclimate of the apple orchard along with soil moisture to a significant level which further can influence the fruit quality. Photosynthetically Active Radiationis known to be reduced by 30% under hail nets, which plays a major role in growth and development of fruit, along with PAR, temperature is also less by 11% under hail nets. Some of the fruit quality parameters are directly influenced by the amount of PAR received during the growth and development period, the reduction in incoming solar radiation has negative impact on some fruit quality parameters such as fruit colour, TSS, and fruit firmness along with other parameters. The economic return from apple is directly proportional to the quality of fruit so a slight compromise with fruit quality can result in reduced market price and hence restricting economic gain to the farmers.

Keywords: Apple, Anti-hail nets, economic gain, Fruit quality, PAR.

Satellite Retrievals in Estimating the Concentration of Trace Gases and Black Carbon over the Subdivisions of Indo-Gangetic Plain

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ABSTRACT

The space-borne observations reveal an extremely high loading of particulates and also the emission of trace gases over the Indo-Gangetic Plain (IGP). With a burgeoning population and combustion sources (fossil fuels (FFs), biofuels (BFs) and crop-residue burning in close proximity to each other, the IGP is widely regarded as a hotspot for anthropogenic emitter of air pollutants in South Asia. The deteriorating air quality over this region, especially during the winter, is a major source of concern, as pollutants travel long distances from their source regions to other remote areas, polluting their pristine atmospheric conditions. Thus, the current study investigates the spatial, seasonal, and temporal variation of biomass burning, as well as its impact on regional concentrations of black carbon (BC) and trace gases such as NO2, SO2, CO, and O3 over different cities of Indo-Gangetic Plain (IGP) subdivisions, namely, Trans IGP, Upper IGP, Middle IGP, and Lower IGP. During the course of this study, data for NO2, SO2, CO, and O3 were obtained from the CPCB online portal in order to accurately determine the inter-seasonal changes in the concentrations of the aforementioned pollutants during two post-harvest periods in India, namely, the post-monsoon season (September-October 2021) and the summer season (April-June 2022) at multiple subdivisions of IGP. The data of following cities was analyzed, Chandigarh (Trans-IGP), Agra, Lucknow (Upper IGP), Patna (Middle IGP) and Kolkata (Lower IGP). During the study period, multi-satellite retrievals were also used to estimate fire counts and surface concentrations of pollutants. Furthermore, the air mass trajectory observation revealed a large gradient of pollution transport from north-west to south-east along the Himalayan foothills, indicating regional transport over the region and supporting the high concentration of concerned pollutants over the studied region during the study periods.

Keywords: Black Carbon, Crop-Residue Burning, Indo-Gangetic Plain, Satellite Retrieval, Trace Gases.

Waste-to-product transformation in Delhi: A Critical Review

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ABSTRACT

As the population of India is growing rapidly in past few decades, the amount of waste generated is becoming tough to manage. Solid waste management is one of the biggest obstructions in moving from an unsustainable to a sustainable country. Indirectly, municipal waste contributes to soil pollution, water pollution, air pollution, and other environmental problems as the burning of municipal waste releases extremely harmful gases into the atmosphere which further degrade the soil fertility of landfills. Due to poor waste segregation practices, Indian scenarios are the worst in this regard. Only 85% of the solid municipal waste is collected by MNCs, and 55% of it ends up in over-utilized landfills in Okhla, Ghazipur, and Bhalswa, where the quantity of waste created in Delhi alone is 12,350 tonnes and is projected to increase by 18,915 tonnes by 2041. Therefore, it is essential to process and manage municipal trash. The handling of biomedical waste and home garbage is not adequately understood by waste collectors or landfill facilities. Untreated, improperly separated, and exposed garbage serves as a rat and flies breeding ground, which spreads disease and these areas render our environment unsuited for the habitation of humans and animals. Collecting recyclable materials with high calorific values that cannot be used in waste-to-energy projects is one option for managing municipal waste. By delivering this recyclable municipal garbage, such as glass, paper, and plastics, to the manufacturers and industries established in Delhi-NCR that utilize existing materials rather than new ones for manufacturing goods. The major goal of this research is to utilize waste that would otherwise be disposed of in landfills for other purposes in order to reduce landfill waste. Additionally, it discusses how to handle garbage that can be used in waste-to-product initiatives and has a high calorific value.

Keywords: Solid Waste Management; High Calorific Value Waste; Pollution; Sustainable Environment; Waste-to-Products.

Cancer Due to Carcinogens Present in the Environment in India: Efforts needed for reducing Health Risk

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ABSTRACT

This paper provides a view of the major facts and figures related to types of cancer caused by the carcinogens present in the environment. The cancer burden in India started in the early 1990s because of liberalisation followed by rapid industrialisation. AIIMS has listed all the carcinogenic chemicals produced in the environment in the publication "environmental and occupational determinants of lung cancer". Outdoor air pollution has been considered as cancer causing for humans. India reports 114,000 lung cancer cases each year as per the National Cancer Registry, 2014. There are three external agents that causes cancer- physical, chemical and biological carcinogens. Asbestos which is a naturally occurring fibrous silicate mineral has a record of high amount of usage in India and is only below China in terms of usage. All the six types of asbestos are carcinogens and cause lung cancer and mesothelioma. Occupational determinants like exposure to arsenic has been considered as the cause of lung cancer. Tobacco is a carcinogen that has been there in India since many centuries. India is the second largest consumer and third largest producer of tobacco in the world. The main chemical found in tobacco is nicotine which is a highly addictive chemical. Its usage over a long period makes a person physically and psychologically dependent on it but more than 4,000 different types of chemicals have been found in tobacco out of which 60 have been classified as carcinogens. Data has shown that tobacco use among males is 48% and among females is 20%. Cancer risk can be reduced by not using tobacco, minimizing occupational exposure to ionizing radiation, reducing exposure to outdoor air pollution and indoor air pollution, including radon, low consumption of alcohol, etc. India is committed to achieve reduce in cancer burden by 2030 as a part of sustainable development goals.

Keywords: Cancer, carcinogen, air pollution, tobacco, cancer burden.

Hazardous Efects of Flouride on Human Health

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ABSTRACT

Flouride is found natural in soil, water, and foods. It is also synthetically for use in drinking water tooth paste mouth washes and various chemicals products A flouride content of 0.7ppm is now considered the best for dental health. A concentration that is above 4.0 ppm could Hazardous. Exposure to high concentration of flouride during childhood, when health are developing can result in mild dental flourosis. Excess Exposure of flouride can lead to bone disease known as skeletal flourosis over many years. This can be result in pain and damage to bone and joints. The bones may become hardened and elastic increasing rank of fracture. In 2014, flouride was documented as a neurotoxin that could be hazardous to child development. In 2017 a report was published suggesting that exposure to flouride before birth could lead to poor cognitive outcome in future.

Keywords: Concentration, Hardened, Published, Exposure, suggesting.

Prospects of wastewater in Agriculture irrigation

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ABSTRACT

About 80% of India's water use is in agriculture, mainly for irrigation, pesticides and fertilizers, and livestock. Also in the value chain, water is used for food preservation and processing. Future projections suggest that total water demand will increase to 1,447 km3 by 2050. Due to population growth, rapid urbanization, and the effects of climate change, Indian cities are projected to have a water demand-supply imbalance due to extreme weather events such as droughts and floods. Farmers prefer municipal wastewater because of its high nutrient content, which increases crop yields in the short run. In addition, using wastewater can save on the cost of extracting groundwater, prevent freshwater exploitation and save the amount of groundwater available for generations to come. However, there have been concerns about upstream effluents in wastewater, which are not always adequately treated by STPs. The increasing load of industrial waste in wastewater and its high toxicity has had negative long-term effects.

Keywords: Wastewater; Agriculture; Irrigation; urbanization; freshwater.

Alteration in Catalase concentration in the skin of male albino rat under the stressed condition of UV-B radiation

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ABSTRACT

The purpose of present study was to investigate the concentration of skin Catalase in male albino rats under stress of acute (1 day) and sub acute (15 days) artificial UV-B exposure. Twenty healthy male albino rats (100-140 g) were taken for the present experiment. Dorsal side of rat body was prepared for the experimentation. Hairs from the dorsal side were cut after made a patch on the skin of male albino rat. Rats were grouped into four sets and each set contained 5 rats. The Set A1 (Control set) and Set A2 (Control set) were not exposed to artificial UV-B radiation while Set B1 was exposed to 0.44 J/cm2 of artificial UV-B radiation continuously for 10 hours for 1 day and Set B2 was exposed to 0.029 J/cm2 of UV-B radiation continuously for 40 min/day for 15 days. Rectangular radiation chamber (90cmx45cmx30cm) and Philips F30T8 fluorescent tube light of 300 nm wavelength was used for the UV-B exposure of albino rat. Results of investigation indicate a significant decrease in Catalase concentration in the skin of male albino rats after acute and sub acute artificial UV-B exposure. Present study also indicates decrease in Catalase concentration in the skin of male albino rats of Set B1 is more than the Set B2. Study concluded that the UV-B radiation causes damage to the antioxidant system leads to decrease in Catalase concentration in the skin of male albino rat.

Keywords: Catalase, Male albino rat, Skin, UV-B radiation.

Evaluation of antioxidant activity of drought tolerant fungal endophytes

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ABSTRACT

Drought is the major yield limiting factors for crops in arid and semi-arid regions. It is widely accepted that the endophytic fungi coexisting in plants can alleviate oxidative damage caused due to drought stress in plants through its antioxidant activity. In this study, six fungal endophytes (P1R1, P4L5, P6R3, P6R4, P10R1, and P12R2) isolated from drought-adapted plants growing in arid and semiarid regions of Karnataka were examined for their antioxidant activity. These fungal endophytes imparted drought tolerance and improved growth of maize seedling under drought condition. The antioxidant capacity of the fungal crude extracts was assessed based on the 2,21-azino-bis(3-ethyl-benzthiazolin-6-sulfonicacid) (ABTS) method. Total phenolics were determined based on the Folin-Ciocalteu method, while the flavonoids content in the fungal extracts was determined by the spectrophotometric method with aluminum chloride. Fungal cultures were grown in Potato Dextrose Broth (PDB) and Polyethylene glycol amended PDB (drought stress). All the fungal endophytes showed highest ABTS + radical scavenging activity, total phenolics and flavonoid production under stress condition. The ABTS+ radical scavenging activity was higher in isolate P10R1 compared to ascorbic acid (as a control) and other isolates grown under stress. A higher content of total phenolics was detected in P6R4. Total flavonoids were higher in isolate P10R1. These findings indicate that fungal endophytic isolates from plants under water stress condition enhance drought tolerance by producing antioxidant compounds.

Keyword: ABTS+, Antioxidant activity, Drought, Flavonoids, Fungal endophytes, Total Phenolic.

Variations in Atmospheric Pollutant concentrations during Haze event at a Downwind Site of the Indo-Gangetic Plain

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ABSTRACT

Air pollution affects not only the air quality in megacities but also the medium and small-sized cities due to rapid urbanization, industrialization, and other anthropogenic activities. From December 2019 to January 2019, the Indo-Gangetic Plains region, including Agra encountered an episode of poor visibility during the daytime, named as Haze period. During the haze event, the daily average PM2.5 and ∑BTEX concentration reached 153.1 µg/m3 and 257.6 µg/m3, however, visibility reduced by ~2.2 times. In this event, the concentrations of secondary aerosols species, NO3−, SO42−, and NH4+, were 18.0, 9.8, and 8.3 µg/m3 respectively during the haze period which were higher than the non-haze period (14.1, 5.0 and 6.2 µg/m3). The concentration of PM2.5 and BTEX were found to be 2-3 times higher as compared to non-haze period. Similarly, 23%, 13% and 22 % increment was observed in the concentration of trace gases (CO, NOx and O3) during the haze period. Toluene showed the higher ozone forming potential (143.2 µg/m3) during the haze period followed by xylenes, ethylbenzene and benzene. Meteorological parameters show that during haze period, the diurnal variation in temperature was lower (6 °C < T < 15 °C) as compared to non-haze period (12 °C < T < 21 °C). RH during haze period was always > 80% and reached a maximum value of 88% at night. A significant correlation between PM2.5 and CO (r = 0.86) during the haze period indicated similarity in their emission sources; which was attributed to the biomass burning and burning of solid organic matter. The study demonstrates how regional emissions and meteorological conditions can affect the air quality in a city; which can be useful for proper planning and mitigation policies to minimize high air pollution episodes.

Keywords: Episodic haze, Ions, Particulate matter, Tropospheric ozone, Volatile Organic Compounds.

Eco-friendly chitosan based nano composites for an extensive range of waste water treatment applications

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ABSTRACT

Waste from Industrial factories, mines, and sewage produces the chemical contamination of water therefore the clean and safe ways for wastewater supplication is required. A wide range of toxic derivatives such as heavy metals, aromatic molecules, and dyes are the main causes of contamination that can cause the serious health/environmental problem. Hence, there is an essential need to develop technologies that can remove the toxic wastewater pollutants. Adsorption on natural polymers and their derivatives is one of the advance techniques for the removal of wastewater pollutants. Due to the ability of binding to a variety of organic and inorganic particulates, chitosan is an ideal flocculant for the removal of several anionic and cationic dyes and heavy metal ions. It facilitated to bind with the suspended particulate ie. heavy metals, dyes etc even at acidic, neutral, and alkaline pH conditions. The other nano-sized materials enhance the potential of chitosan. Hence, the application of chitosan nanocomposites in wastewater treatments has the potential to overcome from pollution.

Keywords: Chitosan, chitosan-composites, wastewater treatment.

Seasonal Histological changes in Gonads of the Catfish, *Clarias batrachus* (Bloch, 1794)

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ABSTRACT

The spawning season of C. batrachus coincides with the monsoon as in case of carps. The presence of single and sharply distinguishable peak of matured ova in the ovaries indicates that fish spawn only once during the breeding season. The gonadosomatic index also confirms that C. batrachus spawns once in a year. Clarias batrachus is monogamous i.e. one female courts with one male. Only success was observed with one male to one female combination. Fertilization is external. Under natural condition female lays eggs in horizontal holes in the embankment 20-25 cm below the water surface. The size of holes depends on the size of fish. Sometimes female adjust the size of the hole to lay eggs and the fertilized eggs are demersal, adhesive in nature. The yolk contains no oil globule. After swelling the egg diameter ranges from 1.7-1.9mm, perivitelline space is 0.1-0.2mm. Blastodisc is red in colour. The fertilized eggs were guarded by males.

Forty mature catfish of both sexes (n=10 per season; 5 males and 5 females) were used to study the effect of different seasons on the histological and histochemical structure of the gonads. The histological results showed that gonads were degenerated during winter, fully matured in spring and distended during summer season. Therefore, winter, spring and summer may be considered as resting, spawning and distending period in the case of freshwater fishes. During autumn, both testes and ovaries appeared as spent gonads where the testes showed many empty seminiferous lobules and the ovaries showed many atretic follicles therefore, autumn was considered as post-spawning or spent season. The results of Gonado-Somatic Index (GSI) were coincided with the histological structure of the gonads where they show peak value during spawning season and showed the lowest value during winter resting season.

Keywords: Histology; Testis; Ovary; Catfish; Seasons.

Development and Nutritional Evaluation of Multi Grain Cake-rusk supplemented with Pomegranate peel powder

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ABSTRACT

This study describes information pertaining to development, nutritional evaluation and shelf life of value-added cake-rusk prepared using wheat, chickpea and pearl millet flour and pomegranate peel powder. Chickpea and pearl millet flour ratio was kept constant (15%) while wheat flour was substituted by pomegranate peel powder at 6, 8, 10 and 12 per cent levels in cake-rusk. Value added cake-rusk containing 6, 8 and 10 per cent pomegranate peel powder were organoleptically acceptable and their scores fell in the category 'Liked very much' to 'Liked moderately'. The protein contents in control cake-rusk were 9.82 per cent which were significantly (P≤0.05) lower than Type-I (11.23 per cent), Type-II (10.79 per cent) and Type-III (10.35 per cent) of value-added cake-rusk. The value-added product had significantly higher, fat, crude fibre, mineral content and antioxidant activity than control. The sensory scores for cake-rusk decreased gradually during storage period however cake-rusk were found to be organoleptically acceptable up to 90 days, respectively. From the present study it is concluded that all the value-added pomegranate peel powder supplemented cake-rusk were found to have better nutritive value than control.

Keywords: Organoleptically Acceptable, Pomegranate peel powder, Supplemented, Value added product.

Quantification of microplastics in the Gangetic fishes of Uttarakhand

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ABSTRACT

Microplastics (MPs) have almost contaminated every aquatic ecosystem hence the different life forms present in such systems are at risk of being affected. Therefore, it is crucial to study the reach of MPs among various organisms of aquatic bodies contaminated with MPs. This study is thus designed to understand the distribution of MPs in different Gangetic fish species of Uttarakhand with respect to their feeding habits. The samples were sorted into three categories: herbivores, carnivores, and omnivores. For this purpose, fish guts were analysed and digested with 30% hydrogen peroxide to eliminate the organic matter. Then the samples were filtered with cellulose nitrate filter paper 0.45-micron and were observed under the microscope to count potential MPs particles. The result suggested the presence of MPs in all samples of different categories viz., fibre, fragment, film, foam and bead/point particle. The fibrous particles were recorded to be dominant in all analysed samples. And more particles have been detected in carnivores than herbivores. The research showed that MPs enter the fish guts, where they may infect the fish and introduce harmful organic and inorganic pollutants. It is suggested to do a more in-depth analysis of the possible effects of MPs on fish.

Keywords: Feeding Habits, Fibres, Fish, Microplastics, River Ganga.

A review of religious water body using different physicochemical parameters: A study of Galtaji (Jaipur) (Rajasthan)

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ABSTRACT

In all life form on Earth water is simplest of living organism to most complex of human system. India is the most religiously diverse nation in the world. Galtaji, a magnificent natural spring located in Rajasthan, is one of the most beautiful.

The purpose of this study is to evaluate the literature about various physicochemical analyses of a religious site's surface and ground water bodies. Along with idol immersion, a lot of religious offerings are dumped in water bodies during the festival, including food, flowers, cosmetics, decorative items, painted objects, and polythene bags. In terms of seasonal change in both physical and chemical parameters, all prior writers whose works were studied agreed that anthropogenic activities significantly contribute to surface and ground water contamination (pH, total hardness, dissolved solids, sulphate, nitrate, and total alkalinity, BOD, COD)

These studies conclude that most water bodies are polluted due to human activities and avoid the spread of endemics that can and physical environment.

Recommendation of study includesi-) Restrict the dumping of waste into water bodies. ii) Regular monitoring of water quality standards. iii-) Regular review of environmental effect on water bodies

Keywords: Galtaji water body, Ground water pollution, physico chemical parameters, review surface water pollution.

Prospects of Circular Economy for Sustainability in Construction Industry

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ABSTRACT

There is a continuing demand for development due to rising population. urbanization, commercialization, and industrialization. Construction, which is simply creating a structure on a specific site, is currently at its height and will continue to increase. Rapid urbanisation will have an influence on us on a local, regional, and global scale. Construction offers numerous advantages, but it also has significant environmental consequences. Thus to keep the need of people in mind as well as protecting the environment we need to switch towards circular economy which ensures sustainable development. It aims restorative, regenerative, and revolutionary design rather than just recycling and reuse. Circularity in construction refers to redesigning the supply chain based on environmental sustainability standards in order to solve global resource shortages and climate change. The research will consider a range of goals which will aid in understanding the possibilities of the circular economy and the amount to which work has to be done in the sector. The investigation will include identifying waste types and determining their reusability and take into account all the aspects and at the end evaluate and optimize the construction waste generation at different stages for waste minimization and comprehend the reusability. Construction waste in India has been researched in terms of its sources, kinds, impacts, and management solutions. To tackle waste management difficulties, it is critical to reduce the high volume of construction trash generated. Many researchers have successfully established the various objectives related to the study, but there is no study that holistically covers all domains of implementing circular economy in the construction sector while concurrently applying artificial intelligence for waste minimization forecast.

Keywords: Circular economy, sustainable development.

Isolation, detection and optimization of bioplastic (polyhydroxybutyrate) producing bacteria from industrial contaminated soil

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ABSTRACT

The biomaterials produced by microorganisms under various environmental conditions include bioplastics. Out of these bioplastics, the most widely produced are PHA, PHB and their derivatives. The unbalanced growth condition such as limited concentration of O, N, P, S, or trace elements, or high carbon concentration lead the microorganisms to produce biplastics in the form of polyesters which they store intracellularly in storage granules. Microbes including Alcaligenes latus, Azospirillum rubrum, Azotobacter vinelandii, Bacillus megaterium, Bacillus cereus, Enterobacter sp., Leptothrix sp., Methylocystis sp., Pseudomonas sp., Ralstonia eutropha, Rhizobium sp. and Rhodobacter sphaeroides are involved in bioplastic production. The present aim is to isolate such microorganisms and detect PHB, PHA in them by various method. A total of 80 morphologically distinct bacteria were isolated from the industrial waste contaminated soil. These were further screened on the basis of presence of PHA and PHB by sudan black B dye staining method, plate staining method and nile blue fluroscent dye staining methods. The isolates were optimized for different carbon source like glucose, mannose, lactose, maltose and sucrose. The maximum PHB production was reported by isolate N10 and N6 when maltose and glucose used as carbon source. The microorganisms showing high levels of these bioplastics (PHA and PHB) can be further used for production of bioplastics which are highly sustainable for environment.

Keywords: PHA, PHB, bioplastic, screen, sustainable, industrial.

Utility of Azolla as organic manure in sustainable Agriculture

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ABSTRACT

Keeping in mind the environmental concern among the modern society, the practice of organic farming has increased in present times. Chemical fertilizers are harmful to the biological cycle and affect the quality of the soil in long-term and are also harmful to health. Chemical fertilizers kill beneficial agricultural friendly and eco-friendly microorganisms present in the soil. Chemical elements enter the human food cycle and cause many diseases. Azolla is found to be very effective as biofertilizer if used appropriately. As it grows at a rapid rate, it doubles within a week. Azolla is a multipurpose fern which is also called "Green Gold". It can be used directly as organic manure. The leaves contain symbiotic algae like Anabaena, which take sunlight and perform photosynthesis, and help in the growth of Azolla. It acts as nitrogen fixation and increases the quality of the soil along with promoting beneficial agriculture-friendly micro-organisms. By the way, if any vacant space is available then it can be cultivated by making beds with brick walls. First of all, its culture is prepared and then it is used as biofertilizer. There is a lot of scope for Azolla to be used as biofertilizer across the world and more and more studies should be conducted to get its benefits.

Keywords: Azolla, Nitrogen fixation, organic manure, organic fern, organic fertilizer etc.

Heavy metal ion uptake using biodegradable polymeric film

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ABSTRACT

Most films used to preserve foodstuffs are made from synthetic plastic materials. However, for environmental reasons, attention has recently turned to biodegradable films. Gelatin has been extensively studied for its film-forming capacity and applicability as an outer covering to protect food against drying, light, and oxygen. Moreover, it is one of the first material proposed as a carrier of bioactive components. Gelatin was mixed with distilled water under mechanical stirring until it was completely dissolved. The solution was casted to form film. The gelatin films were evaluated for their swelling behaviour, solubility in food, moisture content, thickness and biodegradability. It was found that when the films were buried in natural soil to test biodegradability, after 5th day the gradual loss in weight has been observed from 0.366gm to 0.147gm and after 15 days it completely degrades. Gelatin films are completely soluble in water within 3 hours. Water solubility for pure gelatin film observed was 29 ± 1.6%. Gelatin film showed UV-visible light absorbance ranging from 280 to 480 nm with maximum absorbance at 420 nm. In this study, the removal of heavy metal ions from aqueous solution using natural gelatin films was investigated. The efficiency of gelatin as an adsorbent for the removal of heavy metals such as Zn (II) and Cu (II) from aqueous solutions has been determined. The aim of this work was to develop biodegradable film suitable for uptake of heavy metals under acidic solutions. For this purpose, gelatin films were synthetized and tested to carry out copper (II) ions and zinc (II) ions extraction from aqueous acidic solutions as a model.

Keywords: Heavy metal, biodegradable, polymeric film, aqueous solution, synthesis.

Toxicology: Risk assessment and risk management

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ABSTRACT

Toxicology has focused on poisonous chemicals with death as the primary endpoint, in toxicology even insignificant amounts of a chemical could resulting in a lifetime of harm.

One of the greatest difficulties in estimating the toxicity of household products is the fact that most of the ingredients are not disclosed on product labels or other documents. Household pesticides. The terminology relates to their function in the product rather than their toxicological characteristics, and these ingredients, with few exceptions, are not listed on product labels. Occupational Safety and Health Administration, contains LD50 or other toxicity data. The risk of adverse effects from exposure to household products is difficult to estimate because of the wide variety of products available, the many ingredients they contain, the presence of many "trade secret" ingredients, and the wide variety of exposure scenarios.

There is no correct way to examine the causes of neurotoxicity. Can divide into three overlapping areas: neurotransmitter/receptor effects, are often transient; damage to the peripheral nerves, causes a permanent damage to the developing nervous system. Agents like carbon monoxide reduce the availability of oxygen to the brain resulting quickly in unconsciousness or even death. Cyanide, working by a quite different mechanism, inhibits a cell's ability to utilize oxygen. In the peripheral nervous system, the length of cells contributes to their increased susceptibility to damage from agents that disrupt the transfer of nutrients. Acrylamide, for example, causes damage to the cell transport system, which results in paralysis that is first noticed in the legs.

Keywords: Toxicology, Household products, Neurotoxicity, Risk assessment and risk management, leg paralysis.

Study of the Avifaunal diversity of an urban College campus of Motihari, Bihar (India)

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ABSTRACT

Birds are culturally and ecologically significant and plays very crucial role in an ecosystem functioning. The avian diversity and their richness depict biological indicator of the quality of an ecosystem. The present study of avifaunal diversity was conducted in the typical urban campus of Laxmi Narain Dubey (L. N. D.) College, Motihari, East Champaran district of Bihar, India for one year from September 2021 to August 2022.A checklist of observed avian species was prepared. During this study period, a total 27 bird species belonging to 24 genera and 18 families were recorded. The family Ardeidae and Corvidae were represented by 3 species in each while family Accipitridae, Cuculidae, Hirundinidae, Muscicapidae and Pycnonotidae were represented by 2 species in each, 11 families such as Cisticolidae, Columbidae, Coraciidae, Dicruridae, Leiotrichidae, Nectariniidae, Paridae, Psittacidae, Strigidae, Sturnidae and Zosteropidae were represented by single species. The family Ardeidae was represented by three genera (Bubulcus, Egretta and Ardeola) while family Corvidae was represented by two genera (Corvus and Dendrocitta). The feeding habit of the observed bird species were also recorded. The findings of present investigation provide changing contours of land use and its impact on urban avifaunal distribution and diversity.

Keywords: Ardeidae, Avian diversity, Champaran, Corvidae, Motihari, Muscicapidae.

Agriculture development in the Hill Districts of Uttarakhand

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ABSTRACT

Agriculture sector plays a significant role in any economy and socioeconomic development. It is one of the most important sectors of Uttarakhand. Development has mainly happened in the plains and hill district have been left behind. The positive characteristics of these hill districts are that they have appropriate climate for high-value agriculture and a pleasant atmosphere because of 60% forest cover. For Uttarakhand hills, development should be made by the name of organic green state. In rural areas, agriculture is an important occupation. Our basic needs depending on agriculture and nature confer various resources for agriculture

Keywords: Agriculture, Development, hills, rural, organic.

Case study on role of women empowerment in Nainital District, Uttarakhand

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ABSTRACT

SDGs are the goals replaced the Millennium Development Goals. SDGs are a group of 17 objectives suggested by the United Nations. SDGs concerns gender equality and empowerment of women and girls as the 5th Goal amongst 17 goals. Women have always been an important part of our economy from bringing income as a wage earner to becoming an entrepreneur and providing employment opportunities or be it contributing in household activities. Therefore, overall development and growth of a country is possible only when women will be considered equivalent to men in various fields. Empowerment of women is an aggregate idea covering all socio-economic, political aspects of any nation. SHGs focus on giving women equal rights for the easy access of ownership and control over land, financial services which are the part of Sustainable Development Goals. SHG model has been beneficial in engaging the marginalised women to grow in different nations. SHGs have been rigorously working towards the government's SDGs plan. Various resources, literatures and studies concluded the positive relationship of SHG model in terms of literacy, less dependency on male, better education, health and social status of a group member. Also, the study focuses on the contribution made by SHGs in uplifting women by providing various technical skills, getting market access which are a part of sustainable developmental goals. Microfinance- SHG model has been the crucial factor in eliminating the need of money lenders, providing awareness about various schemes, well-being of the member. The purpose of this study is to comprehend the role of Self-Help Groups play in empowering women in Nainital District.

Keywords: Self Help Groups, Sustainable Development Goals, Gender Equality, Women Empowerment, Socio-Economic Factors, Equality.

Causes & Consequences of Rural Out-migration in the Kot Block, Pauri Garhwal Uttarakhand

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ABSTRACT

The study was carried out in the year 2020-2022. The study examined the consequences of out-migration in block Kot, district Pauri Garhwal, Uttarakhand as the migration is the concerned topic in the state. Data was obtained through primary questionnaire-based survey & secondary sources. In the study random sampling is done. Different statistical tools are applied with SPSS software. It examined the socio-economic characteristics of the studied area. The study found that Agriculture & Allied activities like livestock, fruit preservation units or forest-based products are and may be become prime source of income in the Hill rural areas. There is significant evidence that out-migration is helping rural families to improve their personal wellbeing through remittances but it also has adverse impact. In the last decade approximately 5 lakh people migrated temporarily or permanent from state (URDMC 2018). Out of these 42% were of 26-35year old. Out-migration is affecting various traditional system of rural areas. The study finds that people are migrating in search of employment from Hill areas to Plains Urban centers. The study supports the policy which may increase the income of rural people can demote migration in rural areas.

Key words: Out-migration, Pauri Garhwal, Unemployment.

Foliar application of chitosan-elicits growth and disease resistance in lettuce crop grown under hydroponic condition

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ABSTRACT

Chitosan has become of interest as a bio stimulant suitable for use in sustainable agriculture since it is biocompatible, biodegradable, environmentally friendly, and readily available in large quantities. Chitosan 80% DD, molecular weight 50-70 kD was selected for study. Seed germination was conducted in oasis cubes, one seed per whole, and chitosan 0.05 to 0.5% concentration was used. The effect of foliar application experiment was conducted on Lactuca sativa, variety lolorosso, in hydroponic conditions. The foliar application of different concentrations of chitosan, viz. 0 % (water control), 0.1%, 0.2%, and 0.5% (w/v) was applied. Three applications were done at 5, 15, and 30 days after transplantation on growth, and disease resistance were evaluated. After three applications, observation was recorded at 40 DAT at the time of harvesting. It was observed that chitosan increased leaf surface area, leaf fresh weight, dry weight, and disease incidence in chitosan treated plants compared to untreated lettuce crops. Grey mold disease incidence was 46 PDI in the 0% untreated control, but 31 to 7 PDI in the chitosan 0.1, 0.2, and 0.5 chitosan treatments. The total phenol analysis also showed a higher content of chitosan treatments. The results indicated that chitosan, and foliar application of chitosan, enhanced lettuce growth and reduced disease incidence in lettuce crops grown in hydroponic conditions. Hence, chitosan might have the potential to be used for sustainable production of lettuce under hydroponic conditions.

Keywords: chitosan, gray-mold, disease resistance, hydroponic, lettuce.

Organic Farming: An Emerging Approach towards Sustainability

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ABSTRACT

Concerns about climate change and sustainability are top priorities across all sectors of economy, including agriculture. Organic farming, one of the technological improvements to combat climate change and attain sustainability, promotes the use of on-farm inputs like compost, animal manure, and nutrient recycling while utilizing low-energy, off-farm inputs and forbids the use of chemicals. Sustainable agriculture, a field that is quickly expanding in many countries, can be evaluated. Food security, global warming, and climate change are pressing challenges that need to be addressed in the modern day. Additionally, organic food generally benefits public health. In the study entitled "Organic Farming: an Emerging Approach towards Sustainability", data regarding economics of organic farming over conventional farming were collected and analyzed. The costs incurred while cultivating inorganic cauliflower and tomato were Rs. 140027.20 and Rs. 117615.64 per hectare respectively, which are more than that incurred in case of the organic cultivation of cauliflower (Rs. 129596.10/ ha) and organic tomato (Rs. 111894.78/ha). The net income received from inorganic cultivation was lower than that from organic cultivation. The output-to-input ratio for the cultivation of cauliflower in inorganic and organic methods was 1.71 and 2.24, respectively, according to a cost analysis of the two methods. In the instance of organic tomatoes, the output-input ratio was 2.65 as opposed to inorganic tomatoes' (1.95), showing higher returns on investment per rupee for organic vegetable crop cultivation. The results showed that organic farming is more economical than inorganic farming in terms of cost and returns. Organic farming offers a lot of opportunity to encash its productive potential to a wider extent with greater assurance of high quality and toxin free vegetables. The low yield of vegetables in initial phase of organic farming can be compensated with higher market price for quality produce provided properly labeled products are marketed.

Keywords: Organic Farming, Sustainability, output-input, health, productive.

Wastewater Irrigation Risk Assessment: Heavy Metal Contamination of Food Systems and their Dietary Intake by Local People in Northern India

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ABSTRACT

Wastewater is often discharged to natural water bodies through an open channel as well as used by marginal farmers to irrigate the agricultural fields, particularly in sub-urban areas of developing countries. In the present study, the samples of irrigation water, soil, vegetables (palak, radish, garlic, cabbage and brinjal,) and crops (paddy and wheat) were collected from the agricultural areas receiving untreated wastewater from a carpet industrial and residential areas since a decade. The contents of Cd, Cr, Cu, Ni, and Zn in the filtrates of water, soil, and crops were determined using an Atomic Absorption Spectrophotometer (Perkin-Elmer AAnalyst 800, USA). Daily intake, hazardous quotient and heavy metal pollution index were computed to assess the health risk associated with consumption of heavy metal contaminated crops. The mean concentrations of Cd and Zn in palak (5.4 µgg-1 dw and 58.4 µgg-1 dw, respectively) and Cr, Cu, and Ni in wheat grains (16.0 µgg-1 dw, 28.0 µgg-1 dw and 40.7 µgg-1 dw, respectively) were found highest and had exceeded the Indian safety limit. Daily intake of Cu, Ni, and Cr via consumption of tested cereal crops was found higher than the vegetables. The health quotient revealed that health of local residents is more linked to vegetables than cereal crops. The present findings may be helpful to the policymakers and regulatory authorities to modify the existing policy of wastewater uses in the agriculture and disposal to the natural water bodies. The regular monitoring of heavy metal in the wastewater should also be ensured by regulatory authorities for their safe disposal to natural water bodies/agriculture in order to reduce human health risk associated with the degree of heavy metal contaminated suburban food systems.

Keywords: Food systems, Health risk, Heavy metals, Suburban, Wastewater.

Screening and growth evaluation of the thermotolerant yeast isolates for sugar, ethanol and pH tolerance

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ABSTRACT

The ethanol production potential of thermotolerant yeast strains isolated from different fruit wastes was investigated. Simultaneously they were assessed for sugar, ethanol and pH tolerance. A total of 110 yeasts were isolated by different fruit wastes and were screened to determine thermotolerance by growing at different temperatures viz. 35, 40 and 45oC by using Yeast extract Potato Dextrose broth. Among these, 20 yeast isolates grew satisfactorily at all three temperatures viz. 35, 40 and 45oC. Further, all 20 thermotolerant isolates were screened for sugar, ethanol and pH tolerance. The broth medium was supplemented with different glucose concentrations ranging from 10 to 25per cent (w/v), ethanol concentrations from 5% to 20% (v/v) and pH ranging from 2.5 to 7.5, respectively and all the tested broth samples were incubated at temperature (35°C, 40°C and 45°C), time (24 h, 48 h, 72 h and 96 h) and growth was measured by OD at 600 nm. Among 20 isolates, four (YP11, YM17, YPA48 and YPA64) were tolerant to glucose 25.0 per cent (w/v), ethanol 20.0 per cent (v/v) and pH 7.5.

Keywords: Thermotolerant yeast, osmotolerant, ethanoltolerant, pH tolerance, fruit wastes.

Screening of themotolent yeast isolates for sugar and ethanol tolerance

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ABSTRACT

An ideal microorganism used for ethanol production must have rapid fermentative potential, improved flocculating ability, appreciable sugar tolerance, enhanced ethanol tolerance and good thermotolerance. The ethanol production potential of thermotolerant yeast strains isolated from different fruit waste was investigated. Simultaneously they were assessed for sugar tolerance and ethanol tolerance. A total of 110 yeasts were isolated from different fruit wastes and were screened to determine thermotolerance by growing at different temperatures viz. 35, 40 and 45oC by using Yeast extract dextrose peptone broth. Among these, 20 yeast isolates grew satisfactorily at all three temperatures viz. 35, 40 and 45oC. Further all the 20 thermotolerant isolates were screened for sugar tolerance and ethanol tolerance. The broth medium was supplemented with different glucose concentrations ranging from 10 to 25 per cent (w/v) and ethanol concentrations (5% to 20% v/v) and incubated at temperature (35°C, 40°C and 45°C), time (24 h, 48 h, 72 h and 96 h) and growth was measured by OD at 600 nm. Among 20 isolates, four (YP11, YM17, YPA48 and YPA64) were tolerant to glucose at 25.0 per cent (w/v) and ethanol 20.0 per cent (v/v). Ethanol and sugar tolerant characteristics of the yeast may enhance ethanol production in high sugar medium.

Keywords: Thermotolerant yeast, sugar tolerant, ethanol tolerant and fruit wastes.

Some Epidemiological aspects of Lymphatic Filariasis and its Prevention by using Fish predators

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ABSTRACT

Out of 20 studied districts, the highest frequency of patients found in Lalmonirhat and Thakurgaon followed by Gaibandha. In the present study, 69.2% patients were found in north zone and 30.8% patients in south zone. 89.81% patients were found in endemic area (17 districts) and 10.18% patients were found in non-endemic area (3 districts). There was no patient in age group (0-10), the highest number of patients was found in age group (41-50); the highest number of patients goes to healer for treatment rather than doctor and health complex; 90.5% patients are suffering in leg swelling, hand swelling (7.6%), 0.7% and 1.2% patients are suffering in breast and scrotum swelling respectively. The most patients of endemic districts are illiterate having knowledge gap. More effective breeding grounds for Culex quinquefasciatus was higher in north zone. Pit surrounding the tube well harbored the highest concentration (75.07%) of Culex quinquefasciatus, followed by abandoned pond (20.68%) and ditches (4.25%); peak population of Culex quinquefasciatus was rom November to April. Out of eight different predators, *Clarias batrachus* were found in most of the breeding grounds. Fishes were allowed to feed upon different instars of Culex quinquefasciatus to determine their predation capacity; *Clarias batrachus* consumed the highest number of larvae (24,372.76/ day) followed by Oreochromis mossambicus (4,915.48/day).

Keywords: Lymphatic filariasis, epidemiology, vectors, prevention and predators.

Vulnerability assessment of mountain villages in the Trans-Himalayan region of Leh district using Livelihood Vulnerability Index Approach

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ABSTRACT

The mountain communities are the first to experience the effects of climate change. They are most vulnerable to climate change effects due to their fragile environment. The IPCC livelihood vulnerability index was employed to understand the level of vulnerability of local farmers to climate change. The approach comprises three major vulnerability components i.e., exposure, sensitivity, and adaptive capacity. The primary data via questionnaire and interview was collected from 376households from 11 villages in the study region in terms of demographic profile, livelihood strategies, social networks, health, water, food, climate variability, and natural disasters. A composite index was used to combine the data of different sub-components or indicators of each major component. The vulnerability ranges from (0) as least vulnerable and 1 as most vulnerable. The results show an exposure value of 0.874, a sensitivity value of 0.22, and adaptive capacity with a value of 0.87in the villages. The overall vulnerability value of the villages was 0.019. The result indicates that these villages are highly exposed to climate variability and natural disasters with the least adaptive capacity and moderate sensitivity.

Keywords: Livelihood Vulnerability Index; Climate Change; Mountain communities; Vulnerability Assessment.

Role of Skin Microbiome in Modulating Skin Cancer

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ABSTRACT

As ozone layer depletion continues to pose a bigger threat each passing day, a dramatic rise in the incidence of skin cancer can be detected in certain populations. Cutaneous melanoma with a heterogenous aetiology is considered to be the most complex and serious type of skin cancer. Sun exposure plays a primary role in melanoma tumor formation. 98.7% of UV radiation that reaches earth is UV-A, the most predominant component of sunlight. It has the capacity to penetrate five-times deeper into the skin due to its long wavelength and triggers DNA damage, overproduction of Reactive oxygen species (ROS), inflammation and immunosuppressive effects culminating into cancer. Usually most of the lesions created in DNA due to sun exposure are corrected by Nucleotide Excision repair; however if such lesions cannot be repaired then genetic information in the cell can be permanently mutated which can be lethal.

The rising concern about the increasing amounts of UV radiation entering the earth has led to the adoption of the Montreal Protocol and other treaties to ensure reduced emission of halogenated chlorofluorocarbons (CFCs) from automobiles, refrigerators or fire extinguishers that are known for depleting the Ozone layer.

Moreover, it has been found that UV exposure disrupts normal microbiota of the skin. Death Associated Molecular Patterns (DAMPs), Pathogen Associated Molecular Patterns (PAMPs), microbial toxins, cytokine and chemokines trigger inflammation, cell proliferation, immunosuppression impacting the tumor microenvironment of the skin facilitating carcinogenesis.

Clinical studies have confirmed that probiotic administration and restoration of gut microflora can indirectly improve skin condition by their pro-apoptotic properties and maintaining skin immune homeostasis.

Modern advances in microbial research has opened new avenues for us to understand pathogenesis and treatment of cancer triggered by UV irradiation. However the exact pathway in which skin microbiota modulate carcinogenesis is not exactly clear and demands further research.

Keywords: CFCs, Cutaneous melanoma, cytokines, DAMPs, microbiome , PAMPs, UV radiation.

Ecosystem Service Assessment of Vellayani and Akkulam Lake, Thiruvananthapuram District, Kerala

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ABSTRACT

Lake Ecosystems are significant resources as they play an important role in providing ecosystem goods and services. In recent decades, these ecosystems have been under increasing pressure as a result of various anthropogenic activities. Lakes are highly susceptible and important, at the same time, they retain high levels of biodiversity and contribute significantly to human well being. Despite an increasing popularity in the topic of Ecosystem Services, there is only limited application of this concept for sustainable resource management, due to lack of practical methodologies. This study reviews and analyse the already existing literature on Ecosystem Services globally. It focuses on the economic valuation and assessment of the various ecosystem services provided by two ecologically significant lakes in Thiruvananthapuram district, Kerala, India. Primary data for the study was collected from fish landing centres, aquaculture practicing areas, fishermen communities and local residents of the area and secondary data was collected from different Government departments like Kerala Water Authority, Department of Fisheries and Tourism. Valuation of provisioning services for three consecutive years 2019, 2020 and 2021 was based on the direct Market value of the products. The major ecosystem services assessed from the Vellayani Lake were drinking water supply, inland fishery (capture fishery and aquaculture) and lotus cultivation by the local residents. The annual income from Tourism activities supported by the Akkulam Lake was valued and assessed. The study also highlights the difference in the market prices of these services with the onset of Covid-19 and how it affected the livelihood of people depending on the lake system.

Keywords: Economic Valuation, Ecosystem Services, Ecosystem Services Assessment, Lake Ecosystems, Market Price Method.

Neurotoxicity Assessment ofAlmix and Excel Mera 71 Herbicides in *Anabas testudineus*

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ABSTRACT

Present study first time addressed neurotoxic potentiality of Almix (66.67 mg L-1) and Excel Mera 71 (17.2 mg L-1) in brain optic tectum of Anabas testudineus based on histological observation. A.testudineus was exposed for 30 d. Study showed several endpoints in optic tectum with varying degree. Spongiosis, binucleated nuclei, congestion, necrosis, enlarged pyramidal cells (EPC), neuronal degeneration, vacuolization, gliosis, abnormal orientationof the horizontal cells and granular cells were prominent pathological lesions in different layers of optic tectum in Almix and Excel Mera 71-treated A.testudineus. Among the six layers, stratum periventriculare (SPV) andstratum album centrale (SAC) layer were most affected by herbicide exposure. The mean assessment value (MAV) showed significantly higher ($p < 0.0001$) value in Almix (3.49 ± 0.28) and Excel Mera 71 (4.14 ± 0.10) exposure, in comparison with control fish (0.09 ± 0.04). Appearance of necrosis in neuronal cells and vacuolizationin optic tectum under Almix and Excel Mera 71 treatment indicated that both herbicides have potential neurotoxic effects. In particularly, Excel Mera 71 have higher neurotoxic potential than Almix. Collectively, these alterations in optic tectum indicated that visual, sensory and motor functions of A. testudineus adversely affected and Almix and Excel Mera 71 exposure have direct effect on brain metabolism, thereby affecting its growth and development. Finally, the results presented here showed that Almix and Excel Mera 71 are very toxic to fish and could be used as baseline information for understanding the mechanism of Almix and Excel Mera 71 toxicity in aquatic environment.

Keywords: Almix and Excel Mera 71 herbicides; Anabas testudineus; Brain; Histopathology; Optic tectum; Neurotoxicity.

Effect of pharmaceutical contaminant 17-β estradiol on growth and lipid production in marine diatom *Chaetoceros gracilis*

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ABSTRACT

In recent times, the occurrence of steroidal hormones in aquatic bodies preceded the emission of endocrine-disrupting molecules which have harmful impacts on the existence of aquatic organisms as well as the whole aquatic ecosystem. The purpose of this study is to reduce the hazardous effect of these steroidal hormones from water bodies and their biotransformation using microalgae diatoms. Nevertheless, the flexibility and strength of diatoms to adsorb and grow in various stress conditions including different nutrient loads which are drained directly into the water sources as the discharge of different polluted water sources like pharmaceutical, hospitals, agricultural fields, municipal and waste of industries like paints, textiles and so on. The use of diatoms in this way is an environment-friendly and sustainable approach to cleaning such types of pollutants from water bodies. In our study, we have executed this exceptional capacity of diatoms with *Chaetoceros gracilis* which was cultivated in different proportions of simulated pharmaceutical wastewater containing 17-β estradiol to explore their consequent effect on the growth, production of biomass, and synthesis of the lipid. In our study, as compared to the control group, we found that by increasing the concentration of estradiol (0.5 to 2.0 mg L-1) in the simulated wastewater, we observed that the number of cells increased by 1.5-fold (26 x 10-5 to 37.5 x 10-5 cells mL-1) and increased biomass productivity (0.050 to 0.111g L-1 d-1) in 1.5 mg L-1 concentration and lipid content was also increased significantly (18.28 to 29.5 % DW) in 0.5 mg L-1 concentration. In this way, the cultivation of the diatom *Chaetoceros gracilis* within the simulated medium had a noteworthy effect on the productivity of lipid and biomass can be a suitable feedstock for biofuel production with an undiscovered potential of the diatoms and help in pharmaceutical contaminants combating from water resources.

Keywords: 17-β estradiol, Chaetoceros gracilis, Diatom, Lipid productivity.

Susceptibility of Nilaparvata Lugens population from Rice growing areas of Nellore District, Andhra Pradesh to different groups of Insecticides

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ABSTRACT

The use of chemical insecticide has been the primary method for control of Brown plant hopper (BPH), Nilaparvata lugens (Stal) (Hemiptera: Delphacidae) in rice growing areas of Andhra Pradesh. Though insecticides did help in suppressing the pest initially, the indiscriminate use of chemicals has resulted in problems such as resistance development and resurgence of the pest (Nagata, 1982; Gao et al, 1987). In many rice growing areas of india, insecticides failed to give the desired level of control of the pest because of the development of resistance to insecticides. Yucong,Wen et al., 2009 tested the toxicity of imidacloprid, acephate, fipronil, carbosulfan and buprofezin in four fields populations and the results showed that compared with the susceptible strain, BPH field populations had developed moderate to high level of resistance to imidacloprid and low level of resistance to acephate, but no resistance to firpronil, carbosulfan and buprofezin. Basanthi et al., 2013 reported higher resistance levels to conventional insecticides and low resistance to newer molecules in field populations of BPH from rice growing areas of Karnataka, India The first ever report on insecticide resistance in BPH in India was from Godavari delta of Andhra Pradesh. So to assess the susceptibility of BPH population to frequently used insecticides at Nellore district the present study was conducted.

Field population of N. lugens collected as nymphs from Nellore district, Andhra pradesh were used to study the susceptibility to different groups of insecticide commercial formulations (chlorpyriphos, Pymetrozine, Dinotefuron and Ethofenprox). The rice stem dipping method (Zhuang et al, 1999) was employed for the determination of median lethal concentrations (LC 50) of the insecticides. The data were subjected to probit analysis (Finney, 1971) to determine the LC50 values. All the analysis was performed using SPSS 13.0. the results revealed that BPH population collected from farmer's fields of Nellore district recorded 1.513 folds of resistance for chlorpyriphos during 2019-20. In case of Pymetrozine, Dinotefuron and Ethofenprox recorded 0.738, 0.803, 0.963 folds of resistance, respectively against BPH.

Study of Foodand BehavioralEcology of Painted Stork (*Mycteria Leucocephala*) in Kaggaladu Bird Sanctuary, Tumkur, Karnataka, India

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ABSTRACT

The diversity of avi fauna is one of the most important ecological indicators to evaluate the quality of habitats. Most birds play a useful role in the control of insect pests in agriculture and act as scavengers useful to mankind. The painted Stork (Mycteria leucocephala) is one of the most common aquatic birds in the Indian subcontinent and also one of the important species from five genera and 19 species of storks all over the world. It is categorized as a Nearly Threatened (NT) species in the Red Data Book list of the avifauna of the World (IUCN). The painted stork is reported as a piscivorous aquatic bird. This stork species has a sluggish mode of feeding and stays for 1-4 hrs at a place, if not disturbed. The present study mainly emphasized the feeding ecology, feeding behaviour, techniques, types, and availability of prey species and strategies of painted stork Kaggaladu Bird Sanctuary, Tumkur. The present article mainly emphasized the feeding ecology and Behaviour of the painted Stork and strategies of feeding and types and availability of prey species in the Kaggaladu Bird Sanctuary. Shallow water marshes and wetlands with a good population of weed fishes and bivalve Mollusks are the ideal feeding habitat for Painted storks. Their feeding is greatly affected due to increased fishing and anthropogenic activities in the surrounding wetlands of Kaggaladu Bird Sanctuary.Painted storks in this region feed on fish. Moreover, the fecal waste analysis of this stork species indicates that 70-80 % part of the food contains Gastropods and bivalve shells from animals, and filamentous algae hydrophytes from plant parts. Anthropogenic activities and behavioral responses of this species in its habitat were observed to reach the conclusion that such activities are forcing the storks to change their feeding habitat frequently which is increasing the energy demand for flying and food search.

Keywords: Food, Behaviour, Painted Stork, Fishes, Hydrophytes, Kaggaladu Birds Sanctuary.

Citizen activism and Impact on Environmental Policies

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ABSTRACT

In India many people's movements are going on for environmental protection. These movements are spontaneous and have arisen out of difficulties in the lives of the local villagers. Such movements are help in environment policy formulation. However many government initiatives has been taken after these movements. But these kinds of government inventions have limited positive result. A detail study has been undertaken by researchers to better understand the relationship between Activism and its impact on environment policies and government intervention. The study is focuses in three state Jharkhand, Bihar and West Bengal. Outcome of the study will help to take better initiatives towards environment protection.

Keywords: Citizen Activism, environmental policies, government interventions.

Comparative In-Vitro Antifungal activity of essential oil from the Seeds of *Neolitsea pallens* (D. Don) Mom & Hara & Aerial parts of Agrimonia aitchisonii Schonbeck Temesy from Himalayan region

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ABSTRACT

The essential oil from the seeds of *Neolitsea pallens* (D. Don) Moms & Hara growing in the Himalayan region is found rich in sesquiterpenoids and oxygenated sesquiterpenoids whereas the essential oil from aerial parts of Agrimonia aitchisonii is dominated by oxygenated monoterpenes. The essential oils from these species were evaluated for their antifungal activity by using poisoned food technique under Invitro conditions. Both these oils showed variable antifungal activity against S. sclerotiorum, A. tenuis, C. graminicola, R. solani and F. oxysporum f.sp. ciceris. The mycelia growth inhibition shown by these oils varied from 25.9±0.00% - 100.00±0.00% for N. pallens and 11.11±0.03% - 100.00±0.00% for A. aitchisonii at 500µg/mL for these test fungal strains. At this concentration the essential oil of N. pallens is found to be more potent as compared to that of A. aitchisonii. The IC50 values showed a range from 58.5µg/ml – 335.8µg/ml for N. pallens and 41.10µg/mL – 85.44µg/mL for A. aitchisonii as compared to standard fungicides with IC50 values varying from 34.2µg/mL – 98.6µg/mL. The use of essential oils as anti-fungal agents does not develop any side effect either in plants or animals. Also medicinal plants are renewable natural resources, providing valuable natural products which are environment ecofriendly, less toxic and bio-degradable.

Keywords: Essential oil, antifungal activity, inhibition, fungal mycelia.

Cover cropping as a Biological Nitrogen Fixer as a Means of Improving Soil Quality

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ABSTRACT

Plant and soil health are adversely deteriorated due to the overuse of chemical fertilizers in the rice-based systems of India. The Indian government has recently compensated for high prices in terms of fertilizer, which have increased drastically due to the global war and COVID situation. In 2020, the nutrient-based subsidy contributed 0.5% of GDP (Rs. 0.73 lakh crore) in India. The regeneration of nutrients and improving nutrient use efficiency through biological nitrogen fixation (BNF) in the soils will help smallholder farmers to reduce input costs and ultimately improve soil health. BNF can be achieved by using green manure/cover crop that increases soil fertility and organic matter. It offers a conducive micro-environment that promotes soil microbial biodiversity thereby facilitating nutrient cycle.

Considering the above challenges and BNF as an opportunity, a pot experiment was conducted during Jayad 2022 at the IRRI-SARC, Varanasi, Uttar Pradesh, India. To understand the fertilizer embedment, three treatments were used, including conventional (N:P:K, 120:60:60 kg/ha), organic (vermicompost, biochar, vermiwash, eco-urea, gibberellic acid), and integrated nutrient management (INM) (50% of N:P:K, 120:60:60 kg/ha and 50% through organic). Leguminous crops have the ability to fix nitrogen biologically from the atmosphere. This study can help to understand the biological nitrogen fixation in the soil through cover cropping by Sesbania and Mungbean, and how it mitigates the GHG emissions from the soil. Improved quantification of legume BNF will help farmers manage nitrogen in a way that maximises output and minimizes detrimental environmental losses. To understand the variability of soil, pre-post samples from all the treatments with INM, organic and conventional, were taken and analysed. The growth attribute and GHGs emission were also estimated in the experiment. Use of BNF significantly increased plant growth, the number of nodules and dry matter production. Compared with controlled treatment, an increase of 12.6, 25.1 and 75.4 kg N per hectare in Mungbean and 50.3, 53.2 and 25.3 kg N per hectare in Sesbania were observed under INM, organic and conventional system, respectively. Cropping system of Mungbean and Sesbania in the rice-wheat crop rotation is an eco-friendly opportunity to improve soil nitrogen and mitigation of GHG emissions. Furthermore, organic and INM reduce the cost of cultivation by reducing the input cost of fertilizer. Though this was just a pot experiment, strategic research under different agro ecologies is required to validate the findings.

Keywords: soil health, GHG emissions, nitrogen use efficiency, bio-inputs, natural farming.

Social-Cost Benefit Analysis of Sewage Treatment Plant

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ABSTRACT

Clean water is not only essential for life but beholds the socio-economic aspect of living. Moreover, the increased process of urbanization has resulted in the scarcity of clean drinking water available for drinking, cleaning, and cooking purposes. The objective of the study is to analyze the economic, health, environmental, and ecological impact of two sewage treatment plants in Delhi. The study adopted the methodology of social cost-benefit analysis, based on the well-structured questionnaire used in the field survey during the study. The benefits such as social, economic, environmental, and ecological have been computed using appropriate indicators. The total costs were computed by fixed costs such as construction cost and cost of land, operating costs consisting of the maintenance cost, cost of electricity consumption, cost of chemicals used and manpower employed, and the cost involved in the dumping of manure. The study reveals that the benefits remain underestimated in both plants. There remains a huge potential for enhancing a substantial amount of ecological and economic benefits. The effluents from the plants can be utilized more efficiently and economically by distributing non-drinking water, biogas connections, electricity generation from biogas, and distribution of sludge used as manure to a larger section of society. Moreover, the land covered under the sewage treatment plant can be developed as a national park for the community with minimal entry charges and revenue.

Keywords: Sewage wastewater treatment plant, socio-economic impact, social-cost benefit analysis, biogas plant, sludge.

Chitosan nanoparticles composite prepared from low molecular weight chitosan with a higher degree of acetylation induces resistance against downy mildew disease in grapes

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ABSTRACT

The Downy mildew of grapes, caused by the oomycete biotrophic fungus Plasmopara viticola, is the most devastating disease which impairs quality and reduces yield. Chitosan nanoparticles (CNP) were synthesized from low molecular weight chitosan having a higher degree of acetylation and were evaluated for invitro antifungal activity and pot and field efficacy against downy mildew disease grapes. CNP significantly inhibited the growth of *P.viticola* in a laboratory ex-vivo leaf disc assay, with an EC50 of 40-78 mgL-1. In comparison to an untreated control, foliar application of a nano formulation induced systemic and controlled downy mildew of grapes under greenhouse conditions and in vineyards. Biochemical and physiological analysis showed induction of activity of phenylalanine ammonia lyase, peroxidase, and polyphenol oxidase, catalase in CNP treated plant leaf extract. Further, comparative analysis of CNP with chitosan and fungicides viz. copper, mancozeb revealed that the lower dose of CNP was on par with the recommended dose of copper-oxychloride and mancozeb fungicides for downy mildew management.

Keywords: Chitosan, downy mildew, degree of deacetylation, grape, low molecular weight, nanoparticle.

Human Gluten-Related Disorders therapy using plant proteases as a key enzyme

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ABSTRACT

Plant proteases are responsible for hydrolysis and mobilization of proteins during the stage of germination which is observed specially in cereal grains and seeds. Just like this instance, plant proteases are important for different biological tasks that a plant's life cycle constitutes. The majority of plant proteases which are responsible for seed germination are from the cysteine proteases. The cysteine protease group includes the C1A family known as papain- like proteases and the C13 family known as legumains. Wheat has gluten as its main structural component along with toxic proteins available in cereals like rye and barley. The proteins which make Gluten toxic are called gliadins and glutenin. These toxic proteins are responsible for various gluten-related disorders like celiac disease and wheat allergy, in both cases the gastrointestinal mucosa reacts to gluten mediated by T-cells. Since for plant proteins, gluten is a suitable simple target, our previous knowledge about proteases involved in protein mobilization, gluten degradation can be done from the various plant sources making it easy for consumption of products to patients and provide less exposure and more safety. Genes can be manipulated with various gene therapies as a tool against gluten-related disorders. The wide range of proteases available can be used to focus on the enzyme which impacts the most to the grain composition reducing the gluten content.

Keywords: Celiac disease, cysteine proteases, gliadin /glutenin, Gluten-Related disorders, Wheat allergy.

Molecular assessment of wild and cultivated Cicer species using ISSR markers

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ABSTRACT

Characterization of germplasm is one of the prerequisites for utilizing it in crop improvement programs and this requires understanding of genetic relationship between the wild and the cultivar genotypes. For this purpose, we investigated genetic relationships between 12 wild and cultivated accessions of chickpea using ISSR markers. ISSR amplification result shows 123 bandout of the 250 bands i.e, (49.2%) bands were polymorphic. The dendrogram classified all twelve accessions into two distinct major clusters A and B, with about 21% of the similarity coefficient value. Based on 20 ISSR primers, Jaccard's similarity indices between pairs of accessions ranged from 0.119 to 1.00. UPGMA dendrogram revealed that the cultivar genotype ICC2210 (Kabuli) from Algeria and the wild genotype ICC17156 (Desi) from Turkey had the lowest similarity indices. According to Principal Component Analysis (PCA), the top three principal components, with Eigen values of 5.40, 3.35, and 2.61, are the most informative, accounting for 61.33% of overall genetic variation. All the accessions were divided into three groups, which covered seven (58.33%) of the total, although five (41.66%) were scattered on the plot. The PCA results resemble to the cluster and similarity coefficient analysis although some deviations have been observed. This information could be useful in breeding strategies for the improvement of chickpea accessions.

Keywords: Chickpea, ISSR, Molecular markers, Polymorphism, Genetic relationship.

Plastic Waste Management: Transition from a linear to a Circular Economy

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ABSTRACT

Plastics find their use in every sector owing to their durability, low cost and versatility, and have become an integral part of the global economy. Societies all over the world are following the make, take, use and dispose model of linear economy in terms of plastic usage which has a significant impact on the environment and thus need to be managed efficiently. Worldwide, a huge amount of plastic waste is generated, but only a few percentages of this waste is recycled and the remaining find its way into the various ecosystems thereby harming the environment and life. The world needs a transition from linear economy to a robust circular economy in terms of plastic waste management so as to have more sustainable resource management. In a circular economy, plastics are used and reused for a longer duration while extracting the maximum value from them and finally recovering and regenerating products at the end of their service life. Apart from reuse ad recycling of plastics, various technological innovations and interventions, like diverting Plastics to road construction, plastic to alternative fuel, plastic as raw material in cement kilns, Plastic to pavement blocks or tiles, Conversion of PET bottles waste into textile products and likewise can help reduce plastic waste thereby plummeting environmental and health impacts. Thus, plastics if brought into circular economy would ensure a sustainable and a resource efficient future.

Keywords: Environment, Recycle, Resource Management, Reuse, Sustainability.

Assessment of physical, chemical and microbial characteristics of water samples of ponds of Doaba region of Punjab, India

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ABSTRACT

Ponds in India are constantly polluted by anthropogenic activities. These reservoirs are important ecosystems that must be protected. Keeping in mind the current status of the available water for drinking, these water bodies should be maintained as a source of drinking water in the absence of potential drinking water source in an area. Many regions view natural and constructed ponds as suitable dumping sites for sewage, agricultural runoff, and domestic waste. Thus, it is vital to monitor the pond's water quality and ecological health in order to maintain and restore it. Present study was carried out to assess the variations in the physical, chemical and microbial status of ponds across Doaba region of Punjab. Limnological parameters of water collected from different sampling regions like pH, electrical conductivity, total dissolved solids (TDS), dissolved oxygen (DO), biochemical oxygen demand (BOD), chemical oxygen demand (COD), total alkalinity (TA), total hardness (TH), chloride, nitrate, phosphate, fluoride, total coliform and fecal coliform were evaluated. All parameters were done following standard protocols methods as per APHA Standard methods for examination of water and waste water, 23rd edition, 2017. The value of water temperature recorded from 10 different sampling sites of Doaba region of Punjab was in the range of 24±0.05°C to 32.46±0.06°C, respectively. The highest values of parameters like pH (10.46±0.03), electrical conductivity (813.33±3.33 µS/cm), DO (8.66±0.12 mg/L), BOD (190±1.23 mg/L), COD (302.66±14.52 mg/L), TDS (483.66±0.33 mg/L), TA (232±3.05 mg/L), TH (263.33±1.76 mg/L) and chloride (77.96±1.15 mg/L) etc. Total coliform was present >1600. Fecal coliform was present at all sites. All studied parameters were found to be more than permissible limit as per Drinking Water Standards (IS 10500 : 2012) prescribed by CPCB.

Keywords: Microbial analysis, physico-chemical analysis, ponds, wastewater analysis.

Effects of Global Climate Change on Society and Future Needs

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ABSTRACT

Global climate change has become a major threat to the nature and the present society. Large reservoirs, forests, plains, mountains and deserts all have come under the grip of climate disturbances. Similarly, people in the society are falling prey to the consequences of climatic changes like air pollution, floods, drought, earth quakes and pandemics. Air pollution has become the 4thlargest threat to human beings after the commonepidemics. Further, climatic changes might lead to worsen the quality of life sustaining natural resources such as air and water which in turn will spread various diseases and altering the survivable weather conditions. Widespread exploitation of natural resources and greenhouse gases are the main contributors to global climate change, which has led to an increase in temperature around the world. Present competitive landscape for resources such as food, water and land may further lead to sub-economic tensions that cause global climate change. Therefore, climate change may become a major threat to international peace and security in the near future. To counter this various remedial aspectsmay be acquired like curtailing the use non-renewable natural resources, replenish fuel consuming automobiles by the smart automated electrical systems etc. This study explains the impact of climate change on all walks of life with various advancements and remedial initiatives.

Keywords: Global Climate Change, GHGs, Global Warming.

Hazardous Effects of Air Pollution on Respiratory Organs around the Globe

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ABSTRACT

Nowadays people around the globe are facing various types of respiratory diseases like asthma, chronic obstructive pulmonary disease, pulmonary fibrosis, lung cancer, etc. due to air pollution by burning fossil fuels, plastic, waste heat from vehicles, air conditioners, generators, volcanic eruption, dust storms and leakage of gases. Urbanization and industrialization in India result in hotter urban areas having poor air quality and due to this, around 1.5 lakh people had the respiratory disease in 2020. Although protective measures were taken by the government like recycling garbage, burning fossil fuel in a controlled way, walking for shorter distances and carpooling while traveling, banning the use of lead in petrol, and setting up industries away from civilization and in such a place where no organism be harmed, decreasing the duration of the use of A/C, by quitting smoking an individual can save his or her self, by properly closing or sealing the gas chambers or pipes to avoid any case leakage to make people aware to induce big changes, still very lesser implementation has been done. This paper elaborates on the various hazardous effects of air pollution on respiratory organs along with the actions taken by the government in reducing air pollution. This paper also enlightens the opportunities and advancements that can be done regarding this issue.

Keywords: Air Pollution, Respiratory Diseases, Environmental Protection Act, Pollution Under Control Act.

Response of Smriti Van's animals to dietary modification and significance of fruit tree afforestation

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ABSTRACT

The eating habits of the wildlife living in Smriti Van in Jaipur were observed for 15 days in order to determine how they would react when their daily conventional bird feed was changed to include a variety of fruits with varying juice contents. This information was used to further discuss the significance of fruit trees in defending wildlife against the effects of climate change, the environment, and the advantages of fruit trees afforestation. It was noted that the animals arrived in large numbers and preferred fruits over dry grains. During India's hot month of July, the approach comprised placing fruits out for animals at various areas and checking on them every 15, 30, and 45 minutes.

The result of our experiment shows that birds and squirrels tended to congregate at locations with fruits rather than those with only dry grains. In just 15 minutes, birds preferred eating strawberries followed by pomegranates, indicating that they preferred hydrated food over the other options (fruits, seeds, nuts, grain). According to present findings, animals prefer hydrated fruits over dry grains. This behavior demonstrates how much value they place on tasty, nutrient-rich food that is also generally good for their health, and staying hydrated also helps animals cope with the effects of heat waves brought on by climate change and how these parks with fruit trees can impact the ecosystem of cities. The advantages and effects of fruit tree afforestration on human health, cities and ecosystem are also listed in this paper.

Invasion of Ageratina adenophora alters the rhizosphere soil characteristics in banj oak and chir pine dominated forests in the Central Himalaya, India

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ABSTRACT

The biological invasion has emerged as one of the most severe environmental and socio-economic problems and has increased drastically over the decades. This study focuses to understand the influence of invasive shrub species Ageratina adenophora on soil physical and bio-chemical properties in banj oak (Quercus leucotrichophora) and chir pine (Pinus roxburghii) forests in the Almora district of Uttarakhand, India. The rhizosphere soil (RS) samples were collected from upper and lower soil layers of the soil profile of two shrub species, i.e., Rubus ellipticus (native) and Ageratina adenophora (invasive). Soil tightly adhered to the roots was brushed off on paper bags and considered rhizosphere soil. Soil moisture (Mo), pH, soil organic carbon (SOC) and microbial biomass carbon (MBC) were analyzed. One-way ANOVA was used to test the significant difference in soil properties between the forests and between native and invasive shrub species. Results indicated that the RS of Ageratina adenophora has significantly higher ($p < 0.05$) Mo, SOC, and MBC in banj oak than RS of Ageratina adenophora in chir pine forest, while soil pH did not vary significantly between the forests. In the banj oak forest, the RS of Ageratina adenophora has significantly ($p < 0.05$) higher SOC and MBC compared to the RS of Rubus ellipticus. However, in the chir pine forest, SOC and MBC did not change significantly between the RS of native and invasive. In general, Mo and SOC showed a decreasing trend while soil pH increased from the upper to lower layer in both native and invasive shrub species. Our findings suggested that compared to chir pine forest, banj oak forests have high soil moisture, and other soil conditions that favour the invasion of Ageratina adenophora relative to the native Rubus ellipticus.

Keywords: Ageratina adenophora, biological invasion, rhizosphere, Rubus ellipticus, soil microbial biomass.

Transitioning towards sustainable Agri-food Systems in India: Concerns and Policy Recommendations

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ABSTRACT

The agri-food sector of India, while being a major influencer of social and economic indicators also plays a deterministic role in conserving the country's natural resource base. Moreover, the sector's self-sufficiency in terms of food production has been pivotal in shielding the country from food security associated challenges during and post the COVID-19 pandemic. The present study therefore attempted to ascertain the impact of the pandemic on the agri-food sector along-with institutional reforms targeting resilience within the sector. Henceforth, policy recommendations to further improve the governance landscape of agri-food systems were suggested. A thorough analysis of government datasets, annual reports of agriculture ministry, agri-food sector related administrative interventions and advisories issued during pandemic, research articles and policy briefs was undertaken as part of methodology. Results indicated that movement, storage and processingwere the major issues affecting agri-food systems in India while the economic packages launched by the government to enhance grain distribution among the socio-economically deprived sections greatly benefitted food security during the pandemic. Recommendations such as use of digital technology to enhance connectivity of retail stores, distribution of therapeutic foods and immune supplements among the economically vulnerable and nutritionally poor sections, promotion of 'planetary healthy diets' with responsible consumption practices and agronomically suitable crop diversification were suggested to improve the overall sustainability and vitality of agri-food systems in India. It was concluded that promotion of resource efficiency within the agri-food sector along-with eco-friendly diets would significantly benefit implementation of the Sustainable Development Goals (SDGs) in India.

Keywords: agri-food systems, food security, policy recommendations, SDGs, sustainable food supply chains.

Seasonal profile and chemical characterization of ambient PM10 and PM2.5 and AQI enumeration at Lucknow city

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ABSTRACT

Clean air is imperative to the survival of all life forms on the planet. However, recent times have witnessed enormous escalation in urban pollution levels. It is therefore, incumbent upon us to decipher measures to deal with it. In perspective, the present investigation was carried out to assess PM10 and PM2.5 loading and associated chemical profile of three-locations, viz. commercial, industrial and rural area in Lucknow during the summer and winter of 2021. In order to ascertain PM profile, trace elements, ionic species and organo-chlorine pesticides associated with PM were assessed. SEM-imaging was also carried out to gauge PM composition. 24 hr wintertime concentrations of PM10 (Avg±SD) at the commercial, industrial and rural area and exceedance percentage of maxima above NAAQS were 228.3±32.1, 217.3±25.9 and 167.2±27.2 µg/m3 and 156%, 158% and 101% respectively. Corresponding wintertime PM2.5 values were 124.0±15.0, 107.8±14.7 and 71.1±12.3 µg/m3. Similarly, mean 24 hr summertime concentrations of PM10 were 139.6±20.7, 136.0±19.8 and 116.0±20.7 µg/m3 and exceedance were 69%, 65 and 40% over NAAQS. Both PM10 and PM2.5 concentrations were found to exceed NAAQS frequently, however wintertime means were often in the hazardous AQI range. In this context, AQI was worst for Commercial area (317), whereas it was 145 for rural area. A total of 18 elemental species were associated with PM10 (0-882.4 ng/m3 during summers and 0-1339.3 ng/m3 during winters), 10 ionic species (0-3000 ng/m3 during winter and 0-1914 ng/m3 during summer, and OCPs (0-5.47 pg/m3 for winters and 0-2.64 pg/m3 for summers). Commercial area showed highest PM loading and complexity in particulate profile owing to multifaceted vehicular emission combined with road dust and soil re-suspension. It is observed that residents of Lucknow city regularly face exposure to particulate pollutants and associated constituents. It is therefore imperative to develop pollution abetment strategies to combat urban air pollution.

Keywords: urban air pollution, trace elements, ionic species, OCPs, particulate matter.

Glacial Ice: The most reliable marker of climate change

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ABSTRACT

The past and present state of the climate can be detected by glaciers very accurately. As glaciers react to minute but persistent changes in climate, their present area and volume are a result of variations in both precipitation and temperature. Understanding climate change on long-time scales requires knowledge of glacier fluctuations. The majority of glaciers are presently receding. The National Snow and Ice Data Center (NSIDC) estimates that since 1994, there has been a 400 billion tonne annual loss of glaciers. The melting of glaciers poses risks to the human communities that live nearby, including outburst floods, landslides, debris flows, and debris avalanches. They may also result in the outbreak of diseases caused by the pathogens preserved in the permafrost layer. In addition, glaciers make a significant contribution to water resources, which are often severely limited in the majority of the world.

The number of days per year when sea ice covers Uummannaq Fjord has decreased over the past few decades as a result of the glaciers surrounding the fjord melting more quickly. An ancient culture that has adapted to the seasonal advance and retreat of sea ice is now faced with the possibility of a permanent ice retreat. The winter isolation of island communities like Saattut, which has 200 residents and 500 sled dogs, is broken by the arrival of sea ice. For hunting trips and family visits, residents use sleds and snowmobiles instead of expensive flights or boats. Even on the mainland, Greenland has no roads that connect its towns. Additionally, Kiribati is in danger of being submerged by rising seas, but the islanders' spirit is unwavering. Tarawa, the capital of Kiribati, is at risk of flooding as more of the city is below eight feet above sea level. Mangroves cannot stop the ocean from encroaching, but mature trees' trunks and roots can lessen erosion and dampen storm surges. The lagoon's shore has been stabilised by the planting of seedlings close to Tarawa's airport. By now, climate change has become a natural phenomenon. But the planet's climate is drastically altering right now, affecting all forms of life on land and in the sea. The greenhouse gases' impact on rising temperatures is just the start of this journey. Extreme weather, such as prolonged droughts, shifting breeding and migration seasons, changing food availability, new disease patterns, rapid ice melt, and rising sea levels are the following. Since glaciers grow by accumulating layers of snow so thick that the portion at the bottom gets compressed into ice, more snow falling on a glacier on land could be a possible solution.

Keywords: climate change, environment, glaciers, global warming, greenhouse effect, melting ice, rising sea-level.

Impact of pesticides on physiological behavior and nigrostriatal nerve pathways in Caenorhabditis elegans leading to Parkinson's disease

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ABSTRACT

Synthetic pesticides have been in use in many developed and developing countries since their introduction in the 1940s and are used commercially to control hazardous pests and insects, to which we are getting exposed either directly or indirectly. Four classes of synthetic pesticides pyrethroids, organophosphates, carbamates and botanical insecticides used as toxicants commonly used in household products and their assessment were evaluated by using C. elegans as a model organism with different physiological and neuronal aspects. Out of these selected pesticides the transfluthrin, trichlorfon and methiocarb were found to be more effective as compared to control as they changes the physiological endpoints in C. elegans. Alteration in the physiological endpoints can cause an impact on the nervous system by the dopaminergic neuron degeneration in a transgenic strain of C. elegans BY250 exposed by commercial concentrations at different exposure periods. This determined that these synthetic pesticides are effective for humans and may cause neurodegenerative diseases by DArgic neuron degeneration that leading to parkinson's disease. The approaches in the present work have a complete profile as it includes physiological as well as neuronal aspect to understand mechanism of synthetic pesticides.

Keywords: Pesticides, physiological behavior, nigrostriatal nerve pathways, C. elegans, Parkinson' disease.

Loss of crop yield in Delhi region related to surface Ozone: estimation based on network of ground-based observations

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ABSTRACT

From January 2018 to December 2021, continuous, real-time measurements of gaseous air pollutant, surface ozone (O3) were taken at 36 air quality monitoring stations (AQMSs) spread across 2000 km2 in Delhi-NCR. The four year continuous measurement of surface ozone data was used to calculate surface ozone related yield losses for crops such as rice and wheat. The widely used metric (Accumulated exposure Over a Threshold of 40 ppb i.e. AOT40) was used to calculate the exposure-plant response index. The ozone levels (2018-2021) were high enough to exceed "critical levels" for human health and agriculture. The AOT40 levels significantly exceeded during the Rabi season (winter (D-J-F) and pre-monsoon season (M-A-M) for wheat as well as Kharif (J-J-A-S) growing season for rice. Using AOT40 values calculated during the three month growing season, we have calculated relative yield losses for wheat and rice. The relative yield losses for wheat and rice were found to be 2.06% and 6.79% respectively. Wheat is the most impacted crop with Crop Production loss of 1751 Mt followed by rice at 1280 Mt. The economic loss for the New Delhi Region was also higher for wheat (0.042 billion US dollars) as compared to rice (0.029 billion US dollars).

Keywords: AOT40, Economic Loss, Kharif, Rabi, Relative Yield Loss.

Source apportionment and seasonal variation of Polycyclic Aromatic Hydrocarbons (PAHs) and Nitro-PAHs

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ABSTRACT

Atmospheric concentrations and seasonal variation of 16-priority Polycyclic Aromatic Hydrocarbons (PAHs) and Nitro-PAHs were investigated at a rural site of Agra, India for a one-yearperiod to assess their sources and potential correlations with Ozone (O3), NOx and meteorological parameters. The mean concentration of particulate and gas-phase PAHs (-PAHs) were 301 ± 366and 418 ± 665 ng m−3, respectively whereas the Nitro-PAHs concentration in the particulate were17 ± 27 ng m−3 and in the gas phase were 19 ± 45 ng m−3. The highest concentration of PAHs was found during the winter season followed by summer, post-monsoon and monsoon. A similar trend for seasonality was identified for Niro-PAHs. The impacts of meteorological parameters on ambient PAH levels were season dependent. Gas phase concentration of PAHs was higher during the high-temperature summer season whereasduringthe winter season low temperature and high relative humidity (RH) lead to an increase in the PAHs concentration in the particulate phase. In general, low molecular weight PAHs were found mainly in the gas phase whereas high molecular weight PAHs were found mainly associated with particulate matter and medium molecular weight PAHs distribute equally between both the gas and particulate phase. Statistically significant correlation ($p<0.05$) of PAHs with ambient O3 and NOx indicates that PAHs concentration in the ambient air depends on photochemical oxidation and biomass combustion. Source apportionment of PAHs was done using molecular diagnostic ratios (MDRs) and Principal Component Analysis (PCA) which indicates that vehicular emission, biomass and coal combustion are the main sources of PAHs and Nitro-PAHs in the ambient air of Agra.

Keywords: PAHs, Nitro-PAHs, Gas-particle distribution and Source apportionment.

Vishuddhi-Menthol as an indigenous disinfectant (Masks and Surfaces)

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ABSTRACT

In the Covid-19 pandemic, repetitive use of synthetic sanitizers is carcinogenic to our bodies and harmful to the environment. Most people know the dangers of chemical disinfectants and want to buy natural disinfectants that are readily available, have cheap prices and do not cause any health hazards. So, we developed the Vishuddhi project. In the present study, we evaluated the strong Antibacterial activity in menthol leaves against pathogenic bacteria (Bacillus subtilis, Pseudomonas aureus). We found that Menthol is very effective against viruses and bacteria. It can address many sanitisation challenges and will pave the way for odourless, natural, safe and low-cost methods to achieve hygienic reusable masks and clean surfaces. We also added aloe vera properties with menthol. We conducted a test where used surgical masks and N95 masks were treated with Menthol. We observed that masks become odourless and bacteria-free due to Menthol's bactericidal effect. Natural peppermint (Mentha piperita) menthol could be a potent source to sanitize masks and surfaces. Given the multiple benefits of menthol (100% anti-microbial effect), it seems critical as sustainable, renewable, metal-free and combinable with other textile effects. It gives odour management natural technologies, hygiene function, and material protection.

Keywords: Vishuddhi, indigenous disinfectant, Menthol, sustainable, hygiene.

Low molecular weight with a higher degree of acetylation, chitosan nanoparticles composites control bacterial blight disease in pomegranates

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ABSTRACT

An interest in the development of ecofriendly approaches for disease management in agricultural crops, using organic compounds like chitosan as an alternative to antibiotics or chemical pesticides, has been initiated. Chitosan-based nanoparticles (CNPs) were prepared from low molecular weight (10–50 kD) with a high degree of deacetylation (90–95 DDA). The synthesized nanoparticles were characterized by field emission scanning electron microscopy (FESEM), particle size analyzer (PSA) and tested for their antimicrobial activity against Xanthomonas axonopodis pv. In an invitro bioassay, CNPs had a particle size of 30–70 nm, a zetapotential of +24 to +40, and an EC50 of 56–72 g/mL-1 and an MIC of 92–110 g/mL-1 against X in an invitro bioassay. The pot study and field study observed that three applications of CNP at doses of 0.05 to 0.1% at 5–8-day intervals were at par with streptocycline at 500 ppm and copper hydroxide at 2 gL-1.

Keywords: Chitosan, nanoparticle, pomegranate, blight disease, Xanthomonas axonopodis.

Entrepreneurship Education: A step towards sustainable developmental Goals

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ABSTRACT

In 2015, some universal goals were set by the United Nations for the welfare of human beings, which were named Sustainable Development Goals. These universal goals act as a guide for the development of all nations. In the context of India, to make these goals achievable and to meet the immediate challenges, the new education policy was announced in 2020 by the Education Minister of India. The basic objective of this education policy is to restructure India's education system in the context of these Sustainable Developmental Goals, making it capable of meeting the challenges of the 21st century. For this purpose, many fundamental changes in education have been recommended in which entrepreneurship education has emerged as an important dimension. Entrepreneurship education is that education which can develop the basic qualities inherent in the human being and lead him towards becoming self-reliant. Entrepreneurial culture and education are important in the context of emerging economy. It prepares the human being for the challenges and also develops the qualities of effective planning, communication, management etc. Through entrepreneurship education, students can prepare better products based on international standards. Along with this, it also inspires the students to move towards green development by connecting with their environment. But this is possible only when this entrepreneurship education is imparted effectively and it also includes harmony with the environment. How can entrepreneurship education prove effective in achieving these universal goals? What are the challenges that might come up during this time? This paper analyses these issues.

Keywords: Sustainable Developmental Goals, National Education Policy 2020, Entrepreneurship Education, Environment.

Polychaetes and sponges – Potential bioremediators for addressing future aquaculture concerns

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ABSTRACT

The growing world population largely depends on fisheries as a source of cheap protein. In future, the world fisheries production would be mostly from the aquaculture sector, which is the farming of aquatic organisms. This is greatly achieved by the adoption of new and advanced technologies, species diversification, effective utilization of available water resources without deterioration, and so on. At the same time, this growing industry also faces some challenges on maintaining the proper water quality and disease outbreaks. Sustainability is of prime importance in aquaculture in terms of overcoming these constraints and this could be achieved by adopting new candidate species in the aquaculture practices like polychaetes and sponges, which serve as potential bioremediators of organic pollutants and pathogenic bacteria. Polychaetes are filter feeders that are actively involved in the remediation of wastes from the aquaculture systems, while the marine sponges are sessile filter-feeders which are effective in treating the microbial pollutants. In addition to these major roles, polychaetes serve as a protein rich nutritious feed for the fishes being cultured, while sponges could be used in developing drugs for human ailments. Thus, coupling of polychaetes and sponges in fish farming would benefit both the fish and humans by effectively managing the aquaculture production and improving the health conditions of humans. Advanced aquaculture practices like Integrated Multi-Trophic Aquaculture (IMTA) have greatly increased the involvement of these two components for effective utilization and production in a sustainable manner. Understanding the potential utilization of polycheates and sponges, its mechanism in remediation and gene level intervention in terms of alleviating organic and microbial pollutants and restoration of nutrients from aquaculture wastewater is necessitated to achieve sustainable aquaculture production targeting the FAO's Blue revolution transformations.

Keywords: Polychaetes, Sponges, Microbial pollutants, Organic pollutants.

Jharia Coal Mine Fire and Health Externalities: An Evaluation of Health Cost near Jharia Coal Fields

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ABSTRACT

The present study is based on the health externalities of the people living near Jharia Coal Field (JCF) due to coal mine fire burning since centuries. The study also emphasizes on the economic valuation of the health impact of the colonials near Jharia Coal Fields. The data of total 100 households have been collected from four villages near coal fields and the total 50 households have been collected from two controlled (non-mining) areas. Cost of Illness approach has been used to analyze the health impact. After field observations , discussions with the villagers Doctor's interviews , and evidences from various official reports it was found that due to coal mine fire and emissions from toxic gases the atmosphere of the Jharia coal field have been highly polluted. The local people of Jharia coal fields are suffering with various air and water borne diseases and spending a large portion of their income on treatment of these diseases as compared to the controlled (non-mining) villages. Considering the need of urgent implementation of the sustainable pattern of development has now become crucial to act and not react on such issues because climate change is no more an illusion but a reality and the brunt of it is being witnessed throughout the globe. So, this problem is no more area specific problem but it is also a part of global stress.

Keywords: Jharia coal Fields, Cost of Illness (COI), Health externalities, air & water borne diseases, health expenditure, climate change.

Role of Farm Machinery in Sustainable Rice Production in India

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ABSTRACT

Rice is the dominant kharif crop of north western zone of India. In Rice–Wheat (RW) rotation, rice is of immense importance for the food security and livelihoods in India. The widespread adoption of high-yielding rice varieties along with improved management practices led to drastic increase in its productivity but at same time it makes us to think about the cost at which we are obtaining this and can we sustain it in future. Raising yields on existing farmland is essential for saving land for nature, but the prospects for yield increases comparable to those of the past 40 years have narrowed down. In order to further enhance the rice production and maintain self-sufficiency we should focus on farm mechanization. Due importance was not given to farm mechanization until the beginning of the century. Earlier, only large scale farmers came up to fabricate simple manually operated machinery like weeder, thresher, winnower etc. With due course of time and the growing demands for foods, it was realized that agriculture will have no other alternative than to adopt mechanized cultivation to feed over increasing population. When comparing direct-seeded rice (DSR) to manual puddled transplanted rice in sowing/transplanting, researchers discovered labour and cost savings of 97% and 8%, respectively. The DSR method offers various advantages over the PTR approach, including labour savings of 40–45%, water savings of 30–40%, fuel/energy savings of 60–70%, and reduced greenhouse gas emissions. Moreover, agricultural machinery must be brought to use in for rice cultivation for increasing the quality of products and reducing the huge cost of its production and thereby minimizing the over exploitation of resources. Thus, this paper summarizes the role of farm mechanization in sustainable rice production in India.

Keywords: Direct-seeded rice, Farm Mechanization, Production, Rice, Sustainable Agriculture.

Polyester Based Biodegradable Plastics: A Remedy To Plastic Waste Problem

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ABSTRACT

The accumulation of plastic wastes is a matter of global concern. Since the commercialization of plastics, their manufacture has risen promptly which in turn has resulted in generation of tremendous amount of plastic waste in the environment. Plastic wastes being corrosion resistant and non-biodegradable not only pollute the soil and water but also have hazardous monomers that release chemicals which can produce cancer and introducereproductive deformities in marine organisms, invertebrates, rodentsand in human beings.

Polyester-based biodegradable plastics act as an alternative to conventional commodity plastics as introduction of weak functional groups such as esters, urethanes, orthoesters, carbonates, anhydrides and amides in their structure makes them susceptible to microbial enzymatic hydrolysis and degradation. Polyester based plastics can be of various types, such asPoly-3hydroxybutyrate (PHB)/3-hydroxybutyrate-co-3-hydroxyvalerate (PHBV), Poly lactic acid (PLA), Poly -caprolactone (PCL), and Polyethylene terephthalate (PET). PHBV/PHB, PCL, PLA, PET are primarily degraded by mesophilic bacteria Bacillus megaterium, Lactobacillus plantarum, Sphingobacterium sp, and Pseudomonas sp. respectively. These plastics are also degraded biologically by several other mesophilic and thermophilic bacteria and fungi with the help of enzymes like lipases, esterases, proteases etc. Alsothe production of biodegradable plastics is based on renewable sources. Generally, PHB/PHBV, PCL and PLA are used to manufacture packaging materials, medical implants, and drug delivery systems whereas PET is used to make textiles, clothings and storage materials. Polyester based biodegradable plastics can be a basis of sustainable development by being an effective means of reducing soil and water pollution due to non-biodegradable plastic waste.

Keywords: Biodegradable Plastic, Plastic waste, Pollution, Polyester, Sustainable development.

Investigative study of the parameters of drinking water obtained from underground aquifer as used by inhabitants of certain localities of Ranchi Jharkhand India

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ABSTRACT

Through this research paper, it is tried to estimate the quality of drinking water procured from the hand pump as used by the some inhabitant of certain locality of Ranchi. Seven parameters i.e pH, TDS, Hardness, Fluoride, Iron, Arsenic and MPN count were considered to evaluate the quality of drinking water of this area. For this five samples were taken from each locality. Drinking water quality procured from hand pumps of twenty seven sampling points was studied. The average count for the various parameters was near to the acceptable value. The average values of the Iron for the localities Samlong, Mahadew toil, Hatia, Chota Ghaghara, Hinoo, Hatma, Baraha Ghaghara, Simber toil, Ratu and Harmu were respectively – 7.23mg/l, 2.90 mg/l, 3.50mg/l, 0.526mg/l, 0.284mg/l , 1.42mg/l, 2.22mg/l, 3.29mg/l, 7.125mg/l and 1.806mg/l. After study it was found that condition of drinking water in these localities were satisfactory except for the presence of high concentration of iron at certain areas. A large amount of fecal coliform was found in the water of hand pumps which are set up near the dumping yard or garbage point.

Keywords: Hand pump Drinking water, pH, TDS, Hardness, Fluoride, Iron, Arsenic, MPN count.

Statistical Model for Annual trends and Magnitude of Climatic variability across locations from Malwa-Agro Climatic Zones of Madhya Pradesh

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ABSTRACT

Malwa plateau agro climatic zone comprises 8 entire districts (Indore, Dewas, Mandsore, Neemuch, Raigarh, Ratlam, Shajapur, and Ujjain) and part of Dhar (Dhar, Badnawar, Sardarpur Tehsil) and Jhabua (Petlawad Tehsil) districts of Madhya Pradesh. Malwa agroclimatic zone is average rainfall 977 mm. the average rainfall in Malwa agroclimatic zone in the different districts Indore(1006.76 mm), Ujjain (914.82 mm), Dewas (1015.86 mm), Rajgarh (973.22 mm), Neemuch (780.4 mm), Ratlam (895.0 mm) , Mandsoure (823.7 mm) and Shajapur (957.06 mm) [ ]. The soils of the area are medium, deep and shallow black and contain 40-60% clay. pH ranges from 7-8, CEC 33-55 c mol kg-1 and bulk density varies from 1.2-1.6 Mgm-3, low in N, medium to high in P and high in K, S and Zn deficiency are very common. Infiltration: 1.55-3.66 cm / hr (Low-Medium). Major crops are soybean (Kharif); chickpea and wheat (Rabi).Other crops are maize, sorghum, pigeon pea (Kharif) and spices, opium, medicinal crops (Rabi).
Indore: - in Indore district on annual basis rainfall trend result show the increasing trend with high 99.0 % of significance level annual positive growth in Z statistics 2.69. Dewas :- In Dewas district on annual basis rainfall trend result shows the increasing trend with no-significance level. Ujjain :- In Indore district on annual basis rainfall trend result show the decreasing trend (-1.27) with non-significance level. Shajapur: - in Shajapur district on annual basis rainfall trend result show decreasing trend (-1.14) with non-significance level. Neemuch:- in Neemuch district on annual basis rainfall trend result show decreasing trend (-0.41) with non-significance. Ratlam :- in Ratalm district on annual basis rainfall trend result show increasing trend (Z-0.24) with non-significance and Q-0.013 decades wise increase trend. Mandsaur:-in Mandsour district on annual basis rainfall trend result show decreasing trend (-0.20) with non significance. Rajgarh :- in Rajgarh district on annual basis rainfall trend result show decreasing trend (-0.30) with non-significance trend.

Keywords: Rainfall Statistical analysis, Mann-Kendall and Sen's T tests, Trend analysis.

Diatoms as sustainable natural sources of Omega 3 Fatty acids

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ABSTRACT

Diatoms are most valuable source of long chain fatty acids majorly EPA and DHA in aquatic life. Omega 3 fatty acid are found to be the most important dietary supplement as the body produce very less amount of these fatty acids due to which supplements are required. Omega 3 fatty acids have many therapeutics applications like it maintains heart health, bone health and also maintains blood sugar levels. Diatoms are primary producers of EPA and DHA which can help vegans to avoid the animal-based food supplements. The major problem in using diatoms is low biomass productivity due to which commercialization of Omega - 3 food supplements are not reported. This can be overcome using different cultivations systems like different media optimization, different variations in salinity etc. Concentration of the total lipids extracted from the diatom biomass is highly dependent on the solvents. The largest amount of lipids was produced by the solvent mixture of chloroform and methanol at equal concentration. The total lipid content found in diatom Thalassiosira weissflogii was 35.3% DW with EPA 5.14 % and DHA 5.06% on the other side for Chaetoceros sp. EPA was 9.18% and DHA was 10.47% . This will help to produce both food and feed supplements which can reduce dependency on animal-based food and feed supplements and benefit both the humans as well as aquatic society.

Keywords: Algae; Diatoms; Food supplement; Omega 3 fatty acid.

Repurposing spent water as sustainable source for cultivating Diatom algae

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ABSTRACT

Algal biorefineries require sustainable cultivation practices with reduced water and energy footprint. For this study, spent water (SP) from the air conditioning unit (SP1), from the water purifier/ RO unit (SP2) and from the condenser tube of Distillation unit (SP3) were collected. Experiments were conducted to assess growth dynamics of Chaetoceros gracilis and Thalassiosira weissflogii in three culture medium containing (a) seawater f/2 (SW) as control, (b) simulation of filtered autoclaved spent water + seawater f/2 (1:1, v/v), and (c) filtered autoclaved spent water (100%).

Growth changes were monitored every fifth day with an exponential hike during the onset of third weekof the cultivation cycle. Both the strains showed significantly high cell numbers in the test setups than in the control maximum being in the cultures supplemented with 50% SP1 and 50% SW. Interestingly, it was also noticed that cultures of C. gracilis cultivated in 100% SP2 (68.42 x10 6 cells mL-1) and 100% SP3 (43.6 x10 6 cells mL-1), showed higher cell concentration than the respective 50% simulated media. Whereas, in case of T. weissflogii, the simulated (50%) SP1 (70.28 x10 6 cells mL-1)and SP3 (41.42 x10 6 cells mL-1) cultures had higher cell count than the respective 100% cultures.

Biomass Productivity was highest in the 50% SP1 culture of C. gracilis (0.045 g L-1 d-1) and 100% SP2 culture of T. weissflogii (0.06g L-1 d-1). The overall results strongly validate that the spent has the potential of sustaining diatoms which in turn is keystone in maintaining the aquatic ecosystem.

This preliminary experiment highlights the carbon neutral and cost-effective cultivation of microalgae by reusing household and industrial spent waters thus addressing the quest for water-energy nexus.

Keywords: Biomass Productivity, Diatoms, Growth, Spent water, Sustainability.

Photocatalytic GO@g-C3N4 assisted biomass and lipid production by *Chlorosarcinopsis* sp. MAS04

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ABSTRACT

Purpose: The rapid exhaustion of the non-renewable energy sources and surging population put up pressing priority for sustainable fuel. Microalgae based biodiesel is one of the most viable candidates as it has the potential to mitigate the majority of associated environmental issues. Whilst low biomass yield and lipid production limits the development of microalgae-derived biodiesel feedstock on a wide scale. However, recent research has proposed that nanomaterials could be used to expound the associated impediments.

Research Method: The GO@g-C3N4 nanocomposite was synthesized and characterized by techniques like, scanning electron microscope, X-ray diffraction, Fourier transform infra-red spectroscopy, UV-Visible absorbance, and Zeta potential. Further, a 96h cytotoxicity assay of the microalgae viability against the as-synthesized nanocomposite was performed ahead of the experiment. Subsequently, the microalgae cultures in this experiment were supplemented with 0-200 mg/L of the nanocomposite for 30 days. The growth of the microalgal strain was evaluated at an optical density of 680 nm after every 24 h of inoculation for 30 days whereas, lipid was estimated by measuring the Nile red based fluorescence with an excitation and emission wavelength of 530 nm and 575 nm respectively.

Result: The obtained findings suggested that the 50 mg/L of optimal supplement of GO@g-C3N4 nanomaterial for microalgae culture results into the highest biomass and lipid production of 3.825 g/L and 38.5 % respectively, that is 1.5-fold higher biomass and nearly a 1.9-fold rise in lipid content, compared to the control.

Conclusion: The study concluded that by stimulating the light absorption, the addition of GO@g-C3N4 nanocomposite could increase the efficiency of photosynthetic processes, consequently enhancing biomass and lipid biosynthesis. Additionally, these results corroborate the idea that the nano-algal interface for biodiesel production could be a promising strategy for the sustainable development.

Keywords: Biomass, Microalgae, Nanocomposite, Photocatalytic, Reactive oxygen species.

Addressing Water Pollution through Behaviour Change

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ABSTRACT

Water, the unique life sustaining liquid is being polluted at an alarming rate, day in and day out. Right from the village pond to the high seas are drowning in chemicals, agricultural-industrial-domestic wastes, plastic and other pollutants. A careful examination behind each and every pollution source reveals an anthropogenic intervention in various forms and it is this behavior that contributes to the daily discharge of 2 million tons of sewage and industrial and agricultural waste into the world's water (UNWWP) and when it comes to developing countries 70 percent of the industrial waste and 80 percent of the sewage are discharged untreated into the water bodies. The end result is nearly half of the hospital beds in the world are filled with patients suffering from water borne diseases; every 20 seconds a child dies out of water related illness and every year unsafe water sickens about 1 billion people. India is not an exemption and despite the holy status attributed to many water bodies, they have become dumping places of human, agricultural, municipal and industrial wastes. Since, the pollution of water bodies is the product of human intervention and not natural, the issue of pollution can be addressed effectively only through a change in human behavior. But unfortunately what can be seen is that even the future generations are being trained in polluting the well springs of nature. The present paper explores the different human behavior that contributes to water pollution through field research using observation techniques. The pattern identified during observation is generalized using secondary data and comes to the conclusion that water pollution can be addressed effectively only through a behavioural change.

Keywords: Behaviour, Human Intervention, Water, Pollution.

Studies on the anthropogenic impact of the Narmada River

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ABSTRACT

Narmada is the fifth largest river in India. It is commonly known as the Lifeline of Madhya Pradesh. The major part of the Narmada River (88%) flows in this state. It originates from Amarkantak of eastern MP and it flows towards the West and joins the Arabian sea at Bharuch in Gujarat. During the initial field observations, this river was found to be disturbed by different anthropogenic activities like the discharge of industrial effluent, aquaculture wastewater, domestic sewage, agricultural confluences, and dam construction thus the river was selected as a representative study area to investigate the effects of different types of anthropogenic disturbances on water quality and faunal communities. eco–Chemical characteristics of River Narmada water suggest The Physical factors contributing a great role in water quality such as Temperature, pH, and Turbidity water level and intensity of illumination are also important factors to maintain the water quality. The pH of water is directly related to carbonate and bicarbonate ions present in it, which is closely associated with CO2 pressure and the ionic strength solution, and altering the values change the quality of water have been activities in the aquatic solutions. achieved during the present study are tabulated. The result of Physico Chemical properties obtained during the present study was found to fluctuate with the standard values of water quality given by the World Health Organization, BIS (Bureau of Indian standards) to categorize the sites according to their pollution board.

Keywords: Physicochemical factors, Aquaculture wastewater, Agriculture confluences, pH of the water and Turbidity, Water Pollution, Water Quality, Narmada River.

Drought induced changes in Dipcadi erythraeum: Role of salicylic acid

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ABSTRACT

The Dipcadi erythraeum Webb & Berthel.(family Asperageceae), is medicinally important an endemic and threatened bulbous plant of hot Indian Thar desert. Distribution of D. erythraeumis restricted torocky and gravelly soil of Jaisalmer, Jodhpur and Barmer districts of the Rajasthan state where drought is common limiting factor. Salicylic acid (SA) is an endogenous signalling molecules plays important role in protection of plants from biotic and abiotic stresses.

To understand droughts responses and protective role of SA (0.4 mM, the study was conducted to assay photosynthetic pigments, biochemicals, enzymatic and non-enzymatic antioxidant and cytosolutes content in D. erythraeum. Plants exposed to water-stressed conditions of field studies, SA at (0.4mM) and water stress +SA were treated plants, respectively. Drought stressed plants exhibited decrease in photosynthetic pigments (Chla, Chlb and carotenoids), protein content, chlorophyll stability index (CSI) and membrane stability index (MSI). Decline in these parameters were correlated with increase in level of malondialdehyde (MDA) content indicating adverse effects through excess reactive oxygen species.

Results showed that water stress increased antioxidative enzymes, superoxide dismutase (SOD), peroxidase (POD) and catalase (CAT), and non-enzymatic antioxidants (ascorbate, phenols) and cytosolutes (proline and sugars) content. Further, SA alone and (water stress + SA) showed high pigments, CSI, MSI, antioxidant and cytosolutes while reduced MDA content. Overall our results showed that exogenously applied SA can be used for protection of D.erythraeum in drought stress .

Keywords: Antioxidant; Cytosolutes; Dipcadi erythraeum; Drought; Salicylic acid; Thar desert.

Carbon dioxide fixation by microalgae in bioreactors

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ABSTRACT

The present study focussed on investigating the carbon dioxide fixing properties using vehicular exhaust fumes. For this purpose, microalgae Spirogyra and Ulothrix were collected from freshwater streams and grown using suitable media in bioreactors. The concentration of carbon dioxide (mg/L) was determined using the titrimetric method. The concentration of carbon dioxide (ppm) emanating from the vehicular exhaust fumes and in the bioreactors was also measured using the air quality monitoring devices developed in the laboratory. Ulothrix showed the highest carbon dioxide fixation rate, followed by Spirogyra (75% and 71.6% respectively). Changes in pH were also monitored during the study period.

Keywords: Carbon dioxide fixation, Exhaust fumes, Microalgae, Spirogyra, Ulothrix.

Assessment and study of traffic noise in different areas of Rishikesh City – A yoga capital of India

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ABSTRACT

A study has been made to evaluate the noise pollution at thirty different locations in Rishikesh city, which is situated between Latitude N30°5'12.94"N and Longitude78°16'3.4"E. In the course of noise sampling, every location 20 readings were measured with help of noise level meter at an interval of 30 seconds in a period of 10 minutes from 5 January 2021 to 30 January 2021 for the parameters such as L10, L50, L90, Lmax, and Lmin in addition to Leq in different categorized vicinity. The results revealed that maximum and minimum pollution levels of noise varied from 56.1 to 83.6 dB (A) Leq in the city. Based on the questionnaire survey, 70% of respondents reported annoyance, 90% insomnia, 48% hypertension, 75% nervous tension, 80% irritation, and 50% no disturbance due to noise. The higher noise level produces direct and cumulative inauspicious effects on the health of existing population and animal and it also humiliate suburban, societal and working environment with consequent real and insubstantial losses. The noisy environment also rises as one of the crucial poisons of circumstance. Many national and international researchers say noise pollution is a globally major problem including in India. Noise level in the study area is found higher than the standard limits prescribed by CPCB. The present assessment will be key for the responsiveness of the community and responsible authorities to take any action to manage noise pollution and protect society from its unfavorable effects.

Keywords: Equivalent continuous noise level (Leq), Noise pollution, Noise pollution indices, Noise standards, Traffic noise and Questionnaire.

Geospatial assessment of air pollution impact on vegetation Health at Sonipat, Haryana

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ABSTRACT

The air quality has improved significantly after the implementation of lockdown as compared to pre lockdown data. It generates a scenario for impact assessment of air pollutants on vegetation health. The changes in vegetation activity during lockdown period was examined using Sentinel-2 data during the period April 2019, April 2020 and April 2021. Normalised Difference Vegetation Index (NDVI) and Normalised Difference Red Edge Index (NDRE) were generated to measure the changes in vegetation health. The study was conducted in Rural and Urban sites at district Sonipat (Haryana). The analysis of criteria air pollutants (PM10, PM2.5, SO2, NO2, O3 and CO) and precipitation was done to compare the vegetation health before lockdown, during lockdown and after lockdown. A significant difference (p=0.000000000) was noticed between the lockdown period (April-2020) as compared to April 2019 and April 2021. It helps in identification of health status of vegetation in rural and urban setups. The decrease in concentration of criteria air pollutants during lockdown turns out to be a blessing in disguise. The study helps in finding the tolerant tree species for development of greenbelt and urban green spaces. It also provides natural solution to air pollution and helps in achieving UN "sustainable cities and communities" goal 11 of sustainable development.

Keywords: Vegetation health, Air pollution, NDVI, NDRE, Sustainable, lockdown.

An evaluation of the socio-economic status and mode of subsistence of the Kolar River fisher communities in Sehore district, Madhya Pradesh, India

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ABSTRACT

Fisheries play an important role in supporting livelihoods around the world, as well as providing food for over one billion people. The study seeks to better understand the livelihood patterns of fishermen in the Kolar River basin, a tributary of the Narmada River in Madhya Pradesh, India. From September 2020 to June 2022, the current study was carried out to assess the livelihood status of the traditional fishing community of the Kolar River adjacent to the Bhopal region. During the study period, data were collected through a well-structured questionnaire survey from 11 villages as well as Veerpur, Jhar pipli, lohapathar, magarpat, saras, dabri, balondiya, bawadia, khaamkhera, sallikhera, and Jivantal near the Kolar River. A total of 250 fishermen were chosen at random to be interviewed. The study's findings revealed some fascinating information, The majority of the fishermen were between the ages of 24 and 55, with 70% being joint and 30% being nuclear. Almost 71% of the fishermen were illiterate, relying on the village government school and hospital (80%). They use trap gill nets and cast nets to catch fish. According to the investigation, the majority of the houses (65%) were kachcha, while 27% of the people lived in Pakka houses. Survey indicators such as occupation status, educational status, type of ration card, and fisherman enterprise details were also used to investigate the socioeconomic condition of fishermen. It was discovered that fish farmers were dealing with a variety of issues, including social, economic, and technical issues.

Keywords: Bhopal, Kolar River, fisherman community, livelihood pattern, and Socio-economic status.

Host-parasite relationships and pathogenicity of Meloidogyne javanica on Tomato (*Lycopersicon esculentum*)

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ABSTRACT

The host-parasite relationship between initial inoculation density (Pi) of root-knot nematode, Meloidogyne javanica, and growth of tomato was evaluated. Initial inoculation densities were 0, 0.125, 0.25, 0.5, 1, 2,4, 8, 16, 32, 64 and 128 second-stage juveniles (J2s) g -1 soil. A Seinhorst model [y = m + (1 − m) z P–T] was fitted to shoot length and shoot dry weight data for inoculated and control plants. Tolerance limits (T) of tomato to M. javanica for shoot length and shoot dry weight were 1.6 J2s per g-1 soil. Results of the host-parasite interaction showed that an initial inoculum level of 1.6 J2s g-1 soil of M. javanica was found to be the damaging threshold level with which plant growth parameter was inversely proportional. The maximum nematode reproduction rate (Pf /Pi) was 32 at an initial population density (Pi) of 2 J2s g-1 soil. We also observed that the root galling index was greatest at 64 and 128 J2s g-1soil.Knowledge of the relationship between initial nematode population densities in soil and plant growth is essential for making decisions regarding the management of root-knot nematodes.

Keywords: Pathogenicity, Plant- Nematode Interaction, Tomato, Meloidogyne spp., A Threshold Level

Propylparaben loaded chitosan-TPP nanoparticles synthesis and evaluation of antimicrobial activity

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ABSTRACT

Food spoilage is process of deterioration of food by which humans cannot consume it due to its reduced quality, non-edibility, off odor and tastelessness. This spoilage occurs due to chemical reactions. Microbial activities in food causing loss of food supply at very big rate. So, for increasing the shelf life of food and maintain its nutritional quality, texture and flavor, food preservation is necessary. In present study, Propyl paraben was used for synthesizing polymeric nanoparticles using chitosan and TPP as polymer. Propyl paraben is propyl hydroxybenzoate used as a preservative possess antimicrobial activity. It is also used as a preservative and flavoring agent. Propyl paraben loaded chitosan TPP nanoparticles were synthesized by ionic gelation method. In this method negatively charged TPP particles interact with positively charged chitosan nanoparticles.The particle size was found to be 280 nm with encapsulation efficiency of 89%.The antibacterial activity of Propyl Paraben loaded Chitosan-TPP nanoparticles was evaluated using well diffusion method.Analysis of antimicrobial activity of synthesized nanoparticles evaluated against different bacterial strains of gram positive (Staphylococcus aureus) and strains of gram negative bacteria (E.coli, Pseudomonas aeruginosa, Klebsiella pneumoniae) by agar well diffusion method. The synthesized nanoparticles showed high activity against the strains. Also, high antimicrobial activity of pure drug i.e. Propyl Paraben was observed against all the test organisms. While no activity was observed in case of blank nanoparticles. Thus Propyl Paraben loaded Chitosan-TPP nanoparticles can act as effective antimicrobial agents.

Keywords : Chitosan-TPP nanoparticles, enhanced antimicrobial activity.

Identification and characterization of pharmaceutically important compounds from crude and purified fractions of blue green algae

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ABSTRACT

The studies on pharmaceutically important compounds of Blue Green Algae (BGA) have evolved in the past few years and have been proven to be extremely helpful in the development of drugs with diverse biological activities such as antioxidant, antibacterial. Several novel bioactive compounds from BGA have already been commercialized, and scientists are putting their efforts into novel BGA from different/extreme environments to harness their potential for pharmaceutical and biotechnological applications. Growing concerns about antibiotic resistance in bacteria and the pursuit of novel compounds and drug candidates are significant strategies for its preparedness. In the current investigation, antioxidant potential, thermal stability, and antibacterial assessment of crude and purified fractions of Arthrospira sp. isolated from high-altitude lake water were characterized using 16S RNA sequencing. From the mass culture of A. platensis, HANL01 extracts were prepared with different solvents and antioxidant potential, and antibacterial properties were studied against multiple antibiotic-resistant (MAR) bacteria such as E. coli, P. aeruginosa, P. fluorescence, S. enteric, S. typhimurium, and Sh. dysenteriae. Amongst all the crude extracts, MeOH extract was found most effective against all the antibiotic-resistant bacterial isolates. Column purified MeOH fraction and TLC Fraction showed significant antibacterial potential. Maximum zone size was observed with column purified MeOH fraction. Crude extracts were found stable at 25ºC even after 63 days of storage. Based on the GC-MS profiling, five major compounds namely Pentadecanoic acid, Phytol, Heptadecanoic acid, Oxirane, and Octadecyne have been identified. Pentadecanoic acid was reported as the main compound as the spectra of this bioactive molecule (11.13%) were observed as the highest peaks with a maximum hit (9.447). The result of the study showed that high altitude Arthrospira platensis HANL01 is a good source of antioxidant and antibacterial compounds and could be used for further research in the field of drug discovery, particularly against multiple antibiotic-resistant bacteria.

Keywords: 16S rRNA sequencing, bioactive compounds; GC-MS profiling; columns fraction; TLC fractions.

Implications of free radicals on various human diseases: Role of Superoxide dismutase enzyme

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ABSTRACT

The rate of chronic diseases being increasing at a fast pace and for prevention and treatment, various chemical methods are available though they have side effects. Therefore, with more emphasis of green technology, numerous potential natural enzymes came to light for effective treatment and sustainable method. Free radicals like Reactive oxygen species (ROS) generated from biotic and abiotic stress are a threat to living organisms, especially human beings. The evolving organism, however, had created complex defense mechanisms to avoid these reactive by-products of its metabolism and had also created a way to use these species in physiological processes to help it survive. Superoxide dismutase (SOD) proteins are crucial antioxidant enzymes found in animals and plants which are functional for physiological defense strategies against ROS and superoxide anions to preserve their levels in the body. SOD supplementation may thereby activate the body's antioxidant machinery, allowing it to neutralize excess free radicals and be utilized in a range of pathological situations. ROS is widely considered an etiologic factor for several diseases. For proper working of cellular signaling, functioning, and survival of human beings, an appropriate balance of ROS is required. The present review illustrates the clinical aspects of SOD in several human health problems including RBC- related disorders, amyotrophic lateral sclerosis, cancer, diabetes, rheumatoid arthritis, respiratory diseases, neurodegenerative diseases, kneecap joint diseases, etc. SOD enzyme is a powerful tool despite certain demerits in clinical applications. Therefore, several forms of conjugates and mimetics of SOD have been synthesized to make it more effective and efficient against several diseases. The utilization of natural SOD-based therapies for the prevention and treatment of illnesses requires further research in this area.

Keywords: SOD-based therapies; diseases; ROS; antioxidants; Free Radicals

Contamination of Soil in Delhi-NCR: A Critical Review

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ABSTRACT

The occurrence of toxic chemicals in the soil, in higher concentrations, causes a risk to human health and the ecosystem as it reduces the productivity of the fertile soil. At present, soil pollution has become a more significant threat to the environment, especially to populations and industrial economies. Soil pollution used to be a local issue, mostly associated with unsustainable activities such as uncontrolled waste disposal but during the last decades, it has received wider attention, becoming a general environmental problem. The origin of soil pollution is associated with human activities, resulting in the accumulation of containments in soil that may reach levels of concern, and deforestation is also one of the causes. In the national capital region, soil pollution is caused due to excessive use of pesticides and insecticides, dumpsites, municipal solid waste, and the different chemical releases due to their burning. The metabolism of microbes and arthropods may be adversely impacted by this pollution, which may result in the extinction of some tiers of the primary food chain and the injury of predator animal species. Discolored and stained oil, odors, Minimal plant life, Erosion, and Paint chips are the different encodings of soil contamination. The most soil-contaminated locations in Delhi are the dump sites at Bhalswa and Ghazipur, as well as the industrial zones of Jhilmil, Wazirpur, New Friends Colony, Dilshad Garden, and Lawrence Road. This paper investigates the heavy metal contamination in irrigation water and soil, peri-urban and wholesome sites in Delhi-NCR along with the health rate index which is due to rapid industrial growth in the national capital region. It also presents a straightforward methodology for the stabilization of a specific soil, pavement, and environment.

Keywords: Soil Contamination; Heavy Metal Toxicity; Human Health; Dumpsites; Municipal Solid Waste

Status and Performance of Sustainable Development Goals in India

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ABSTRACT

The concept of Sustainable Development emerged in the 1980s as a response to the negative social and environmental effects of the prevailing approach to economic growth. The major emphasis was on the maintenance of ecological processes, the sustainable use of resources, and the maintenance of genetic diversity. Since the Brundtland Commission Report, a number of events and initiatives have bought us to the wide-ranging interpretation of Sustainable Development, which set the agenda of the Sustainable Development discourse both in developed and developing countries. As a result of a proliferation of sustainable development strategies and policies etc., innovative technologies, scientific and educational initiatives, and new legislative regimes and initiatives have emerged. In 2000, the General Assembly of the United Nations in the Millennium Summit passed the 'Millennium Development Goals (MDG)' and set the agenda to achieve these goals by 2015. However, these MDGs could not be achieved to the level of satisfaction. Therefore, a new strategy for sustainable development was formulated and 17 sustainable development goals were set to be achieved by 2030. These goals are: End poverty in all its forms everywhere; Ensure healthy lives and promote; End hunger, achieve food security and improved nutrition, and promote sustainable agriculture; well-being for all at all ages; Ensure inclusive and quality education for all and promote lifelong learning; Achieve gender equality and empower all women and girls; Ensure access to water and sanitation for all; Ensure access to affordable, reliable, sustainable and modern energy for all; Promote inclusive and sustainable economic growth, employment and decent work for all; Build resilient infrastructure, promote sustainable industrialization and foster innovation; Reduce inequality within and among countries; Make cities inclusive, safe, resilient and sustainable; Ensure sustainable consumption and production patterns; Take urgent action to combat climate change and its impacts; Conserve and sustainably use the oceans, seas, and marine resources; Sustainably manage forests, combat desertification, halt and reverse land degradation,halt biodiversity loss; Promote just, peaceful and inclusive societies; Revitalize the global partnership for sustainable development. The present paper is aimed to analyze the status and performance of sustainable development goals in India on the basis of the performance of different states and UTs of India from 2018-19 to 2020-21. The data indicate that there is substantive progress in cases of some states. However, some states are either stagnant or lagging behind.

Keywords: Sustainable Development; MDGs; SDGs; Environment.

Measuring connectedness with nature through the CNS scale and the experience of bathing in the backwaters of Kerala.

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ABSTRACT

This paper explores human connectedness with nature (CN) through experiences in nature, and it tests the connectedness to nature scale (CNS) in the Indian context. Traditionally, the freshwater estuaries of Kerala, known as the backwaters, were used for bathing when there was limited access to piped water. The experience in nature, while bathing in the backwaters, was much more than a functional bath, it was also a way of connecting with divinity through nature. The backwaters were seen as a manifestation of Devi, the Indian conception of a universal mother goddess who manifests in all of nature. This made the experience of bathing in the backwaters a holy experience in nature, a means to connect with nature. Consequently, the backwaters were protected as holy by the people who revered it as Devi. Eventually, as the population increased in the backwaters communities, as household access to piped water became commonplace, and as the water quality of the backwaters began to be impacted by development and population, the experience of bathing in the backwaters was lost. People generally stopped the practice altogether, and the once popular way of connecting with nature now appears to be extinct. This paper examines whether if the experience of bathing in the backwaters has impacted the level of CN among the local people. The study employs a quantitative assessment of CN using the CNS to measure local emotional connection to nature, and also considers whether the CNS is an accurate measure in India for this purpose.

Keywords: CNS, connectedness with nature, disconnect from nature, human experience in nature

Effect of Climate change in various insects and their population decline

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ABSTRACT

The population density of insects is extremely high and definite but we see that this might group of animals are disturbed by various environmental factors that influence their birth, development, breeding and reproduction. Almost all the insects, throughout the world is affected by rise in temperature and sudden changes in climate. The insects that survive in an endemic region for a long time is now forced to migrate from that place as there are no favourable conditions for them to survive. The most affected insect groups are butterflies and Moths (Lepidopterans) which are insects of aerial flight. As the temperature, humidity and the entire natural cycle of an environment is disturbed by changes in climate, there are a lot of possibilities for these organisms to die and ultimately leads to extinction of the group. But there are some other groups of insects which still combat these hurdles and strive to continue a successful mode of living such as Bumblebees which are especially tolerant to the changes in temperature and climate. Changes in agricultural patterns also have increased the mortality of the insects as they cannot find a host plant to start their entire lifecycle from laying eggs to developing into a fully grown adult. Hence if we are continuously emitting the greenhouse gases which alters the climate, these small creatures may not survive as they have tracheal respiration which has direct contact with the external environment. Many case studies have been conducted in various parts of the globe that clearly explains the effects of climate change on Insects which is presented in this review.

Key Words: Entomology, Climate change, Agriculture, Feeding, Greenhouse gases.

Shrine Waste Management in Delhi

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ABSTRACT

There are many types of shrines in our country. Religious shrines attract a number of people especially on religiously significant days. These shrines feed devotees and receive offerings. After the performance of rituals, a lot of waste is left behind which can be categorized under three heads namely, biodegradable, recyclable and rejects. Being bulk waste generators, shrines are expected to segregate their waste at source and manage it inside their complexes. While edible items like 'prasada' or 'langar' waste can be either treated through biomethanation or composting or given to gaushalas, floral waste can be used for making incense sticks, holi or rangoli colours by self-help groups (SHGs) and NGOs. Cloth offerings such as sarees, dhotis, chadars, chunaharis are often auctioned once in a year by the Shrine Trust. However, unsold cloth, paper and plastic packaging can be made into sustainable products such as bags, colours and incense and sold in shops at the entrance of the shrines or used by NGOs and SHGs for generating livelihoods. Rejects like chemicals, bulbs etc have to be given to municipal waste collectors for secured landfilling.

It has been demonstrated in the city of Delhi that NGOs such as POWHER Trust working with women and youngsters with special abilities, are managing shrine waste to make eco-friendly products which are sold through exhibitions and events. The earnings help in providing livelihoods to specially-abled persons and women to achieve a better quality of life.

Key words: shrine waste management, solid waste, bulk generator, eco-friendly products

Ecological and Health Risk Assessment of Heavy Metal Contamination in Roadside Dust Sediments of Jammu City

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ABSTRACT

Heavy metal contamination of urban sediments is a serious environmental issue harming ecosystems and human health. The present study is aimed to determine the total metal concentration (V, Cr, Mn, Fe, Ni, Cu, Zn, and Pb), contamination level, ecological and health risks (HI) of heavy metals in roadside dust sediments of Jammu City. The average concentration of heavy metals was elevated w.r.t. to the background levels of Jammu soils by a factor of 1.3, 1.7, 1.4, 1.5, 1.5, 3.9, 3.0 and 3.7 for V, Cr, Mn, Fe, Ni, Cu, Zn, and Pb respectively. A total of 34 RDS samples were collected from different locations in the Jammu city representing various land-use practices such as industrial, urban residential, rural residential areas. The contamination factors in the RDS samples varied in the order as Cu >Pb> Zn > Cr > Ni >Mn> V > Fe suggesting high levels of contamination for Cu, Pb, Zn and Cr. According to Geo-accumulation Index (Igeo) RDS samples are contaminated to moderately contaminated for V, Cr, Mn, Fe and Ni and moderately to heavily contaminated for Cu, Zn, and Pb. The non-carcinogenicrisk assessment in humans in city centre of Jammufollowed trend asCr>Fe>Pb>Mn>V>Ni=Cu>Zn and Cr=Mn>Fe>V=Pb>Ni=Cu=Znfor children and adults, respectively. Ingestion was the major pathway for both carcinogenic and non-carcinogenic health risk followed by dermal and inhalation routes. As compared to the adults, children are more prone for non-carcinogenic risks due to high Hazardous index (HI) values (1.05). High non-carcinogenic risk for Cr and Pb than acceptable range in RDS suggests a higher risk to the local population of Jammu city.

Keywords: Heavy metals, geo-accumulation index (IGeo), health risk assessment (HI), roadside dust.

Challenges of Semi-arid habitat and the surrounding desert environment for the conservation of spiders

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ABSTRACT

The richness of flora and fauna reflects the status of adaptability to their immediate environment. Species are constantly in an adjustment mode, be it the extreme living conditions or taking potential mitigation measures for the impending climate change. The semi-arid habitat and surrounding desert environments offer the finest examples of how animals may adapt and survive.

Spiders are widely varied group of invertebrates that live in a wide range of environments, but the least known group due to persistent neglect by researchers for a long period of time. Their role in the agro-ecosystem is indispensable. Agra is located in the southwest of the State of Uttar Pradesh and is a part of the upper Gangetic plains of North India. It has a semi-arid climate (26°44'N, 27°55'S, 77°26W, and 78°32 E). Apart from residual soils made up of rock pieces, pebbles, boulders, and sand, the soil is primarily alluvial. The climate is markedly periodic due to marked diurnal differences in temperature, high saturation deficit and moderately low rainfall. The average annual temperature is about 23°C to 65°C, and the annual precipitation is 760.4 mm. A seasonal survey of spiders for the most common spider families in this habitat showed two predominant families: Salticidae (28%) and Araneidae (26%). Whereas other spider families are - Lycosidae (16%), Pholsidae (8%), Oxyopidae (9%), Gnaphosidae (3%), Tetragnathidae (3%), Corinnidae (2%), and the least predominant are Hersilidae (2%), Thomisidae (2%) and Sparassidae (1%) present in the semi-arid habitat.

The paper also discusses the role of these species in the agro-ecosystem/ biological control of pests and the economics of their conservation in terms of their biotechnology potentials.

Keywords- Semi-arid habitat, Spiders, Araneidae and Salticidae.

Heavy Metals and Microorganism Detection with Functionalized Nanoparticles

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ABSTRACT

Current world population touching to almost 8 billion number is generating huge and adverse pressure on natural resources like water, minerals, and fuels. Clean and pathogen-free water is the right of the common man and a necessity of life. Water has a crucial and multidimensional role in the development and growth of a country. Unfortunately, the non-availability of pure water forces 2.1 billion people to consume contaminated water and suffer from various chronic diseases like Schistosomiasis, Diarrhea, etc. Detection of heavy metals and microbial pathogens is the minimum requirement for drinking water. Many methods were reported in the literature for detection of microorganism and heavy metals in the contaminated water but colorimetric detection with nanoparticle is new, quick, reliable, and economical method. In this article, synthesis, functionalization, and characterization of nanoparticles is discussed in detail for the heavy metals and microorganism detection. These detections were carried out with the help of environment and pocket friendly device. This device will be promising device for the scientific community for the detection of heavy metals and microorganisms.

Keywords: heavy metals, microorganisms, nanoparticles, colorimetric detection, pocket friendly device.

Evaluation of indoor air quality and its impacts in school buildings: A case study of Haldwani, Uttarakhand

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ABSTRACT

Purpose: The study set out to monitor physical parameters in the field of IAQ, identify the current status of IAQ in Schools, conduct a survey (questionnaires and interviews) with construction professionals regarding IAQ issues and to find the barriers to implementing IAQ best practice in all stages of the project, and then finally, to develop a framework for achieving good IAQ in Haldwani school projects.

Research Method: This descriptive-analytical investigation used portable analysis devices to identify the gas contaminants that affect indoor air quality. An IAQ Monitor (Model HTO-136) Toolkit was used in order to study sick building phenomenon.

Result: Findings showed that 59% of students and faculty thought their working conditions were unsuitable, yet they largely ignored their complaints of headaches, weariness, and inadequate ventilation. In addition, findings also indicated that the PM2.5, PM10, TVOC, HCHO and CO2 being measured. The permissible limits indicates that parameters partials are the cause of the indoor air pollution that is being observed were the effects of stress and depression on students and staff members.

Conclusion: The findings offer suggestions that particular situations, that the location, age, and airtightness of school buildings, as well as the room designs, ventilation rates, construction and furnishing materials, occupant activities, and outdoor pollution, all have significant roles in the concentrations of indoor pollutants. Therefore, it is important to adopt some excellent practises to protect the health of the occupants, especially young children who are more susceptible to environmental toxins. In order to improve air quality and lessen the effect on students' health, it is crucial that schools are not situated in regions with significant traffic or industrial emissions because many indoor concentrations of pollutants are substantially influenced by outdoor sources.

Keywords: Air Pollution, Air quality monitor, Haldwani, HCHO, Indoor Air Quality, PM, TVOC.

Assessment of physicochemical parameters of water in Baraila Lake, Vaishali, Bihar.

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ABSTRACT

The Baraila wetland is a seasonally flooded Bird Sanctuary located in the lower Gangetic plains of the Vaishali district, Bihar. It serves as a habitat for a variety of aquatic flora and fauna. The biodiversity of such wetlands is threatened by various anthropogenic disturbances such as habitat encroachment, agricultural activities, poor wetland management, etc. The present study was conducted to assess this wetland's physicochemical characteristics at four different sites, Bansghatta Ghat, Lohra Ghat, Chakaiya; and Rani Pokhara, during the pre-monsoon season. Triplicate water samples were collected from four different sites of Baraila wetland and analysed for physico-chemical parameters using standard procedures. All the parameters were compared with the Bureau of Indian standards 2012. The pH value of the lake water ranged between 7.7-9.2, with an average value of 8.37, indicating the water's alkaline nature, whereas the hardness value falls in the moderately hard to hard category. Electrical Conductivity, Total Dissolved Solids, Chloride, Sulphate, Phosphate, and Nitrate were within the permissible limit in all four sites. The nutrients showed the following trend: - Sulphate > Nitrate > Phosphate. It was also observed that DO values ranged from 2.42-12.12 mg/l, with an average value of 6.56 mg/l.

Keywords: Agricultural activities, Baraila Lake, Dissolved Oxygen, physicochemical parameters, poor wetland management.

FoPL: Global and Indian context of Food Labels

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ABSTRACT

The constantly growing health concerns have definitely pushed consumers towards 'knowing your food better'. The right to know what we eat and what is in the food we feed to our children is inalienable that must be safeguarded. FoPL is a step forward to make this even simpler and comprehensible. Food packaging and labelling is a small-scale environment that may inform and help people to choose healthier foods. WHO, at international level and FSSAI, at national level, for India has been playing a convincing role in assessing people's choice, behaviour and preference amongst different FoPLs like: Multiple Traffic Lights (MTL), Monochrome GDA, Nutri-Score, Warning Labels, and Health Star Ratings (HSR). There have been calls for uniformity as different nations have created various labelling regulations. However, many developing nations are hesitant to implement such systems due to a lack of solid research, opposition from special interests, or a lack of consensus over the type of FOPL that is most understandable, acceptable, and yet effective. In a national survey conducted by Sahay, et. al (2022) with 20,564 respondents, on an average, when considering ease of identification, understanding, dependability, and influence, warning labels and HSR have been found to lead the list. Between the two, the HSR format was seen to be the most palatable of the two and is easier to understand than the nutrient-specific formats. Amongst the sub-populations (based on gender, occupation and knowledge), HSR, again was found to be apt. When customer behaviour in purchase intention was assessed, all five FoPLs showed significant importance. On these grounds, priority should be FOPL with clearly defined limits which is coherent to youngsters, adults and people of all age groups.

Keywords: FoPL, food, labelling, packaging

Vermicomposting of Temple Floral Waste: Sustainable Approach from Waste to Wealth

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ABSTRACT

India being a land of diverse cultures and religions produces tons of floral waste every day from religious places which is a serious threat to the environment. Floral waste is biodegradable so it can be used sustainably for making various value- added products such as soil conditioner through vermicomposting, incense sticks, biofuels, handmade paper, natural colors, etc. So, it can be converted into wealth which can also contribute to the economic development of the weaker section of society. In India, a huge amount of floral waste is generated in various religious places, houses during the festive season etc. After serving the purpose they are either dumped into open grounds which become a breeding ground for various disease-causing organisms or are thrown into rivers as a traditional "Jal Pravah " method which in turn causes water pollution and threat to aquatic life. In this study an attempt is made to gather the information related to floral waste management in an eco-friendly manner through vermicomposting to produce a nutrient-rich soil conditioner that can be used for agricultural purposes to cope with the energy crisis for "Zero Waste Management" and for promoting the concept of "Green Temples". After reading the previous literature thoroughly it was found that the vermicompost formed was rich in nutrients like Carbon, Nitrogen, Phosphorus, Potassium, and various micro minerals. Various parameters like Moisture content, pH, temperature, and Electrical conductivity were optimized to produce good quality vermicompost. Thus it was concluded that vermicomposting of floral waste is an excellent and sustainable method of temple waste management in an eco-friendly manner to promote the concept of Zero Waste Management and Green and Clean Temples.

Keywords: Floral waste, Green Temples, Vermicomposting, Zero Waste Management,

Role of Immunotherapy as an effective treatment of Parkinson's Disease

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ABSTRACT

Parkinson's disease is a neurodegenerative disorder that adversely affects neurons that produce dopamine , mostly found around the substantia nigra region of the human brain. Pathological telltale of P.D could be an abnormal concentration of α-synuclein ; a neuronal protein encoded by the SNCA gene , that mediates trafficking of synaptic vesicles and release of neurotransmitters .Pathological strains of α-synuclein work in a manner similar to that of prions that accelerates pathology to contaminate the neighbour cells in little time. Any treatment that could perform effective modification of the disease is yet to be discovered, although immunotherapy may be useful in regulation of overproduction of α-synuclein and thus controlling the symptoms of P.D. Immunotherapy entails reduction of abnormally high concentration of the α-synuclein protein by usage of monoclonal antibodies. Restriction of propagation of α-synuclein can be done by targeting and degradation of extracellular α–synuclein hence checking the infection of the surrounding cells. However, immunotherapy cannot possibly reverse the symptoms that are not influenced by dopaminergic neuronal dysfunctions such as Bradykinesia, instability of posture, tremor in limbs etc.

Keywords: α-synuclein, Dopamine , Immunotherapy, Parkinson's Disease.

Environmental Impacts and Mitigation Strategies of the Current Landfill Site in Gurugram, Haryana

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ABSTRACT

Solid waste is generally understood to be any substance that a user discards after discovering it is useless at the time it was created. Urbanization and growing living standards have resulted in a rise in the amount and complexity of municipal solid waste. In developing countries like India, open dumpsites are common due to a lack of skilled labour and a limited budget for waste disposal. The definition of dumping is a location utilized to dispose of solid waste without regard to environmental restrictions. The facilities for waste collection and disposal have not received much attention. The current research aims to evaluate the environmental impacts and mitigating strategies of the current landfill site in Gurugram city. There is a legal dumping site in Gurugram in Bandhwari near Pali, Gurugram road, Haryana. To gather the necessary data, formal and informal interviews with residents and government representatives, landfill site inspections, and observations were made. Collection of secondary data that includes facts on the landfill site, management and design, and the location's physical, biological, geophysical, and land use characteristics. The city's occupancy and rapid expansion are producing a variety of waste that is endangering the health and cleanliness of its citizens. The handling and management of scavenging or informal waste picking activities, insufficient collection coverage, inconsistent collection services, open dumping, burning, and other challenges all contribute to the current state of waste management. An essential part of integrated waste management is the long-term disposal of solid waste safely and dependably.

Keywords- Degradation, Environment, Landfill site, Mitigation, Solid waste.

Performance Evaluation Study of Effluent Treatment Plant of Polyester Textile Dyeing Industry: A Case Study of SIDCUL, Haridwar, Uttarakhand, India

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ABSTRACT

As contaminated industrial wastewater is one of the major causes of water pollution, it is crucial to keep a check on the quality of wastewater discharged from industries. Hence, this study was undertaken to evaluate the performance of the effluent treatment plant (ETP) of a polyester textile dyeing industry with 150-200 m3/day average wastewater inflow in Haridwar, Uttarakhand, India. Composite samples of the untreated polyester textile dyeing effluent from the equalization tank (inlet) and treated effluent (outlet) were procured from the ETP of the industry on a monthly basis from April 2018 to March 2019. All the physico-chemical parameters and heavy metals were analysed according to Standard Methods for the Examination of Water and Wastewater, APHA et al., (2012).

The study revealed that raw wastewater has high chemical oxygen demand (COD) (2461.0±48.45 mg/L), colour (892 Pt-Co), sulphate (6620.0±7.22 mg/L) and electrical conductivity (EC) (2906.0±5.77 µS/cm) respectively. The treated effluent from ETP showed a significant reduction in colour (71.28%), EC (75.71%), alkalinity (76.04%), biological oxygen demand (BOD) (53.34%) and chemical oxygen demand (COD) (53.53%). However, colour, BOD and COD exceed the standards by Central Pollution Control Board (CPCB), India for safe discharge of industrial effluent in inland surface water. Based on the results it is recommended that pollutant level in polyester textile dyeing effluent is of major concern requiring regular monitoring and further advanced treatment.

It is recommended that the initial step towards efficient wastewater treatment is regular monitoring of the textile dyeing effluent. The functional ETP at the polyester textile dyeing industry is a conventional wastewater treatment system. As the effluent is highly polluted, it is recommended that advanced processes such as membrane processes, adsorption, chemical coagulation and flocculation and UV disinfection can be employed to enhance the treatment efficiency of the plant.

Key words: Heavy Metals; Physico-chemical; Polyester Textile Dyeing; ETP Performance

Electronic Properties of Semiconducting Nanowires and Its Applications in New and Renewable Energy

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ABSTRACT

The presented work has explored the comparative study of electronic properties of semi conducting nanowires of different materials. These nanowires have critical role in photovoltaics and it shapes the future of new and renewable energy. The study has been performed for different shapes of nanowires. The various shapes under consideration are 2-atom Linear Nanowire, 2-atom Zigzag Nanowire, 4-atom Square Nanowire and 6-atom Hexagonal Nanowire. The findings for electronic properties reveal that 2-atom linear wire can be conducting as well semi conducting, 2-atom zigzag wire is conducting for almost all materials, 4-atom square wire is insulating for most of the materials while 6-atom hexagonal wire has come out to be insulating for all materials. Hence a semiconducting material shows conducting, semiconducting and insulating behavior depending on the proposed shape for various materials. The above findings can be critically used in designing the photovoltaics for better efficacy.

Keywords: Electronic Properties, New and Renewable Energy, Photovoltaics.

Occurrence of Occupational Bacterial Zoonoses through Cultured Mudcrab in West Bengal

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ABSTRACT

In West Bengal, two most tradable species of mudcrab (Scylla sp.) are available due to high market demand in local as well as in foreign markets. Scylla sp. is an ecologically, nutritionally and economically important bioresource in West Bengal. Juveniles and adults mudcrabs are collected by professional fisherman and cultured in pond or directly marketed. People of different districts mainly North-24Pngs, South-24Pngs, Midnapur, Kolkata of West Bengal are involved in mudcrab culture as alternative livelihood. Various bacteria are recorded to be related with mudcrab infections. Some of the bacteria may transmit from mudcrab to human and cause diseases (Gastroenteritis, food poisoning, diarrhea, abdominal cramping, nausea, vomiting, fever, lesions, infection etc.) by transmission of toxic genes from water to the craband then to human beings. Such pathogenic infection without proper treatment can result mass mortality of Scylla sp. Several important factors and the water around them have shown the potential for disease transmission to humans from mudcrab. The main causes for bacterial infections are eating raw or undercooked crab, swallowing water or other matters contaminated with infected crab feces or mucus, contact with the infectious agent through open wounds or skin scratch or abrasion. It is reported that transmission via consumption of water with infected organisms or handling are more than 10%. Crab fisherman and farmers in general have lack of environmental awareness, scientific knowledge and that's why they face different types of occupational hazards including zoonotic infections. Present paper investigates the distribution of different zoonotic bacteria and its potential threats, both for mud crab and human population.

Key words: Cultured mudcrab, Livelihood, Bacterial Diseases, Zoonosis, Public health.

Selective degradation of PET by Ideonellasakaiensis 201-F6: Aviable bioremediation of plastic pollution

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ABSTRACT

Plastic has become a staple component of modern life due to its advantageous properties. It is estimated that in 2020, 367 million tons of plastic willproduced but less than 10% recycled. There are mainly seven types of plastic, and the recycling techniques vary depending on the chemical nature of the plastic. In order to recycle plastic, we must first classify types of plastic from a pile of different types of plastic before we convert it to its monomer for re-use. Bacteria convert plastic to monomers through enzymatic processes. In addition to being a greener approach to plastic pollution remediation, its enzymatic nature also allows it to selectively degrade certain types of plastic out of a heap of different kinds. Out of many plastic degrading bacteria here we specifically discussed the mode of action of Ideonellasakaiensis 201-F6. This novel bacteria was isolate from outside a bottle recycling facility. This bacteria is capable of degrading PET (Polyethylene terephthalate) and also capable of consuming it as a carbon or energy source. These bacteria secretes two hydrolyzing enzymes PETase and MHETase which sequentially break down PET to its constituent. The Pet polymer made up of pet monomer which consist of terepthalic acid and ethylene glycol. The first enzyme PETase hydrolysis c-o bond between PET polymer and convert it to Polyethylene terephthalate monomer. The second enzyme MHETase acts on resulting monomers and breaks down into their constituents PTA(terephthalic acid) and ethylene glycol. These two constituents PTA(terephthalic acid) and ethylene glycol are benign in nature and also can be consumed by Ideonellasakaiensis 201-F6. Therefore, using specialised bacteria to biodegrade plastics could be a viable bioremediation approach.

Keywords: bioremediation of PET, enzymatic degradation of PET, selective degradation of plastic, PET (Polyethylene terephthalate) degradation, plastic pollution.

Biotechnological Interventions for Crop improvement and Food Security

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ABSTRACT

Global climate change enforced frequently changing and disturbed climatic conditions like extreme drought, high temprature, prolonged flooding & submergence coupled with speedily increasing global population, industrialization & globalization, luxurious application of agrochemicals (fertilizers and pesticides), soil salinization & compaction, degraded soil & rhizospheric health, depleting water table, war & war like situations pose a obvious threat to food security and human health worldwide. Crop health and crop production is seriously challenged by the abiotic stress factors. Therefore, it becomes imperative to look for the options to boost the crop growth and productivity simultaneously with minimum carbon footprints.

The potential of DEAD-box helicases (pea DNA helicase, PDH45; p68) and mini chromosome maintenance protein (MCM6) has been exploited using Agrobacterium tumifaciens mediated genetic transformation for abiotic stress tolerance. PDH45 imparts salinity tolerance in rice (Oryza sativa L. cv. PB1) by modulating the activities of antioxidants thus protecting the photosynthetic apparatus. Pea p68 provides salinity stress tolerance in transgenic tobacco by reducing oxidative stress and improving photosynthesis machinery. Further, a single subunit MCM6 from pea promotes salinity stress tolerance without affecting yield in tobacco (Nicotiana tabacum) plants.

The research suggests that the potential of PDH45, p68 and MCM6 can be exploited for engineering abiotic stress tolerance in crop plants of economic importance.

Keywords: Biotechnological interventions, Crop improvement, Food security, Genetic engineering, Salinity

Effect of anthropogenic land use on water properties of drinking water sources in Barak Valley region of Assam in North East India

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ABSTRACT

Anthropogenic land use can potentially impact/alter water quality of different drinking water sources. However, the degree of their impact in different watersheds largely remains unknown. We hypothesized that a heterogeneous environment created due to diverse land uses can have substantial effect on the water properties of different drinking water sources. We tested this hypothesis using spatio-temporal data on drinking water parameters collected following standard methods at seasonal intervals for a period of two years from selected surface water sources in the Barak Valley region of Assam in North East India. The study showed that the drinking water from different sources viz., pond, river and tap water, located under different land use types viz., rural area, semi-urban area, urban area, and tea garden area, have their distinctive characteristic features. Thereby, water properties of different sources varied within as well as across different land use types. In the present paper, we have attempted to explain the underlying reasons for such variations in water properties of different drinking water sources located under different land use types.

Keywords: Land use type, drinking water sources, water properties.

Nanomaterials in Water Treatment

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ABSTRACT

Nanotechnology is a diverse arena with multi-disciplinary applications. In the current scenario, environmental applications include wider usage of nanomaterials. Green synthesis of nanomaterials is preferable as compared to chemical and physical synthesis due to its cost-effectiveness, eco-friendly and sustainable tactic. The green synthesis approach includes the usage of parts of plants as covering and reducing agents. Plants extracted bio-surfactants, resources that are biological in nature and microbes have also been used in the extraction of nanomaterials. Nanomaterials are characteristically having less than 100 nm in dimensionally and contain material with innovative and suggestively altered chemical, biological and physical characteristics. Constituents of this measure contain different size-dependent properties, that are diverse and related to their higher counterparts. Required nanomaterial properties, for example, higher surface area for adsorption and higher responsiveness towards photocatalysis would also have better antimicrobial properties for decontamination and also to control biofouling, would have superparamagnetism for element parting, would comprise of electronic and optical properties and would have good detecting nature to measure water value. About nanotechnological applications for water and wastewater treatment are nanoadsorption, membranes and membrane process, photocatalysis, antimicrobial nanomaterials in decontamination and microbial control, nano antimicrobial polymers. Wastewater treatment includes organic contaminants removal, heavy metals removal, fluoride removal, dyes removal, polycyclic aromatic hydrocarbon removal, etc. Regeneration of nanomaterials is one of the vital features of using different acids (hydrochloric acid, sulphuric acid, etc.), bases (Sodium hydroxide, ammonia, etc.) and other materials such as alum, a combination of acid and bases lead to enhance their viability and cost-effectiveness. Regeneration of adsorbents improves the disposal problem of used adsorbents.

Keywords: Characteristics, Green Synthesis, Nanomaterial, Regeneration, Water Treatment.

Assessment of the impact of mining activities on groundwater quality of adjacent areas near Talcher city, Odisha

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ABSTRACT

This study was done to assess the impact of mining activities on ground water quality in Talcher region of Odisha. The mining of coal was being carried out in Talcher since 1918. There is a high possibility that contaminants moved to the aquifer system from the seepage of bottom floor of the mining quarry. The water quality was assessed in terms of physio chemical parameters and heavy metal concentration. The physio chemical parameters such as pH, Electrical conductivity, TDS, Total Hardness, Ca ion, Mg ion, Chloride, Fluoride and COD were analysed (APHA) to know the status of ground water quality. Also some major heavy metals (Cadmium, Cobalt, Copper, Lead, Nickel, Zinc, Iron, Arsenic) were measured using AAS. Samples were taken from 30 different locations. In this study WQI indicates that 47% of samples are of excellent and good quality, 46% are of poor quality which can be consumed after some treatment while 7% falls under the unfit for consumption category. The study also indicates the presence of some heavy metals in most of the locations but within the permissible limit except some samples where cadmium is beyond permissible limit.

Keywords: groundwater, water quality index, heavy metals.

Organic farming and Sustainability

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ABSTRACT

The global population is increasing exponentially. Consequently, the demand for food is also increasing and most of our foods are of agricultural products. Presently, overusage of modern machinery and pesticides, agricultural production increases; but on the other hand the soil structure deteriorates, soil erosion, increase in salinity, soil acidification, loss of fertility and reduction of crop quality are happening. To overcome these types of problems sustainable agricultural strategy is growing on. The broad goals of sustainable agriculture include economic profitability, environmental stewardship and community vitality. Now a days, organic agriculture can be recognized as the main alternative farming system as it is an integrated system of agricultural production based on ecological principles, promotion of biodiversity, biological cycles and organic matter recycling to maintain & improve soil fertility, reduction the use of synthesized fertilizer and maintaining environmental sustainability. The principle methods of organic farming include crop rotation, green manures, compost, weed management, crop diversity, monoculture and biological pest management etc. Digital technologies can be adopted in organic farming to enhance crop productivity, resource-use efficiency and minimizing environmental impacts; e.g., phone-based Information & Communications Technology is well-rooted in the data-rich. The Interactive Voice Responsible technology to reach farmers with agronomic advisory has been proved beneficial. The experiences of religions and traditional knowledge can be mixed with these modern inputs which will make the situation more stable. Apart from above importance of organic farming, it also effects on climate. This sustainable agricultural method can minimize the global warming as a mitigation to climate change, also minimize the emission of green house gases. I have highlighted the importance of this sustainable agriculture on the biosphere and future perspectives through my presentation.

Keywords: Crop productivity, Crop rotation, Organic farming, Sustainable agriculture, Sustainability.

A study on Sustainability Development of Environment through True and Thrift Accounting Model

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ABSTRACT

Environmental Changes have become a global issue, and the situation is rapidly deteriorating, directly affecting global economic growth. One current argument is that manufacturers are unconcerned about the environment, so policymakers revise the accounting model and include green accounting. A Green account system ensures that environmental costs are correctly reflected in the price of goods and services. Conventional accounting may lead to environmentally unsustainable policy decisions. The paper focuses on a practical model. It will be based on Truth for helping renew and reposition accounting, recovering the morality of accountants and the morality of the whole society, which leads to restoring the harmonious relationship between human beings and nature and between ourselves, fundamentally solving the issues including the environmental issue will be the natural result of this restoration. The paper study the meaning, need, and importance of green accounting and the development of green accounting in India. Many organizations incorporate environmental costs as operating expenses because of the events underlying the incurrence of the obligation related to an entity's operations green accounting in their business. The study explores the application of the "True and Thrift Accounting Model". "True" means to keep books with clarity and integrity. "Thrift" is to reduce unnecessary consumption. The fundamental duty of accounting is to keep books with proficiency honestly. It reflects morality – the soul of accounting. This model aims to make people less dependent on materials, transfer people's high-energy consumption lifestyle to a low-carbon lifestyle, recover the moral virtue of the whole society, including accountants, and finally, rebuild a vertical relationship with Truth, restore the harmonious relationship with nature and between people. The study firmly believes that it is not the time to do addition any longer in terms of the cost. Instead, we need to do subtraction. We should look at accounting as a whole instead of accounting for everything separately, e.g., social and environmental accounting, biodiversity accounting, carbon accounting, health and safety accounting, ecological accounting, and sustainability accounting. Everybody knows in our country we create so much of waste. We buy and throw away the things, again and again and yet will not share with the needy. Even when we have more than enough, we are afraid to share, and we are afraid to let go of some of our wealth. The study focuses on rebuilding a relationship with Truth, recovering the morality which makes people see the integration of everything. We can restore a harmonious relationship with nature and between ourselves. The commitment to the environment should be substantial and enduring. Daly's notions "Do not convey that natural capital may be consumed and transformed into other forms that may, in turn, be sustainable." The layout of the paper is the following. Section 1 provides an Introduction, Purpose, objective and literature review. Section 2 Outlines the scope & methodology, Need and importance of Green Accounting, Sustainability Development and Green accounting in India. Section 3 Renew and Redefined model of accounting. Section 4 offers concluding remarks. Finally, the study also highlights some limitations and suggestions.

Keywords: Environment, Green accounting, Sustainability Development, Thrift , Truth

Probiotic potential of few gut-associated bacteria of Snow trout (*Schizothorax richardsonii*) collected from Saryu River of Uttarakhand

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ABSTRACT

Aquaculture with probiotics is farming aquatic organisms by intervening in the rearing and production of aquatic organisms, which is more popular than fish production. The need for increased disease resistance, growth of aquatic organisms, and feed efficiency has brought about the use of probiotics in various aquaculture practices, including fish production. Probiotics are used to improve water quality and control bacterial infections. There are reports that probiotics improve nutrient digestibility, increase stress tolerance, and encourage reproduction. Currently, there are commercial probiotic products prepared from various sources. Naturally, probiotics are found in water, sediment, and organisms in a restricted system; a sizable number of fish gut bacteria have been reported worldwide with their probiotic potential. The present investigation deals with the gut-associated bacteria of snow trout (Schizothorax richardsonii). Total gut content was collected in a sterile area by dissecting the collected fish followed by incubation at 37°C. After a series of standardized microbiological methods, Pure colonies were obtained, the isolates were tested for their probiotic potential and promising bacterial isolates were further characterized by 16SrRNA gene sequencing.

Keywords: Probiotics; Schizothorax richardsonii; aquaculture; Bacteria; 16SrRNA.

Statusof micronutrientsdeficiencies in the soils of Kaithal and Siwan block, district Kaithal

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ABSTRACT

Indian soils have become deficient not only in macronutrients but also in micronutrients. Their deficiencies in Indian soils emerged as one of the major constraints to soil health and crop productivity. Micronutrient deficiencies are now frequently observed in intensively cultivated soils mainly where cereals are grown. The intensive cultivation of the rice-wheat monocropping system in Kaithal has led to deficiency of iron, copper, manganese etc. which has threatened in sustaining higher food production. Thus, there is an urgent need to rectify the individual nutrient deficiency through soil testing, to arrest its further spread. Through the use of soil testing and plant analysis, micronutrient deficiencies have been verified in many soils.A study conducted on the two blocks of the Kaithal district i.e. Kaithal and Siwan blocks to access the micronutrient status of the soil. Fifty soil samples were collected from each block using a hand-held GPS. The results revealed that for DTPA extractable zinc, 22 and 24% of samples were found deficient in Kaithal and Siwan block respectively. The reason for less deficient samples could be the frequent usage of zinc sulphate fertilizers in the area. For DPTA extractable iron 48 and 30% samples, for extractable copper 12 and 20% and DTPA extractable manganese, 88 and 96% samples were found under the deficient category in Kaithal and Siwan blocks respectively. These micronutrient deficiencies need immediate attention to increase crop productivity and sustain soil health and fertility.

Keywords: Micronutrients, productivity, soil health.

Potential of Rainwater Harvesting in District Kangra of Himachal Pradesh

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ABSTRACT

The present Kangra district came into existence on 1st of September 1972 and is located in the Shivalik Hills. The district is predominantly agrarian and around 82% of its population depends on agriculture and its allied activities for their livelihood. The Beas is one of the larger rivers of this district, and contributes to the fertility of the land here. The district is bounded by the following districts of Himachal Pradesh namely Chamba to the north, Lahul and Spiti to the northeast, Kullu to the east, Mandi to the southeast, and Hamirpur and Una to the south. The district shares its border with the states of Punjab on the southwest, and Jammu and Kashmir on the northwest. Rain water harvesting is collection and storage of rain water that runs off from roof tops, parks, roads, open grounds, etc at Kangra. This water runoff can be either stored or recharged into the ground water. Harvesting rainwater allows the collection of large amounts of water and mitigates the effects of drought. Most rooftops provide the necessary platform for collecting water. Rainwater is mostly free from harmful chemicals, which makes it suitable for irrigation purposes. The average annual rainfall of the district is 1751 mm, out of which 83% occurs during June to Sept. Snow fall, is received in the higher reaches of Dhauladhar ranges. Keeping in view present is based on secondary data obtained from line departments and interactions of the authors with people in the rural areas. To describe potential of rainwater harvesting in district Kangra of Himachal Pradesh. An attempt has been to assess the impact of drought on drinking water sources of the at Kangra district in Himachal Pradesh. There is need to change some existing policies relating to water management to tackle the water shortage during water scarcity.

Keywords: Rainwater, Agrarian, Fertility, Drought, Potential.

Impact of pyrolysis temperature and residence time on the physical properties and yield of biochar produced from faecal sludge

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ABSTRACT

A study was conduct to assess the Impact of pyrolysis temperature and residence time on the physical properties and yield of biochar produced from faecal sludge. Pyrolysis was done in the muffle furnace (Make: JAISBO &Model: General) at 300, 400, and 500°C for the residence time of 30, 60, and 90 minutes under an oxygen-free atmosphere with a sufficient supply of nitrogen (flow rate: 200mL/min) during the whole pyrolysis process. Results revealed that moisture contents of biochars produced at 300°C, 400°C, and 500°C in 30 minutes of residence time were observed as 4.38%, 4.27%, and 3.58% respectively. Ash contents of biochars produced at 300°C, 400°C, and 500°C in 30 minutes were observed as 52.6%, 63.2%, and 68.4% respectively. Volatile matter contents decreased from 33.6% to 20.5% from the faecal sludge-based biochar produced at 300°C to 500°C at 30 minutes. BET surface area increased from 5.0 to 18.0m2/g from 300°C to 500°C with 30 minutes of residence time. Water Holding Capacity (WHC) of biochars produced at 300°C to 500°C in 30 minutes of residence time was observed as 58.8%, 65.2% and 67.2% respectively. Increase in WHC of faecal sludge-based biochar with increasing pyrolyzed temperature may be due to increased BET surface area. The biochar yield observed at 300°C was 62.4% which was more than the double biochar yield (28.8%) from 400°C at 30 minutes, while at pyrolysis temperature of 500°C with 30 minutes; the yield was slightly reduced to 25.7%.

Keywords: Ash contents, Biochar yield, Carbonization, and Faecal Sludge.

Eco-friendly approach for biosorption of methylene blue dye from aqueous solution onto sustainable rice husk biomass

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ABSTRACT

The number of textile industries has increased as a result of rapid industrialization. Several pollutants, primarily dyes, are present in the effluent from these companies, which is released untreated into the water streams. Water consumption in the textile industry is notoriously high, at up to 200 L per kg of dye. According to several studies reviewed, this problem has been addressed using a variety of techniques, including membrane separation, advanced oxidation, chemical oxidation, ozonation, adsorption, coagulation, and catalysis, some of which have inherent difficulties, are ineffective, or are environmentally unfriendly. As expected, that would also lead to problems with contamination for the receiving water bodies. The adsorption method, which uses a variety of adsorbents, is one of the most widely used methods for treating wastewater. This study used a rice husk (RH) as a biosorbent to remove methylene blue dye from an aqueous solution. Rice husk, a low-value agricultural by-product, can be transformed into sorbent substances that are used to remove dyes. This review aims to provide an overview of the important scientific findings about the removal of pollutants using rice husk, focusing on the impact of various parameters on rice husk's adsorption ability. This review also focused on thermodynamics, kinetics, isotherms, and optimization studies. The chapter includes suggestions for the potential use of agro-waste in wastewater treatment in the future.

Keywords: Agricultural waste, Rice husk, Biosorption, Isotherm study, wastewater treatment.

Assessment of treatment efficiency of drinking water treatment plant near Jyoti Vihar, Burla, Odisha: A source to household qualitative analysis

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ABSTRACT

Supply of safe drinking water to the community plays a very crucial role in good public health. Regular monitoring of water quality and effectiveness of water treatment plants is a distant reality in developing nations like India leading to periodic outbreaks of diseases like jaundice. The present study investigated the efficiency of water treatment plant developed by Mahanadi Coal Field Limited near Jyoti Vihar Campus, Sambalpur University, Burla. Water samples were collected at different points from source to household, and physicochemical as well as bacteriological parameters were determined using standard methods. Physicochemical qualities of the water samples from tap water sources were found to be pH (6.88±0.05), turbidity (5.15±0.006 NTU), electrical conductivity (170.6±0.1µS/cm), residual chlorine (0.19±0.003mg/L), and fluoride (0.87±0.009 mg/L). The removal effciency of turbidity, total hardness, and nitrate was found to be 98.3%, 82.3%, and 88.7%, respectively. Removal effciency of the treatment plant for total coliforms was up to 94.6% (05 ± 0.26 CFU/100mL in tap water) and faecal coliforms up to 99% (1.51±0.03CFU/100mL in tap water). The overall effciency of the treatment plant (85.5%) and the water quality index (76) were recorded. The present study indicated that the water quality parameters such as residual chlorine, total and faecal coliform did not meet WHO guideline for permissible values. Detection of total and faecal coliform in household tap water samples instead of point of distribution indicated contamination of water due to leakage in the distribution pipe.

Keywords: Coliform, drinking water, efficiency analysis, treatment plant.

Identification of allelochemicals from Tridax procumbens using GC-MS technique

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ABSTRACT

PURPOSE: The indiscriminate use of pesticides hasled to the toxin build-up in the environment. But in reality, the crop yield and productivity can also be increased without the use of these harmful chemicals. An interesting source of an ecological pesticide naturally occurring in plants is called as allelochemical. These are secondary metabolites which help the producing plants to counterbalance biotic and abiotic stress. These compounds can be easily isolated and used in sustainable ecofriendly farming practices because of their ephemeralnature.

RESEARCH METHOD: Hence, the present study was conducted to identify the allelochemicals present in different parts (stem with leaves, root and flower) of the weed Tridax procumbens using GC-MS technique. Three types of extract such as aqueous, methanol and hexane were prepared and analyzed for the presence of allelochemicals.

RESULT: It was found that the aqueous extract of the stem with leaves contained 10 compounds, root contained 15 compounds and flower contained 13 compounds. The methanol extract contained 39 compounds in stem with leaves, 31 compounds in root and 23 compounds in flower. In hexane extract, 17 compounds were identified in stem with leaves, 14 compounds in root and 18 compounds in flower.

CONCLUSION: The identified compounds were found to possess many biological activitieswhere they are considered as biocidal, bioactive, and biodegradable compounds. It could be employed to function as insecticide, fungicide, nematicide, weedicide, antimicrobial plant protection agents and many more. Hence, it can be used instead of synthetic pesticides to prevent environment deterioration. This would help to achieve sustainable environment friendly agriculture practices.

Keywords: allelochemicals, ephemeral, extract, GC-MS technique, sustainable agriculture.

Defluoridation of Fluoride Contaminated Ground Water using *Prosopis juliflora* Bark Adsorbent

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ABSTRACT

In India endemic fluorosis is considered as a major public health problem. The fluoride contamination and its removal approach attract a lot of concern from the scientific community at the global scale due to finite potable groundwater resource. Defluoridation is the conventional safe water to the fluorosis affected communities and adsorption of fluoride ions on to the surface of an active agent. Therefore, in the present study Devadurga taluk have been selected to know the ground water quality. Ground Water samples were collected from tube well in Guntral village of Devadurga taluk, Raichur District. Water quality analysis was carried out and recorded the results. The results reveal that fluoride level recorded 6.4 and 9.3 ppm at two sampling points. Further in order to remove fluoride, defluoridation techniques were followed by preparing adsorbent by using Prosopis juliflora. Plant bark sample. The results after adsorption experiment followed for column method shows 91% removal in 7ppm of fluoride sample at pH 5. Therefore it is clearly evidenced that Prosopis juliflora adsorbent acts as one of the most significant and promising adsorbent for removal of Fluoride in drinking water sources.

Keywords: Groundwater, Fluoride contamination, Prosopis juliflora, Adsorption.

An Overview of Water Quality of Indian Rivers and River Bank Filtration

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ABSTRACT

Water is an essential element for the survival of mankind. For consumption and maintaining personal hygiene water has no substitute. Rapid urbanization and industrialization have been causing tremendous pressure on the existing surface and ground water resources both in quantity and quality. The causes of water quality in surface water and their effect in Indian rivers have been discussed. The quality of river water improves as it travels laterally across the riverbank as well as beneath the riverbed. Considering the enormous potential of treatment of river water through surrounding porous media many countries have recognized the benefit of river bank filtration (RBF). RBF is highly cost effective, its application and use in India needs to be encouraged.

Keywords: Horizontal collector well, Infiltration gallery, Managed Aquifer Recharge, Natural water treatment, River bank filtration, Water quality.

Temporal dynamics of Land use and Land cover over Rajaji National Park

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ABSTRACT

Forests are a vital natural resource which provide us with a variety of goods and services. Loss of forests may lead to increased rate of soil erosion, occurrence of landslides, degradation of aquatic ecosystems and depletion of biodiversity. Degradation due to activities pertaining to infrastructure development such as building roads, laying railway tracks, constructing dams and clearing of forests for settlement and agriculture are common in various parts of the world. The per capita forest land in India is 0.10 ha while the world average is 1.0 ha which reflects the relative lack of forest resources in India in terms of per capita forest lands. Thus, for management of Indian forest resources, it is important to examine the forest loss. In this study, a protected area (Rajaji National Park) was identified to study the land use and land cover dynamics. This study aimed to analyses the land use and land cover (LULC) dynamics in protected area near the Himalayan foothills and also, identifying the main drivers behind its degradation. LANDSAT images were analyzed and classified into different forest classes on ArcGIS interface. Study suggests that the main drivers of forest loss are agriculture, settlement, mining, quarrying, road, railways construction and illegal logging. Results also outlined that the conversion of classes i.e., dense forest areas into moderately dense forest and/or open forest areas, and remote sensing proves to be the best tool in detecting and monitoring the land use and land cover (LULC) dynamics in hilly and rugged terrains.

Keywords: Protected area; Rajaji National Park; LANDSAT; ArcGIS; LULC.

A Life Cycle Assessment Approach on Municipal Wastewater Treatment Plants

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ABSTRACT

Many Nations rising urbanisation and economic expansion in recent decades have put an increasing strain on their sanitation, as seen by their lack of planning to accommodate effective sanitation infrastructure. Significant progress has been reached in the area of impact assessment across many disciplines, the impact of wastewater treatment plants (WWTPs) has yet to be fully integrated. Several models or methodology have been developed to quantity emissions and propose quantification. Plant-wide models are dependable tools for analysing various emissions, and life cycle assessment (LCA) analyses potential impacts. LCA is used as a supportive decision tool to determine the best wastewater treatment strategy. In addition, the performance criteria are proposed, including water sustainability and water management, based on LCA, which delivers an overall better assessment of treatment plants. The ISO (14040 and 14044) LCA frameworks have established a methodology for the estimation of potential environmental consequences produce by the WWTPs. The accuracy of WWTPs related LCA in Nations would significantly rise with the estimate of additional site-specific databases, characterisation factors, normalisation and weighting values, as well as more assessable to background information and LCA software. For the establishing of best practice guidelines and participation of WWTPs for the removal of emerging contaminants. Moreover, improved national and regional life cycle datasets, as well as interpretation of the outcome of land use change and pollutant emissions for extended treatments, would be beneficial. Such activities should hold present and future environmental management knowledge in order to reduce the consequences and accomplish the aims of sustainability.

Keywords: Environmental Impact, LCA, Sustainability, WWTPs

Assessment of properties of bottom ash from incineration of RDF from MSW for heavy metal vontamination

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ABSTRACT

Municipal solid waste generated in the urban areas around the world consists of all sorts of harmful/toxic substances and thus, dumping this waste directly on to un-engineered open landfills is dangerous. The toxins may leach into the soil underneath the landfill and may also find their way to ground water resources. In Delhi, India, municipal solid waste is being converted into RDF (refuse derive fuel) by densifying it and pelletising it. This RDF is used in incineration plants for generation of electricity. However, the ash produced in these plants is still a huge question mark as the properties of this bottom/fly ash are still variable from one area to another. In this study, the bottom/fly ash generated after the incineration of RDF will be assessed for properties like presence of heavy metals (both qualitative as well as quantitative), moisture absorption/porosity of the pellets, presence of other elements such as Ca, P, N, S, C, H, O etc. The presence of toxic elements in the fly ash indicate its incapability to be used for construction purposes by mixing with cement. It is still uncertain whether mixing this ash would render the cement toxic as the heavy metals may leach into the surrounding soil/water bodies along with rain water. Municipal solid waste from landfills of Delhi will be first densified into pellets as per standard methodology and the pellets will then be assessed for various properties including physical strength, composition of elements, calorific value etc and then the environmental concerns will be calculated in comparison with the energy provided by the pellets. The research can further be taken to identify the atmospheric concerns associated while incinerating these pellets and the gaseous pollutants emitted during incineration can be calculated.

Keywords: Toxic, Densified RDF, incineration, soil contamination.

Bioplastics: A sustainable benchmarking future and its emerging applications

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ABSTRACT

Plastics have accumulated in the environment due to poor biodegradation, inadequate waste management, and a dearth of environmental awareness. It is well recognized that plastic garbage contributes significantly to environmental pollution and complicates waste management. Accumulating plastic wrecks in marine areas dates back half a century, with progress piling up on the ocean's surface in the past years. But even in one of the most promising scenarios of the ultimate reduction of plastic waste in forthcoming years, plastic is aggregating and building up regularly in the environment. In the wake of expanding resource diminution, valuation inconstancies, and concussions on the environment posed by petroleum-based plastics, there is burgeoning interest in using biodegradable plastics. Bioplastics are natural bio-based polymers procured from renewable and natural resources such as corn, starch, waste paper, wood, vegetable oils, algae, bacteria etc. These Biopolymers have immense dimensions of applicability overdue to their exceptional thermal and mechanical surface properties. Bioplastics embody an imminent and newfangled industrial segment eminently characterized by synergism and collaboration among biotechnological, chemical, consumer and agricultural sectors. Presently Bioplastic materials are being fabricated to minimize carbon footprints, have immense recycling value and endure biodegradation. This review parlances recent advances in these biodegradable thermoplastics and their opportunistic applications in numerous sectors.

Keywords: Bioplastics, Sustainable, Ecofriendly, Plastics, Biodegradable

Food Security: A Challenge to Sustainable Agricultural Practices In India

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ABSTRACT

In India, agriculture sector is of paramount importance in maintaining GDP. Utmost rural house population is dependent on agriculture for their livelihood and despite of achieving grain sufficiency, country is still struggling with food security and is home to enormous number of hungry people in the world. India rank very low in Global Hunger Index (India stood 101 out of 116 countries in 2021) and Global Nutrition Report also. Management of agricultural practices in country is a huge concern to be addressed for ensuring food security and sustainability. Healthy soil is critical to human health and provides assurance to ecosystem for supporting healthy plane growth, resist erosion, receive and store water, retain nutrient and environment security. Improvement in agricultural practices may also ensure the improvement in nutritional status and productivity of crops grown. Working on soil quality and new farming techniques is the real need of the hour as agriculture is getting new challenges from agriculture from biotic and abiotic world and the rational and efficient use of this vital resource is essential for sustainable development and feeding the growing populationThe aim of this review is to highlight the contribution and efficacy of sustainable farming system, conservation agriculture, modified crops and use of nano fertilizers in improving the agriculture sector to improve food security and reducing hunger as a part of sustainable development goals.

KEY WORDS - Sustainable agriculture, Food security, Global Hunger Index, Soil quality, Nano fertilizers

SCAUF- A Model to estimate Soil Changes under Agroforestry and Forestry

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ABSTRACT

Models facilitate the portrayal of an ecological system, also allowing for the rapid modelling of ecological processes (Schuwirth et al., 2019). Thereby, aids in the development of strategic methods and the establishment of goals for conservation, restoration, and long-term management (Schmolke et al., 2010) and in environmental decision making. Soil Changes Under Agroforestry (SCAUF) is a simple computer-based model that envisages the reverberations of different land use regimes under different environmental conditions. It incorporates agroforestry's distinguishing qualities, notably land use patterns that contain both trees and crops. However, it may be used to compare agroforestry systems to land use in agriculture or forestry, with these being viewed as limiting instances of agroforestry. SCUAF is a process-response model in which the user determines the physical environment, the land use system, the initial soil conditions, the initial rates of growth, and the rates of operation of soil-plant processes. The model stimulates the annual changes in soil conditions, moreover the effects of soil changes on plant development and harvest. It is primarily intended for simulation during 10 to 20 year time intervals, although it may be used for long-term simulation. SCAUF's main benefit is its ease of use besides may be utilized in research and education. This model is used to offer input and output values for economic values for economic analysis. The soil conditions integrated were viz., soil conditions, soil organic matter, plant nutrients, and tree-crop interactions. These models abstract the land-use system in order to discern the implications and repercussions on environmental conditions.

Keywords: Agroforestry, conservation, models, soil conditions, tree-crop interactions.

Modeling the Current and Future Habitat Distribution of Shorearobusta in the Indian Central Himalaya – an ENM Approach forConservation Planning

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ABSTRACT

The subtropical forests of the Indian Central Himalaya (ICH) are chiefly dominated by the climax dipterocarp tree species – Shorearobusta(Sal). Acommercial timber specieshaving medicinal, cultural, and ecological significance; Sal is one of the five most dominant tree species in the ICH. Sal facesa serious threat on account of regeneration loss, forest fires, land-use change, and replacement by exotic species. Therefore, using the ecological niche modelingapproach (ENM), we modeled the current and future habitat distribution forits conservation planning and to assess the impact of climate change on Sal's habitat. Sal occurrence records were gathered from primary (106 points) as well as secondary sources (73 points) and spatially rarefied. We used a maximum entropy-based algorithm for the ENM approach, the bioclimatic variables selected were tested for multicollinearity, and the final model was validated using both threshold-dependent and independent statistics. The current habitat distribution model performed good (AUC 0.943±0.01). Annual mean temperature (BIO01), precipitation seasonality (BIO15), and the precipitation of the driest quarter (BIO17) were the top key predictor variable with the highest permutation importance and unimodal response curves. Only 4% of the total geographic area of Uttarakhand state has more than 60% suitability for the current Sal habitat, with district Dehradun having the most predominant share. The immediate stabilization scenario RCP4.5 and its correspondingCMIP6 counterpart SSP245 showed a drastic reduction in Sal's high suitability region in both near (2041-60) and far (2061-80) future periods. We observed a differential geographic shift of the highly suitable region for Sal habitat under both RCP4.5 and SSP245 scenarios.Low tolerance towards temperature shift and timely precipitation requirement is crucial for Sal habitat suitability. Enhancing the natural regeneration and incorporating plantation initiatives in the highly suitable regions are key for securing Sal's habitat suitability in the ICH.

Keywords: Climate Change, Ecological Niche Modeling, MaxEnt, Shorearobusta, Uttarakhand

Toxicity in food chain caused by pesticide can lea to autism

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ABSTRACT

Pesticides are substances that are meant to control pests including herbicide, insecticide, nematicide, microbicide. Not only farmers use random pesticide to control pests in fields but also now days in India the government is giving orders to municipality to spread pesticide around locality to control vector borne diseases like dengue, malaria without thinking about the side effects of it. Pesticide may help us by killing those harmful pests and vectors but it has a very broad range of side effects like increasing the level of toxicity in the food chain. We know the very common example of DDT how it goes from 0.04 ppm to almost 20 ppm in the food chain. Experimental studies have suggested that increasing toxicity by common pesticides can affect normal brain development, and environmental exposures during early brain development are suspected to increase risk for autism spectrum disorders in children because on the basis of experimental and observational research, certain dose of pesticides may be capable of inducing core features of autism and autism spectrum disorder (ASD). Many observed on field studies show that Babies whose moms lived within a mile of crops treated with widely used pesticides were more likely to develop autism, according to new research. The weight of evidence is beginning to suggest that mothers' exposures during pregnancy may play a role in the development of autism spectrum disorders. There has been 178% rise in autism cases in India in past 20 years. This huge amount of increase in autism points to a certain reason which pesticide can be.

Keywords: Autism, Autism spectrum disorder, DDT, Food chain, Pesticide.

Assessment of Surface Water Quality of Mine Pit Lake and Local Surface Body by using WQI and HPI at Raniganj Surface Coal Mining area, India.

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ABSTRACT

Surface mining and related industries are the most hazard for the total environment. Surface water were collected from nine mine pit lakes and nine local surface water bodies at Raniganj surface coal mining area in post monsoon season to assess the overall quality, heavy metal pollution, various physical and chemical characterization. pH , temperature, electrical conductivity(EC) , total dissolved solid(TDS) , total hardness, total alkalinity, salinity, cations such as Ca2+, Mg2+,Na+, K+ , anions such as No3-,So42-, Cl- , Heavy Metals (As, Hg, Cu, Co, Pd, Fe, Mn, Ni, Zn, Cr, Pb) were analyzed and were compared with the standard guideline recommended by WHO, BIS. Multivariate Statistical Analysis (Correlation, PCA, Cluster Analysis), Piper and Durov diagram, Water Quality Indexing (WQI) and Heavy Metal Pollution Indexing (HPI) were used to study. All the above mentioned studies conclude that all the water from mine pit lake and local surface water body are not suitable for drinking purpose. The main sources of pollution of mine pit lake are Mining and related industries. The main sources of pollution of local water body are from Agricultural runoff and anthropogenic activities mainly. This study may aid in controlling pollution sources and transportation to protect environment and sustainable management in study area.

Keyword: Surface mining, Water Quality, Multivariate Statistical Analysis, WQI, HPI.

PM2.5/PM10 Ratio Characteristics Over Two Most Polluted Sites of IGP Region

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ABSTRACT

The PM2.5/PM10 ratio (PM2.5 and PM10 are defined as mass concentration of particles having aerodynamic diameter less than 2.5 and 10 µm respectively) is one of the important parameters in understanding the severity of the fine mode surface particulate matter pollution. The present study characterises PM2.5/PM10 ratio estimates two Indian sites with varying levels of urbanization. Three years (2019-2021) of collocated PM2.5, PM10, and meteorological (ambient temperature, relative humidity (RH), and wind speed) measurements are collected for Agra and Ghaziabad from CPCB site and investigated the spatial and temporal variability in the PM2.5/PM10 ratio at different scales and to investigate its relationship with meteorological parameters. Over the study sites Agra and Ghaziabad, the seasonal mean PM2.5/PM10 ratio varied between 0.4 ± 0.1(mean ± standard deviation) and 0.8 ± 0.1. Seasonally, the highest PM2.5/PM10 ratio was observed during winter and post-monsoon seasons. Year 2019 showed higher PM levels (PM2.5 and PM10) and higher PM2.5/PM10 ratios than the corresponding values recorded in other years probably due to pre lockdown period. The seasonal mean PM2.5/PM10 ratio estimated (over the study sites) using MERRA-2 (Modern-Era Retrospective Analysis for Research and Applications, version 2) ranged between 0.3 ± 0.07 and 0.79 ± 0.18, and exhibited consistent overestimation (when compared to values derived from measurements) during winter and pre-monsoon seasons. Grossly, the PM2.5/PM10 ratio exhibited a weak association with meteorological parameters and strongly depends on primary emissions and sources. Interestingly, despite variations in geography, population, anthropogenic activities and PM concentrations across seasons and sites, the PM2.5/PM10 ratio showed low variability.

Keywords: PM2.5/PM10 ratio, MERRA-2, Particulate matter, Lockdown.

IMPACT OF CLIMATE CHANGE

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ABSTRACT

Climate change is one of the defining issues of our times. It is now clearer than ever, based on many lines of evidence that humans are changing earth's climate. The atmosphere and oceans have warmed, which has been accompanied by sea levels, a strong decline in arctic sea and other climate-related changes. The impact of climate change on people and nature are increasing apparently. Unexpected flooding, heat waves and wildfires have cost billions in damage. Habitats are undergoing rapid shifts in response to changing temperature and precipitation patterns.

Scientific evidence continues to be gathered around the world. Some things have become clearer and new insights have emerged. Calls for action are getting louder day by day. The 2020 Global Risks Perception Survey from the world economic forum ranked climate change and related environment issue as top five global risks likely to occur within the next 10 years. Scientific information is a vital component for society to make informed decisions about how to reduce the magnitude of climate change and how to adapt to the impact.

This abstract will focus on the impact of climate change on the various areas of life and factors affecting it. It will also focus on the evidence prevailing in the environment to ensure the degree of impact and the future situations that can occur due to climate change.

KEYWORDS: Climate change, Effect of climate change, Evidence of climate change

The emergence of Guillain–Barre syndrome during the coronavirus disease-2019 pandemic

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ABSTRACT

Since the outbreak of Coronavirus disease-2019 (COVID-19) outbreak in January 2020, several pieces of evidence have suggested the association of the spectrum of Gullain Barre Syndrome (GBS) with Severe Acute Respiratory Syndrome coronavirus-2 (SARS-CoV-2). GBS is an autoimmune disorder that causes an acute inflammatory demyelinating polyradiculoneuropathy. Numerous infectious factorsincluding Campylobacter jejuni (the most frequently recognized bacterium associated with GBS), cytomegalovirus, Epstein-Barr virus, measles virus, influenza A virus, and Mycoplasma pneumoniaand non-infectious agents like vaccinations and surgery are some of the causes of GBS. It has a global annual incidence of 0.5-2 cases per 100,000 population, and it mainly affects males more than females and the elderly more than the younger people. Acute inflammatory demyelinating polyneuropathy (AIDP), Acute Motor Axonal Neuropathy (AMAN), Acute Motor and Sensory Axonal Neuropathy (AMSAN) and Miller Fisher syndrome (MFS), are identified as the three primary variants of GBS. Molecular mimicry, which is a theory concerning the mechanisms of GBS, is one of the assumptions. In this mechanism, antibodies are released by the immune response whichcross reacts with the gangliosides at the nervous membranes and causes blockage in the conduction of nervous impulses. Hence resulting in paralysis, problems in respiration, talking, swallowing, bowel and bladder function. Intravenous Immunoglobulin (IVIG) and plasmapheresis can be used as a treatment for GBS.

Keywords: Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2), Guillain Barre Syndrome (GBS), Miller Fischer Syndrome (MFS), Molecular mimicry, Polyradiculoneuropathy

A comparative study of spatial variation of Nitrogen dioxide over the Indian region for the Pre and Post Lockdown period

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ABSTRACT

The oxides of nitrogen; NO (Nitrogen monoxide) and NO2 (Nitrogen dioxide) are very crucial in the atmospheric chemistry due to their role in the radical chemistry and formation and removal of stratospheric and tropospheric ozone. Nitrogen dioxide in the atmosphere is primarily the result of the oxidation of Nitrogen oxide which in turn is released from high-temperature combustion process like fossil fuel burning, vehicular exhaust, forest fires etc. Other sources include biomass burning, microbial activity in soil, lightening etc. whereas the major sinks for Nitrogen dioxide are the atmospheric transport, wet deposition and photolysis. Several satellites measure the NO2 from space including GOME, GOME-2, SCIAMACHY, OMI, and TROPOMI. For the present study, tropospheric Nitrogen Dioxide (NO2) was analyzed over the Indian region for the year 2019 and 2020, using the TROPOMI spectrometer data onboard sentinel-5P satellite. TROPOMI has a resolution of 7 km by 3.5 km (now 5.5km X 3.5km) at nadir which is better than any of its predecessor. Python programming language and Harp tool were used to get the monthly averaged plots with gridded data of resolution 0.01° X 0.01°. A comparison of the tropospheric Nitrogen dioxide (NO2) columnar data for 2020 with the tropospheric Nitrogen dioxide (NO2) values for 2019 has been done. Data for 2019 and 2020 is utilized because on 22nd march 2020 India had to face a Janta (Public) curfew and a complete lockdown from the 24th of March due to then ongoing Covid pandemic situation. Spatial plots revealed that Nitrogen dioxide concentrations were maximum during the winter months and minimum during the monsoon months. Identification of major hotspots for tropospheric NO2 has also been carried out. It has been found that covid-19 lockdown in India resulted in a substantial decrease in the concentrations of Nitrogen dioxide over the study region.

Keywords: Hotspots, Lockdown, Nitrogen dioxide, Spatial, TROPOMI.

Assessing the Physico-Chemical Parameters of Sediment of Kolar River in Sehore district, Madhya Pradesh, India

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ABSTRACT

Physicochemical parameters were used to assess the sediment quality of the Kolar River basin. During May 2021 to June 2022, the investigators hope to better understand the physiochemical properties of sediment in the Kolar River basin, a tributary of the Narmada River in the Bhopal division of Sehore district, Madhya Pradesh, India. During the summer, winter, monsoon, and post-monsoon seasons, samples were collected from six stations using a grab sampler. Scientific manuals were used to guide the methodology (Adoni et al., 1985; APHA, 1998). The results revealed that the sediment characteristics were sandy to loamy (muddy) sand soils with a mean pH value of 7.8, indicating that the sediments were slightly acidic to alkaline. TDS concentration and conductivity were found to be quite high in the bottom sediments, with mean values of 92.58 ppm and 115.33 s/cm. The river sediments were discovered to be quite rich in organic matter content (6.90%) and organic carbon content (1.01%), with a mean bulk density of 1.05 gcm3. The mean values for the macronutrients (calcium, magnesium nitrate, and phosphate) were 68.22 mgl-1, 53.599 mgl-1, 4.383 mgl-1, and 0.088 mgl-1, respectively. The average value of chloride, alkalinity and moisture content was discovered to be in the low range of 21.6 mgl-1, 53.62 mgl-1, and 31.44% during the study. The primary goal of this study is to collect baseline data on seasonal variations in the physicochemical properties, nutrient status, and particle size analysis of the river and its environs.

Keywords: Bhopal division, Kolar River, particle size analysis, physicochemical parameters, and sediment quality.

Hospital Solid Waste Management in India: Strategies and opportunities

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ABSTRACT

Being an over-populated country, our major emphasis should be levied on environmental issues and public health. In this relevance hospital solid waste management (HSWM) needs major attention and careful study reveals that only 5% hospital solid wastes (HSWs)are non-infectious and remaining HSWs are capable to affect the hygiene and safety of the hospital staff, patients, society and waste management staff. Infectious HSWs may cause of some serious diseases like AIDS, tuberculosis, tetanus and toxic chemicals such as dioxins and furans have significant harmful effect on animals. The HSWM department uses a disposal mechanism and for this purpose they follow several procedures like use of different color codes to collect and store HSWs and take various safety measures as use of mask, gloves and aprons to sort, store and transport HSWs. Theentire hospital staff should be aware of biomedical waste management law (BWML). Because inappropriate disposal of HSW may lead a fundamental source which cancreatespollution, numerous diseases for human beings and animals. HSWs also contains some radioisotopes in very small extent which mainly contains 131I,99m Tc, 14C etc. The total amount of HSW is increasing everyday exponentially so to minimize its adverse impact some methods like pyrolysis technique, proper implementation of BWML (1998, 2016), environment protection act 1986, reduce the generation of HSW, proper training of HSWM staff, full knowledge about the color code usage for waste boxes, bins and containers, follow all the rules and regulations for handling waste safely etc. need to implicated at the earliest.

Keywords: Disposal, Harmful effects, Hospital Solid waste, Rules and Regulations, Waste reduction.

Impact of Microorganisms in the Long-Lasting Play of Human Evolution

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ABSTRACT

Astronomically-forced past climate change determined where ancient humans lived and how their habitat, food-preferences and tool making changed over time due to adaptation. Persistent harsh climate conditions could trigger a gradual transition from one species to another may be due to the impact of past climate change on human genetic diversity. Drastic alternations of the Earth's climate were not influenced by humans alone. The earliest photosynthetic microorganisms bleached out enough methane to warm the planet by 15°C. This short span of global warming may have shielded Earth from being frozen which created a comfortable climate for ancient organisms. They served as a source of food for other organisms consequently producing methane, helping to warm Earth's early atmosphere. On the other hand, these ancient microorganisms used energy from the sun to transform metals from rusty minerals, which was used in tool making that shaped human evolution on this planet. Thus, the present study tries to find out how the ancients microorganisms created an earth suitable for human sustenance on a dimly lit early Earth and created the theatre where the long-lasting play of human evolution was staged and also influenced their behavioural evolution by providing them objects for tool making.

Keywords: Bioleaching, Climate change, Global warming, Human evolution, Microorganisms.

Landfilling in urban India results in waterlogging: A hidden terror for future India

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ABSTRACT

Purpose -Waterbodies are essential elements of biodiversity. In India, there are more than12,500 water bodies. India holds 4%of global fresh water and 16%of it's population. Urbanized cities like Bangalore, Ahmedabad, Kolkata, Hyderabad has lost many of their waterbodies due to urbanization, which is a big threat of waterlogging and may ruin the biodiversity.

Research method- Unplanned urbanization of India may result in waterlogging because of which a well-developed city may demolish due to heavy rain as they don't have any sewage plans. More waterbodies should be created to improve drainage system of each city. Because of more people migration in cities results in pollution of waterbodies. Even the Pallikarni marshland in Chennai is used for solid waste dumping. Another result of large number of people migration in cities, availability of land has been getting scarce, size of city wetlands has been decreasing rapidly, construction of road and apartments have shrunk the wetlands. Few cities counted the number of total waterbodies in states because of court rulings.

Result & conclusion- Management of urban flooding report, published on National Disaster Management Authority (NDMA)says, concretisation has been the major problem in several cities. On 5-7september 2022 Bengaluru was flooded severely due to 131nm rainfall overnight. Reports says, the cities drainage system is ill equiped to deal with this sudden heavy rain .There was lack of culverts, rain water and sewage water had no way to pass but accumulated , leading to waterlogging. Development of drainage system, awareness of people about the garbage disposal may save the cities from massive waterlogging.

Keywords- unplanned urbanization, waterlogging, sewage system, waterbodies, biodiversity, garbage disposal.

Prevalence of multidrug resistant staphylococci from urban waste water in Delhi-NCR

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ABSTRACT

This study determined the prevalence of multidrug resistant (MDR) staphylococci from effluent waste water of different pharmaceutical sites and river Yamuna, Delhi-NCR. The increasing prevalence of antibiotic resistance in the aquatic environments is the major concern, where resistant bacteria can transfer their genetic determinants to clinically important bacteria for the emergence of novel resistant pathogens. The pharmaceutical effluent waste water containing different antibiotics create selective pressure on bacteria to developed antibiotic resistance. Therefore, water samples were collected from seven pharmaceutical sites and three river Yamuna sites in Delhi-NCR during 2019-2021. A total 378 staphylococci were isolated from all the sampling sites using various selective media and their preliminary identification was done using different biochemical tests. Among the isolates, 59.25% (224/378) were found as biochemically positive staphylococci including 92.85% (208/224) coagulase negative (CoNS) and 7.14 % (16/224) coagulase positive staphylococci (CoPS). All the biochemically positive staphylococci were screened for oxacillin resistance by broth dilution method and 25% (56/224) were found to be methicillin resistant staphylococci (MRS). Further, antibiotic susceptibility patters of all MRS against 12 different antibiotics were tested by disk diffusion method and 57.14 % (32/56) strains were identified as multidrug resistant (MDR). This high prevalence of MDR staphylococci in the waste water and river environment may pose a serious threat to the public health. More studies are required to determine the resistant determinants among MDR staphylococci and their dissemination in the aquatic environment.

Keywords: Urban waste water, Methicillin resistant staphylococci, Antibiotic susceptibility, Multidrug resistance.

AN ASSESSMENT OF OCCUPATIONAL HEALTH RISK OF LANDFILL WORKER'S AT OKHLA LANDFILL, NEW DELHI

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ABSTRACT

This study is an assessment of the effect of working and environment condition on the health of landfill workers at Okhla landfill, New Delhi. To carry out the assessment a cross-sectional questionnaire comprised of sections related to socioeconomic profile, management of solid waste and leachate and resulting significant occupational health hazards was distributed among landfill workers. Around one hundred and seven (107) workers participated in the survey. Among 107 workers 98% of workers were males and only 2% were female workers. As far as educational qualification is concerned 37% has completed higher secondary, 28% has attended middle school, only 13 % were graduate and rest 10% primary and 11% illiterate. 5% of workers were of the opinion that almost 400-500 truck dump waste in landfill daily however 95% of workers don't know about it. The survey revealed that most of the participants/Respondent suffered from various occupational health hazards time to time like Skin allergies (36.17%), Respiratory illness (31.91%), Eye redness/ Hair loss (23.40%), Cardiac Problem (8.51%) respectively. Environmental condition of rest room reported 51% of worker reported poor environmental condition of the rest room. All the participated worker have good knowledge about leachate. The survey revealed that maximum leachate were generated during monsoon. According to the study conducted there is no leachate collection and treatment facilities. The study highlighted the need for proper Personal Protection equipment (PPE's), Regular health checkup and hygienic condition of workers rest room, leachate collection facilities at study area.

Keywords: - Landfill worker, Occupational health, Socioeconomic, Solid waste, Leachate

β-Carotene Enrichment in Uttapam with Curry leaves: A Miracle Plant

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ABSTRACT

Curry leaf is a wonderful leafy spice with therapeutic, culinary, and dietary benefits. The fresh curry leaves contain a significant quantity of beta-carotene (7663 g), the greatest source of pro-vitamin A. In India, the fermented and shallow-fried uttapam is a widely recognised and well-liked food. The purpose of the current study was to standardise the procedure of development of uttapam that was supplemented with β-carotene by adding 5, 7.5, and 10 per cent of Curry Leaf Powder (CLP). After being blanched for 15 seconds, the curry leaves were freeze-dried and stored for further use. Natural fermentation was carried out during uttapam preparation. The control product uttapam was prepared using Rice: Black gram dhal (2:1) batter and all other required ingredients. Rice: Black gram dhal batter was substituted with 5, 7.5 and 10 per cent of CLP in experimental (T1, T2 and T3) uttapam. Uttapam was analysed for organoleptic acceptability, proximate, dietary fiber, total and in-vitro available minerals and β-carotene.

As per the scores given to colour, appearance, aroma, texture and taste, the overall acceptability of T2 uttapam (7.91) was as much as it was of control uttapam (7.92) and contained the 7092 µg/100g of β-carotene. CLP contained excellent amounts of β-carotene (104100 µg/100g), total dietary fiber (53.68%), calcium (2147.30 mg/100g) and iron (21.30 mg/100g). The soluble and insoluble dietary content of experimental uttapam was ranged from 5.35 to 6.38 per cent and 13.35 to 15.26 per cent, respectively. As compared to control, Iron (3.08 to 4.07%) and calcium (126.44 to 233.85%) contents were also found to be significantly higher in the supplemented uttapam. It may be concluded that CLP can be successfully incorporated up to 10 per cent to develop β-carotene rich products and its consumption may improve the sub-clinical deficiency of vitamin A in vulnerable group.

Keywords: β-carotene, Curry leaves, Enrichment, Organoleptic, Uttapam

Green Building for Sustainable Development: Prospects and Challenges

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ABSTRACT

With expanding human population and industrialization, need forinfrastructural development has become essential boosting construction industry. But the activities of construction industry negatively affect our environment which includes air, water, soil and noise pollution, generation of hazardous wastes and green house gases and many more. Therefore, technologies enabling sustainable construction practices are the need of the hour. Green building is a concept of sustainable construction for better environmental and social protection. The hypothesis aims to carry out construction works in an eco-friendly way withminimum effect on environment, since it depends on essential tenet- "Reduce, Reuse and Recycle".Though Green Building construction is expensive, in the long run it is profitable as the running cost of green structures is much lower than normal construction.Green building aims to minimize the interest on non-renewable assets like conventional electricity, ground water, non-recyclable materials and amplify the use of renewable assets like renewable energy sources, water harvesting, use of recycled materials etc. These buildings are based on bio-climatic design which utilizes productive gear to meet its lighting, cooling, uses proficient waste and watermanagement; provide pleasant and hygienic indoor working conditions. In the developed countries strict measures have been taken by their respective government to support and achieve a sustainable and an eco-friendly development. However, the developing countries are far behind in achieving a sustainable development and eco-friendly constructions as the initial cost is high and most of the developers and builders are either unaware or reluctant to adopt this new technology. In India government has already taken few measures to promote the concept of green building through establishment of Indian Green Building Council (IGBC). Policies implemented by Indian government to popularize this new concept seem promising as India already holds second position in the global green market space.

Keywords: Construction industry, Environmental pollution, Green building, Sustainable development

Superbugs and the Future of Vaccinology

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ABSTRACT

There are strains of bacteria, viruses, parasites and fungi, called Superbugs that are Multi-Drug Resistant (MDR).Klebsiella pneumoniae, Escherichia coli, Serratia marcescens, Pseudomonas aeruginosa, Staphylococcas aureus, Proteus mirabilis, and so on, are some of the most virulent bacteria causing clinical infections that possess Antibiotic Resistance Genes (ARG). The prophylactic measures for this diseases are therefore of great importance, and nano-vaccines (NVs) fit in well here. A nano-vaccine is more efficient because of its sustained release, improved antigen stability, enhanced immunogenicity, better access to lymph nodes and low minimum immune toxicity. Nano medicine provides an innovative tool for combating the high rates of resistance that we are fighting nowadays, especially Superbugs, by the development of both alternative therapeutic and prophylaxis approaches and also novel diagnosis methods. This NVs delivery approaches includes lipid based nanoparticles (NP), dendrimers, polymeric NP, self-assembled nanoparticles, Virus like particles (VLPs) and so on. A promising method for boosting both T and B cells responses is to induce NV surfaces with ligands that target specific immune cells such as dendritic cells. In this review we discuss the challenges and opportunities of creating NVs to curb the menace of superbugs and the breakthroughs in the NV domain in the past decade.

Keywords: ARG, MDR, Nano-vaccinology, prophylactic measures, Superbugs.

Impact of surface coal mining on soil properties of the region at Talabira mining area, Sambalpur, Odisha

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ABSTRACT

Large-scale surface coal mining activities result in disturbance of the local ecosystem by creating different land uses that alter soil properties and hydrological balance of the mining area and surrounding environment. This study aims to evaluate the changes in soil properties in mining-affected lands (mine face topsoil, wasteland, and agricultural land) and reclaimed mine soil (RMS), and to quantify the changes of the selected soil properties with respect to reference Sal forest (*Shorea robusta* Gaertn. F.). Changes in soil properties were analyzed on a profile basis (0–20, 20–40, and 40–60 cm). The study indicates that soil pH, electrical conductivity, and bulk density were increased significantly, while a decrease in nutrient content (N, P, and K) was observed in the mining-affected lands. The overall findings of this study indicated that conversion of Sal forest into other land uses due to mining significantly reduced the nutrient contents and soil quality of the area. Reclamation of the mine degraded land in a short duration does not restore the overall properties of the soils, which has long-term impacts on the surrounding ecosystem.

Keywords: Coal mining, land use, reclamation, soil properties.

The effects of Environmental Pollution in Developing Geriatric Diseases (AD*)

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ABSTRACT

As over the time the aging population increases the factors that affect this aging population is gaining much importance. Of particular concern are the neurological diseases and disorders typically associated with reduced cognitive function. India alone has more than 4 million people estimated to be suffering from Alzheimer's and other forms of dementia.

Alzheimer's disease is defined as premature aging of the Brain, usually beginning in mid-adult life and progressing rapidly to extreme loss of mental powers. Pathologically, one finds increased amounts of beta-amyloid peptide in the brains of patients with Alzheimer's disease.

The role of the environment a putative risk factor has gained importance these days. More worryingly the evidence that pre and post natal exposures to the environmental factors predispose to the onset of neurodegenerative diseases in later life. Neurotoxic metals such as lead and mercury, aluminium, cadmium and arsenic as well as some pesticides and metal based nano particles have been involved in Alzheimer's disease due to their ability to increase beta-amyloid peptide and the phosphorylation of tau protein causing senile/amyloid plaques and neurofibrillarytangles characteristics of Alzheimer's disease.

The major gaps in this data is due to the fact that when older adults experience cognitive problems diagnoses rarely consider the possibility of environmental chemical exposure.

This poster discusses data from epidemiological and experimental studies about the role and factors in the development of idiopathic Alzheimer's disease.

Keywords: Alzheimer's disease, cognitive disorders, beta-amyloid, neurotoxic metals

Clean Energy Production by Microbial Fuel Cell

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ABSTRACT

Water, food, and energy are considered indispensable for all living forms to survive and grow. They are interlinked with each other. One of the most crucial dangers the world is now facing is the consumption of non-renewable energy sources and environmental pollution. As a result, alternative renewable energy sources that are environmentally and economically imperishable catch great interest. Nowadays the world is encountering a serious peril from the consumption of unsustainable resources, fresh water shortage, and food scarcity due to the spontaneous use of fossil fuels. Because of the increasing population, the need for freshwater, energy, and food will increase. And the urge for recycling wastewater will also increase. Microbial Fuel Cells (MFC) can be used as a great alternative energy conservation system for producing bioenergy. It is a bio-electrochemical hybrid system involving electricity generation, wastewater treatment, and nutrient recovery. There are many benefits of MFC including energy saving, reduced sludge generation, and energy conservation. The selection of microorganisms is the main criterion in MFC technology for clean energy generation. MFC is a great and emerging technology for generating clean energy and electricity from wastewater effluent. Membrane technology improves the sewage water and enhances the treatment efficiency. In the coming days, more advanced MFC technology will help to develop an eco-friendly and more reliable source of energy generation from the wastewater system.

Keywords: Microbial fuel cell, Clean energy, Substrate, Anode and cathode material, Wastewater treatment.

An observation on the avifaunal diversity, especially Asian open bill stork (*Anastomus oscitans*) at Barachaka village of Bankura district of West Bengal, India

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ABSTRACT

Asian open bill stork, Anastomus oscitans (Boddaert 1783) are widely distributed in the plains and the peninsula of Indian sub-continent. They usually breed during the monsoon between June to September. The principal objective of this observation is to measure the avifaunal diversity of it, especially at Barachaka village (area 137.22 hectares, village code – 32704, Coordinates 23.3204°N, 87.0053°E) of Bankura district, West Bengal, India and the prospectus of developing a good ecotourism spot in the area. The study reveals that, the safety and food security provided by the villagers encourage these birds to prepare 'colonial nests' in trees very near to the human habitation. Even the tribal villagers sacrifice their tamarind harvest yield for the sake of these birds, and often face a financial loss. Due to heavy rains, chicks sometimes fall from their nests and are rescued by the villagers and returned to their original nest. Similar heronry protection has been observed in some villages of Uttar Pradesh, Andhra Pradesh and Tamil Nadu. Through the regular survey and questionnaires with the villagers we came to know that, these birds have been coming here through last few decades in this particular time of breeding and can't tolerate sunlight and scorching heat at all. Main food-habit of these birds is mollusks, especially golden apple snail. Other studies reveal that the range of these birds is from Pakistan in west to Thailand in south-southeast including China in north, Sri Lanka in south, Myanmar, Bangladesh. Scientific community may also gather lots of traditional knowledge from these people who may be helpful for bird conservation as well as for mankind.

Keywords: Ornithology, Anastomus oscitans, Asian open bill stork, breeding, biodiversity.

Production and processing status of Mahua flower across different regions of Odisha and its impact on tribal economy

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ABSTRACT

Mahua (Madhuca longifolia) and its flowers are plenty available in various regions of Odisha. More than 75% tribal population gains their livelihood from mahua flower collection. But due to poor post-harvest storage and lack of modern technologies for the value addition of mahua flower, spoilage of mahua flower occurs. As a result the poor tribal and local entrepreneurs are facing lots of economic problem due to low profit market of mahua flowers and their products. The tribal lacks the necessary industrial skill for processing of mahua flower. This manuscript reviews the collection of mahua flower across different regions of Odisha with main focus on processing aspects of mahua flower and its impact on tribal economy. Various postharvest practices of mahua flower in different mahua growing districts are briefly included. Recent scientific interventions and value addition of mahua flower to produce marketable products like jam, jelly, dried flower, ready-to-serve beverages (RTS), cakes, mahua extract for medicinal uses has been discussed. There exists a tremendous potential for medicinal use of the mahua flower which has been discussed in this review.

Key words: Mahua flower, medicinal use, postharvest practices, value addition.

Toxicity of Heavy Metals on Human Health and Environment

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ABSTRACT

Almost each heavy metal is serious toxicants as carcinogens. Heavy metals are kept under environmental pollutant category due to their toxic effects in plants, human and food. These are heavy metals persistence, accumulate and not metabolized in other intermediate compounds and do not easily breakdown in environment. Heavy metals are naturally occurring elements, and are present in varying concentrations in all ecosystems. Some of the heavy metals i.e. Arsenic (As), Cadmium (Cd), Lead (Pb), Mercury (Hg) are accumulative poison. Arsenic (As), cadmium (Cd), chromium (Cr), and nickel (Ni) are category 1 heavy metals according to the International agency for Research on Cancer. There is the large of number of heavy metals. Total metals have caused major human health problems in various parts of the world. The term "heavy metal" is connected in many people's minds to metals that are toxic. There is a relationship between the chronic diseases and geologic environment. Geochemical environment is indeed a significant factor in the serious health problems. These metals have been extensively studied and their effects on human health regularly reviewed by international bodies such as the WHO. This reviews paper definite heavy metals and their toxicity and effects on human health.

Keyword: Carcinogenicity, Human exposure, Heavy Metals, Toxicity.

Municipal Waste Management in the Semakau Island of Trash, Singapore

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ABSTRACT

Waste management has been a critical environmental issue since recent decades. Urbanization, economic growth, and population growth all result in waste production. Over 90% of the solid waste produced in low-income nations is frequently dumped in uncontrolled landfills or burned openly. Improper waste management has a negative influence on citizens' quality of life as well as infrastructure and public health. It also has a significant impact on climate change and the environment. Solid waste management (SWM) challenges and issues are of immediate importance in metropolitan environments, particularly in the rapidly urbanising cities of the developing world. The system for managing the generation, storage, collection, transport, treatment, and disposal of solid wastes is known as solid waste management. Solutions for MSW management must be technically practical, economically viable, socially and legally acceptable, and environmentally friendly.

Waste management is often the responsibility of municipalities along with providing the access to an effective and efficient system to the residents. However, they frequently encounter issues that go beyond the municipal authority's capacity to manage the MSW like financial limitations, a lack of organisation, and complexity. This review highlights the problem of municipal waste generation and its management in global scenario with a special emphasis on Singapore's remarkable waste disposal and management system. Singapore, which is regarded as one of the world's cleanest nations, faces similar difficulties in handling its trash. The amount of solid garbage disposed of in the nation has increased by nearly seven times as a result of the expanding population and thriving economy. However, over the years, Singapore has found an effective approach to overcome this problem. This present work aims to present Singapore's innovative solution to its waste disposal problem and lead the way in creating a healthy environment.

Keywords: Municipal Waste management, Waste disposal, Solid waste management, Semakau landfill.

Seedling performance for domestication of *Terminalia bellirica*

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ABSTRACT

Terminalia bellirica is a wild edible fruit with tremendous medicinal properties. Although it is an important species but yet underutilized. So, there is a need for the domestication of this species to provide sustainable source close to the local population for the use. The present study was confined to 12 seed sources of *Terminalia bellirica* distributed in Hamirpur, Kangra, Solan and Una regions of Himachal Pradesh. From each seed source 5 mother trees were further selected. 60 mother trees were selected for the study. Seeds were collected in the month of January, 2022 and then were sown in polybags in the month of March in glasshouse under a homogeneous condition. Emergence of seedling was recorded after twenty days of sowing. Different Seedling traits were studied and the results showed that the regions i.e., Kangra and Una were having highest germination rates of 66 % and 62%, respectively. So, the mother trees from Kangra and Una were found best suitable as seed sources of *T. bellirica* and recommended for further domestication and breeding program.

Keywords: Domestication, Germination rate, Seedling performance, *Terminalia bellerica*.

Particulate Pollutants have Deleterious Effects on Health

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ABSTRACT

Over the past couple of decades, it's realized that particulates in air causes a considerable change in the climate all over the world. The various kinds of particulates in air have now become a worldwide phenomenon and every living being is facing the problems caused by it. Airborne particulate matter (PM) is a mixture of many chemical species ranging from complex mixture of solids and aerosols, composed of small droplets of liquid, dry solid fragments and solid cores with liquid coatings. They can be of a diameter of 10 microns or less (PM10) or fine particulate matter of 2.5 microns or less in diameter (PM2.5), are inhalable into the lungs and can cause adverse health effects. Generally older adults with chronic heart and lung diseases, children, asthmatics and with weak immune systems likely to experience adverse health effects with exposures. Affected humans may get rashes, bronchitis, emphysema, asthma, lung cancer and other chronic diseases. Particulate pollution caused by asbestos, silica, carbon, beryllium, lead etc are capable of causing fibrotic action in the intestinal and lung areas. The death toll caused by smog can be enormous. The mortality rate is higher in urban areas than in rural areas. Reducing deaths and ill health from air pollution is one of the targets of sustainable development. The most effective reduction of pollutants will be to reduce pollution from diesel transport and restricting open burning of biomass and fossil fuels. Even industrial sectors should have a role in reducing particulates with available technologies that could greatly reduce harmful emissions.

Keywords: Air pollution, lung diseases, particulate pollutants.

Pollution assessment of Mydala Reservoir of Tumakuru District, Karnataka by Investigating Physico-chemical Parameters and Diversity of Zooplankton

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ABSTRACT

Water is the most essential natural resource and is prone to pollution due to the accumulation of pollutants such as heavy metals from industrial effluents, agriculture runoffs, organic and inorganic wastes from common households. Various other anthropogenic activities have led to a deleterious effect on the aquatic body affecting the life dwelling in the aquatic habitat and the health of humans. In most cases, factors such as the micro-pollutants are affecting the water body with their toxic presence, yet are not observed with much intensity. Owing to this an investigation was conducted at the Mydala Water Reservoir of Tumakuru district of Karnataka with an aim to assess the physico chemical parameter to understand the abiotic status of the study area along with the study of the diversity of zooplanktons. The zooplanktons are known as indicators of the changes in the water body as they are planktonic heterotrophic free-floating aquatic organisms. The investigation for the physico chemical parameters revealed that all the parameters were within the range prescribed by ISO 10500-1991 this indicates that the water is not polluted and the study of zooplanktons resulted in the diversity of 10 species of zooplankton among which 06 species belonging to Rotifera, 02 species belonging to Cladocera, 01 species belonging to Copepoda, and 01 species belonged to Ostracoda.

Keywords: Mydala Water Reservoir, Physico-Chemical Parameters, Zooplanktons, Micro-Pollutants, Water Quality.

To study the effect of biosurfactant as an antimicrobial agent against multi-drug resistant bacteria

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ABSTRACT

Antibiotic resistant microorganisms exist across humans and the environment. As per Center for Disease Control, antibiotic resistance amongst microorganisms is a natural process. Microorganisms develop resistance mechanisms as a survival strategy. However, antibiotic resistance increases with incessant use of antibiotics and resistant microorganisms find their way into the mainstream environment via food and water, thus making the human populace resistant to antibiotics.

In the study conducted microorganisms were isolated from intestinal tract of chicken and RO filter from household water supply. Thirteen bacterial isolates were taken for study. Morphological and biochemical experimentation was carried out for preliminary identification of bacterial pathogens. The antibiotic resistant profile was constructed for isolates under study by Kirby Bauer's disk diffusion method. The growth curve of microorganisms under study was constructed by measuring optical density of the culture broth after an appropriate interval of time. In parallel the variation in pattern of growth was noted and compared after addition of biosurfactant. Agar well diffusion method was employed to determine the efficacy of crude biosurfactant as antibacterial agent. The microorganisms were labeled as resistant or sensitive as per CLSI and EUCAST guidelines. The antibiotic resistance pattern obtained points out to the incessant usage of antibiotics and introduction of resistant bacteria in water supply and poultry food. Both the agar well diffusion method and growth curve has shown promising results against test microorganisms. Different biosurfactants used have given varied efficacy against isolates under study. This indicates the selectivity of crude biosurfactant and narrow spectrum activity. The promising results obtained have been comparatively analysed by the growth curve readings. The crude biosurfactants have given results comparable to antibiotics.

The study concludes that the spreading of antibiotic resistance to related and different genera points to a grave incidence which needs to be taken into immediate cognizance. The study revealed the efficacy of biosurfactant as antimicrobial agent and potential candidate for future research and development.

Keywords: Antibiotic Resistance, Food borne pathogens, Water borne pathogens, Biosurfactant, Antimicrobial agent.

Exploring the strategies of combined high temperature and drought tolerance in rice

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ABSTRACT

Continuous climate change accompanied by rise in ambient temperature and irregular rainfall cause frequent onset of heat and drought stress in the tropical and sub-tropical regions, impeding sustainable agricultural productivity. Rice cultivation is negatively impacted with high temperature or drought stress at different growth stages, reproductive stage being the most vulnerable stage that directly affects the plant productivity. Combined stress coinciding with the reproductive stage in rice affects the panicle length and increased spikelet sterility leading to poor grain yield. Therefore, the understanding the mechanisms of reproductive success in contrasting rice genotypes under combined stress conditions is essential to encounter the food security. The present study aimed to understand the responses of contrasting rice genotypes IR64 and Sahbhagi Dhan under combined high temperature and drought stress. Combined stress affected the morpho-physiological activities associated with floral development in rice. Furthermore, excessive accumulation of reactive oxygen species (ROS) interrupted the cellular redox homeostasis leading to membrane damage and cell death under combined stress. Following the study, Sahbhagi Dhan exhibited improved tolerance to combined stress contrasting with that of IR64. Enhanced antioxidant enzyme activities also contributed to the combined stress tolerance in Sahbhagi Dhan by maintaining membrane integrity and reproductive success. Overall, the study revealed the comprehensive mechanisms of multiple stress tolerance in rice.

Key words: Drought, Fertility, High temperature, Reactive oxygen species, Rice.

Effect of urea and different organic fertilizers on growth and yield of Mung bean (*Vigna radiata*)

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ABSTRACT

Organic fertilizers are known to sustainably improve soil health & productivity. Effect of different fertilizers (compost, vermicompost, cowdung, biofertilizer liquid and DAP granules) on soil texture, plant growth and yield of dicot plant Mung bean Vigna radiata was studied during the summer season in Delhi. Summers are dry & with a high rise in temperature in Delhi. The composition of these treatments was 1:1 i.e. soil: fertilizers. Parameters analysed were rate of germination, root & shoot length, dry weight & fresh weight of plants. Soil mixtures (treatments) were tested for the presence of inorganic nutrients (chloride, sulphate, nitrate, pH). Biochemical tests on the leaves of the control & treatment plants were compared for pH,chlorophyll content, yield of plants in control & treatments was analysed on the basis of fruit formation and leaf area. The pH of control & treatment mixtures given to plants for germination was found to be ranging from acidic to neutral in different fertilizers. Seed germination was highest in vermicompost & lowest in liquid biofertilizer. Shoot length was maximum in vermicompost & minimum in control. Root length was maximum in vermicompost & minimum in cow dung treatment. Fresh weight of vermicompost treatment was maximum & minimum of compost treatment. Dry weight was maximum in vermicompost treatment & minimum in biofertilizer liquid treatment and the chlorophyll content was higher in cow dung treatment & lower in control.The number of pods per plant was the highest in replicas supplied with vermicompost followed by cow dung.The leaf area had no distinct differences in the treated plants. The number of pods per plant was highest in vermicompost treated plants as compared to other treatments. From the data collected, we can conclude that addition of vermicompost to the soil improves soil texture as well as overall health of the plant including yield.

The Impacts of LULC Change on the Sustainable Livelihoods of a High-altitudinal Tribal Community: A Case of Pangwal Tribe in the Western Himalaya

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ABSTRACT

The Himalayan mountainous landscapes has been undergone a rapid change in land use/cover owing to the recent developmental activities especially 2005 onwards after the implementation of Mahatam Gandhi National Rural Employment Guarantee Scheme (MNREGS) as well as climate change. The present study is an attempt to monitor the changes and transformation in LULC patterns for the periods 1992, and 2021 using Landsat-5 (TM) and Landsat-8 (OLI/TIRS) images respectively and to explore its impact on the sustainable livelihoods of study population. The findings of the study demonstrate that agriculture land, built-up area, barren land and water bodies have increased by 13.23% (3.15 km2), 98.56% (2.05km2), 97.52% (382.41 km2) and 14.49 (0.93km2) while forest cover, pastureland, and snow cover have drastically decreased by -20.97% (-61.34 km2), -21.10% (-98.76 km2) and -68.09 (-228.43km2) respectively. These changing patterns of LULC shows a rapid pace of local roads and tracts construction which making the study area prone to occurrences of various kind of hazards further causing a great concern to the livelihood sustainability of the population. In spite of this, community have also possesses a number of coping strategies to deal with the natural hazards as well as climate change i.e. afforestation on steep slopes, embankment, traditional mixed-cropping, mixed farming, crop rotation and agro-forestry/horticulture etc. The communities have also developed the local management councils for the protection of Bhoj-Patra alpine forests. Therefore, it is the need of the hour to take adequate management and planning measures to lessen hazardous impacts of such land use/cover changes.

Keywords: High-altitude, Sustainable, Livelihood, LULC, Alpine Forest.

Soil Deterioration in Kerala

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ABSTRACT

Soil is considered as the backbone for agricultural productivity. India has major influence on the agriculture worldwide because 70% of Indians work in agriculture. It is considered as the foundation of the Indian economy. Soil erosion is the biggest threat to the farmers of India. It is crucial to understand how to reduce soil erosion on farmland in India. The purpose of this is to analyse the data of the studies that have been conducted on agricultural land in Kerala regarding soil deterioration and the ways to overcome it. Soil erosion affects an area of 119.2 million hectares of land in India. Major causes of soil deterioration were found out to be both by natural causes and anthropogenic causes. Various causes of soil deterioration were studied about the potential reasons like heavy rainfall, urbanization, and deforestation and its remedies that includes. catchment areas, and terracing. The writer has conducted a thorough literature research to learn about the measures taken and tried to prevent soil deterioration on Idukki's agricultural land. In this investigation to assess the soil erosion susceptibility in Kerala, India, the control practices into three main categories, which are agricultural practices, agrostological practices, and mechanical practices were used. People residing in sloped regions like Idukki was severely affected. In this review about soil deterioration in Kerala we encapsulate (1) the main reasons behind the soil deterioration in Kerala. (2) possible solutions to overcome the problems faced by the people. This comprehensive review aids decision makers and producers in putting into practise the best workable strategy for reducing and controlling soil deterioration.

Keywords: soil deterioration, catchment areas, agrostological practices.

A Review on Silver Nanobioparticles for the Treatment of Waste Water

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ABSTRACT

A reliable supply of clean water is required for the establishment and maintenance of a wide range of sustainable human activities. According to UNICEF reports, over 740 million people worldwide do not have adequate safe water supply, while over 2.5 billion people have access to combined water supply (World Water Assessment, 2019). Emerging pollutants in wastewater streams are mostly chemical substances that are non-biodegradable and persist in the environment, bioaccumulate through the food web, and pose a risk of causing adverse effects not only to human health but also to the environment, microflora, and other organisms . These pollutants that exist in various forms in the environment are difficult to eliminate using traditional technologies due to a variety of drawbacks. This has resulted in a shift in research toward the development of cost-effective and efficient technologies for environmental pollutant remediation. Green synthesis of silver nanoparticles is a new research trend in green nanotechnology because it is nontoxic or less toxic, environmentally friendly, efficient, and cost-effective when compared to other conventional physical and chemical methods. Green synthesis of silver NPs uses a variety of biological agents, including plants, bacteria, algae, and fungi. Because of their high efficiency and biocompatibility, a variety of green synthesized NPs are currently being used in water and wastewater treatment. Green synthesized NPs are highly capable of recycling and removing heavy metals from wastewaters without compromising their stability, as well as degrading a variety of organic pollutants from wastewaters, purifying the wastewaters for reuse and recycling and potentially solving various water quality issues worldwide. Pollutants that exist in various forms in the environment are difficult to eliminate using traditional technologies due to a variety of drawbacks. With this context in mind, this review focuses on the emerging green synthesized silver nanoparticles for waste water treatment.

Keywords: Nanoparticles, green nanoparticles, silver nanobioparticles, waste water treatment

Oil Spills and Their Bio-Remediation using *Psudomonas putida*

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ABSTRACT

Oil Spills generally refer to the release of Petroleum or any other Low or High Molecular Weight bearing Non-Biodegradable Hydrocarbon Products. Out of all the oil spills, the most problematic one is the Marine Oil Spills since it's tough to remove and has major consequences over the environment. The life of the marine animals can easily be threatened by such events. Not only animals, but life of aquatic plants also gets hampered due to the spread of oil over the surface of sea, leading to reduction of productivity. Apart from this, the oil spills can also harm the life forms related to oceans like sea birds and mammals and ultimately humans- who suffer both environmental as well as economical losses.

The most common methods of remediation include Controlled Burning, Detergent Treatments, Vacuum suction, Skimming, Solidifying, Booms, Sorbents, Dispersants, and Using Super-Absorbent Fabrics: synthetic or natural sorbent materials, etc. However the most effective and Eco-friendly methods include Bioremediations: which involves microbes or any other biological agents to digest or degrade the oil. Common examples include Alcanivorax sp., Fusobateriota sp., Methylocella silvestris, etc. A Superbug named Psudomonas putida which is the result of genetic engineering (invented by Dr. Ananda Mohan Chakrabarty- an Indian-American Microbiologist) has the ability to degrade such complex hydrocarbon and is the first patented living organism. An experiment was conducted out by scientists - SAFIYANU, ABDULWAHID, MUDI, YA'U., and RITA, to test the ability of Psudomonas putida for degrading petroleum and its products. They grew Psudomonas putida in presence of petroleum for 1 and 2 weeks under defined parameters using methods of serial dilution, total cfu count method, solvent extraction method, etc. and concluded that Psudomonas putida has the ability to degrade 6.425% in 2 weeks.

Oil spills are a serious issue to bother for environment as well as mankind and bioremediation is the best way to combat it due to its low cost expenditure and ecofriendlyness.

Key Words- Marine Oil Spills, Bioremediation, Psudomonas putida, complex Hydrocarbons.

Supply Chain Analysis on Sugarcane- An Outline

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ABSTRACT

The knowledge of sugar production which is spread all over the world is derived from India and it's the birthplace of sugarcane. Sugarcane is a cash crop which plays a significant role in providing livelihood to more than 50 million farmers in India. Sugar plant is a complex and repairable engineering unit, which comprises of various systems namely feeding, crushing, steam generation, crystallization and refining etc. Sugarcane industry is a labour intensive industry. Supply chain management is a central and important area of academic research due to its impact on process industries competing in today's global economy. In today's competitive environment, it is extremely difficult to successfully produce high quality, low cost products without considering a satisfactory set of suppliers. Suppliers form the first link in the supply chain of any organization. It provides employment through cane cultivation and its value chain. Sugarcane is the key raw material which is used to produce sugar for sugar industry. Supply chain management is the overall journey of production, inventory, location, and transportation processes in a supply chain to achieve the best supply chain efficiency which add value for the end users. SCM eliminates the communication gap to avoid delay and quality complains. Supply Chain Management is systematic network of facilities and activities to improve the productivity of sugar industries using improved information technology and interrelating all the related departments with an expected approach for implementation of quality management to improve total business.

Keywords: Value Chain; Sugarcane; Inventory Management; Marketing; Supply Chain Management; Producer; India.

Abbreviations: SCM: Supply Chain Management; TQM: Total Quality Management.

Value Chain Analysis of Medicinal and Aromatic Plants-A Review

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ABSTRACT

Creating value for the products and making it reach to end consumers is a most important concept of value chain. Value chain is the activity that ranges from production, packaging, delivery and final disposal of products after their use. The medicinal and aromatic plants can be grown well in Trans Himalayas (700 species), Western & N Western Himalayas (1700 species), Central & Eastern Himalayas (1200 species), Coastal (500 species), Desert Zone (500 species), Western Ghat Malabar Coast (2000 species), Arid and Semiarid (1000 species) regions of India. Medicinal and aromatic plants (MAPs) play an important role in the sociocultural, health care and spiritual arena of rural India. The value of crops and link between farmers' producer and consumer is created by efficient value chain. The products are in great demand at the national and international markets. The opportunity for exports can be achieve by proper value chain of medicinal and aromatic plants (MAPs). There exists a different supply chain requirement for MAPs with respect to cultivation of MAPs. Strengthening the value chain is most powerful tools for promoting NHWP (Nature, Health, Wealth and Power) - related development goals. The paper is based on review of secondary information source and data collected from different published sources. It helps in highlighting the value chain aspects and importance of the MAPs.

Keywords: Value Chain; Medicinal and Aromatic Plant; Herbs; Species; Producer; Marketing; Supply Chain Management; Cultivation; Uttarakhand; India.

Assessment of pollutants removal efficiency of Lab-Scale Sludge Drying Bed using different aged Septage

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ABSTRACT

This study reports on the effect of septage age on physiochemical properties and the potential and feasibility of a lab-scale sludge drying bed (SDB) for the removal of pollutants. The SDB was constructed in a cylindrical plastic container having 50-centimeter depth using different sizes of gravel. The area of SDB was 0.41 m2. In the Lab-Scale sludge drying bed, 3 major layers of different sizes of gravel were formed and used for the filtration and removal of pollutants from the septage. The complete experimental work was carried out for 6 months. All the Septage samples were collected from the sewage treatment plant (STP) in Dehradun, India, and tested for different physico-chemical parameters such as TSS, BOD5, COD, etc. The Hydraulic retention time (HRT) reported for the constructed SDB was 1 day. The one-time loading capacity of the septage was 10 liters. The constructed SDB has shown reasonably the good pollutant removal efficiency which is comparable to the already established systems. The system has shown an average of 96.6% BOD5 and 95% COD removal over the whole experimental period without any seasonal effect.

Keywords: Septage, Hydraulic retention time (HRT), Septage, Sludge Drying Bed (SDB), Pollutants, BOD and COD.

Metal-organic framework based adsorbents for efficient removal of Organophosphorus Pesticides (OPPs)

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ABSTRACT

The worldwide utilization of organophosphate pesticides (OPPs) has led to serious environmental hazards that pose significant threat to human health. This uncontrolled exposure of OPPs can cause multiple disorders like malignancies, birth defects, premature abortion, sterility, teratogenic effects etc. As a result, effective sequestration of these OPPs has taken into consideration by several researchers and environmental scientists. In this context, metal-organic frameworks (MOFs) had drawn a lot of attention in the field of adsorption due to their multiple adsorption sites, easy functionalization process, robust stability, tunable pore size, and outstanding topology. Therefore, the present review critically summarizes MOF based adsorbents such as pristine MOFs, functionalized MOFs, MOF composites, and MOF-derived materials along with the choice of precise linkers for the preparation of MOFs. The use of functionalizing agents to maximize MOF adsorption is thoroughly investigated. Potential mechanism for the elimination of OPPs, key interaction pathway along with the strategies for optimizing the adsorption capacity of MOFs has also been focused upon. Additionally, a comparative account on the reported MOFs with other adsorbents was also examined. At the end, future prospects for large scale applications and an outlook based on the current trends for the fabrication of appropriate MOFs for effective deployment is suggested.

Keywords: Adsorbent, Linker, Metal organic framework, Modifier, Organophosphate pesticides.

Benevolence of Cyanobacteria in paddy field ecosystem

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ABSTRACT

Cyanobacteria (blue green algae) are present abundantly in rice fields and are important in maintaining the rice field fertility through nitrogen fixation. Occurence of Blue green algae particularly nostocales in local rice fields of Kaushambi district U.P. has been under taken for the first time in this area. In the present study rich biodiversity of nostocales members were recorded. This study helps to highlight the importance of morphological characterization and identification of the cyanobacterial strains and their biochemical analysis of the strains for their application in the rice fields for management of nitrogen fertilizer can be used for sustainable agricultural practices and for human welfare.

Keywords: Cyanobacteria, Kaushambi District, Nitrogen fixation, Rice field etc.

The role of leaf surface wax as contact cues during oviposition explains preferences in the Bihar hairy caterpillar *Spilosoma obliqua* Walker (Lepidoptera: Arctiidae)

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ABSTRACT

Green gram, *Vigna radiata* (L.) Wilczek, is an important pulse crop of Asia. Severe attack by the larvae of Spilosoma obliqua Walker (Lepidoptera: Arctiidae) causes defoliation and reduces seed yield. Females lay eggs on the leaf surface and therefore, surface wax plays an important role as short-range attractant and oviposition stimulant. So, we have attempted to find out whether leaf surface wax compounds (alkanes and free fatty acids) from three green gram cultivars (PDM 54, Pusa Baisakhi and Samrat) could act as short-range attractant and oviposition stimulant in females. The TLC, GC-MS and GC-FID analyses of n-hexane extracts revealed 20 n-alkanes from n-C15 to n-C36 and 13 free fatty acids from C12:0 to C21:0, whilst linoleic acid was unique in Samrat. Females were attracted towards one leaf equivalent surface wax of three green gram cultivars against solvent controls (n-hexane) in Y-tube olfactometer bioassays. A synthetic blend of pentacosane, heptacosane, nonacosane, hexatriacontane, palmitoleic acid, linolenic acid and stearic acid, a synthetic blend of pentacosane, hexatriacontane and stearic acid, and a synthetic blend of hexatriacontane, linolenic acid and stearic acid resembling in amounts present in one leaf equivalent surface wax of PDM 54, Pusa Baisakhi and Samrat, respectively, served as short-range attractant and oviposition stimulant in females. Females showed equal preference for egg laying towards the above three synthetic blends when these blends were tested against each other, and hence, these blends could be employed in development of baited traps in pest management strategies.

Keywords: free fatty acids, green gram, leaf surface wax, long-chain alkanes, olfactometer bioassay, oviposition assay, Spilosoma obliqua.

Multivariate analysis to assess irrigation suitability of surface water in Hirakud Reservoir and Bargarh Main Canal, Odisha, India

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ABSTRACT

Novel approaches for indexing water quality give better insight into the use of water for different purposes. In the present study, ten water samples from different locations of the Hirakud reservoir and main irrigation canal in the Bargarh district were collected in pre-monsoon, monsoon, and post-monsoon seasons from December 2020 to March 2022.Seasonal variation among various physicochemical parameters, major ions and different water quality indices was determined. Multivariate statistical analysis (MSA) which includes hierarchal cluster analysis (HCA), correlation analysis, and principal component analysis (PCA) was combined with the analytical hierarchical process (AHP) for the development of irrigation water quality indices (IWQI) formore accurate estimation of canal water status. The typical trend of concentration of cations (Ca2+>Na+>Mg2+>K+)and anions(HCO3->Cl->SO42->NO3-)was observed in the water samples. Except for Ca2+and SAR, other water constituents were found to be in the acceptable range for irrigation. Various water quality indices calculated suggest that most of the water samples fall in the good to the moderate category for irrigation. The MSA indicates anthropogenic and industrial activities upstream are responsible for elevated trace metals (Cu, Fe, and Hg) concentration. Pearson correlation analysis between major ions and water quality index suggests that the chemical composition of water samples is driven by natural sources and anthropogenic activities. Findings of the present work could provide a baseline for water quality management policy for the RAMSAR sites such as the Hirakud reservoir.

Keywords: surface water, irrigation water index, Bargarh main canal, multivariate analysis, principal component analysis.

A Comparative Study of Soils Contaminated with Dyeing Effluents

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ABSTRACT

The textile industry uses large amounts of water in the dyeing process and after production is over, the contaminated water is discharged into sewers or drains without any prior treatment. Discharge of contaminated water without pre-treatment can directly cause environmental degradation. Direct discharge of contaminated water leads to an undeniable decline in soil productivity and has a negative impact on the level of crop production in the surrounding agricultural land. The contaminants present in the effluent affect the physico-chemical and biological properties of the soil. In the present study an attempt has been made to examine the physico-chemical properties of soils contaminated with chemicals and natural dyeing effluents. Uncontaminated soil was used as a control. The physico-chemical properties of the collected soil such as pH, electrical conductivity, water holding capacity, organic carbon, organic matter calcium and magnesium were investigated. The result showed that textile industry waste has a direct effect on the physico-chemical properties of the soil. Statistical comparison of soil samples loaded with natural dye effluent, synthetic dye waste water including control has suggested a measurable positive impact of natural dyeing over hazardous synthetic chemical dyeing.

Keywords: Effluent, Natural dye, Synthetic dye, physicochemical, soil.

Parasitic health risk associated with eco san toilet manure, wastewater and flood-run-off water in and around Dhaka city

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ABSTRACT

The study was conducted in and around Dhaka city to find out the health hazards associated with direct and indirect contamination with environmental samples - night soil (eco san toilet manure), wastewater and flood runoff water. Those who working on the land or living on or near the crop land where night soil, waste water or flood water are being used have high chance to subsequently infect humans or animals through consumption or handling of the food stuff or through secondary human contamination by consuming foodstuffs from animals. The main areas of sample collection were near the sewerage lines, crop land, flooded area etc. In the present investigation, out of 150 eco san toilet manure, waste water and flood run off water samples 14.29% , 16.67% and 18.57% respectively were contaminated with ten different parasites, three protozoans viz. Entamoeba histolytica, Giardia sp., Trichomonas hominis ; three cestodes viz. Diphyllobothrium latum, Hymenolepis sp., and Taenia sp.; and four nematodes viz. Ascaris lumbricoides, Ancylostoma duodenale, Enterobius vermicularis, Strongyloides sp where those pathogens were screened with adopting concentration method. The investigation clearly showing that a high range of nematode was prevalent (7.29%) in eco san toilet manure and flood run off water (9.80%)whereas cestode (14.29%)were highly prevalent in wastewater. Out of three types of sample, flood runoff water (18.57%) was highly infective with 7.29% and 9.80% single and multiple infection respectively where egg per gram (EPG) was counted by Mc master counting technique. However, prevalence of mild and moderate infection were found 85.19% and 20.99% , respectively and causes accumulative increase of infection with soil and water transmitted parasites. Failure to appropriately process human sewage probably thus poses the greatest threat to human health however it is often impossible to identify sources of food and water contamination.

Keywords: Night soil, wastewater, flood water, egg per gram, infection.

Diatom community structure and ecological state of the Alaknanda riverduring 1992 and 1996 for determining reference condition

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ABSTRACT

Anthropogenic pressures have gradually increased over period of time at Srinagar situated on the banks of the river Alaknanda. A study was designed to assess historical change in diatom community structure and infer past water quality at four year interval. For this study we made species count to determine structure by re-examiningthe diatom mounts of 1992 and 1996.The van Dam ecological criteria were determined for ecological state of the Alaknanda river using OMNIDIA Software 6.0.8. A. pyrenaicum dominated the assemblages during both years. However, A. pyrenaicum-A. minutissimum prevailed continuously for 3 months in 1992 while in1996the assemblages lacked this feature, as it varied from month to month. Also the abundance of the dominant taxa was higher during during 1992, showing stability in 1992 compared to 1996.The N. palea in 1992 and D. monliformis in 1996 dominated assemblage was a notable feature. Both are known for eutrophic preferences. The van Dam ecological criteria does not reflect variation in ecological state between the years, but different assemblages in 1996, indicate a perturbed river due to a variety of stress. This study will serve as a reference point for state of the river ecosystem.

Keywords: Alaknanda river, diatom communities, ecological state, short-term interval, reference conditions.

Impact of Renewable Energy Consumption on the economic growth - A Comparative analysis between India and the USA

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ABSTRACT

Non-renewable sources of energy like coal, petroleum, and gas have helped in the economic growth of a country immensely but they have certain social, economic, and environmental disadvantages, thus encouraging us to use more environment-friendly renewable sources of energy. These renewable energy sources eliminate harmful gasses like carbon monoxide, excess carbon dioxide, etc. Moreover, they can be used for power generation, which can further generate energy. The study aims to conduct a comparative study between the energy consumption deriving from renewable energy sources and its impact on the economic growth of each country respectively concerning India and the United States of America. The study uses secondary data from the period 1990-2018. We have taken the renewable energy consumption and GDP per capita data from the World Bank site for this research. Using Microsoft Excel, the statistical analysis is based on descriptive statistics, regression analysis, and correlation. The results show that there is a positive correlation between renewable energy consumption and the economic growth of the USA compared to India.

Keywords: renewable energy, India, United States, petroleum, economic.

Spatial and temporal variations of Nitrogen Dioxide and Sulphur Dioxide, over Northeast India

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ABSTRACT

Rapid urbanization, industrialization, and an increase in anthropogenic activities have created a negative impact on the pristine environment of northeast India and led to the deterioration of urban air quality. This study analyses the long-term trend of the tropospheric columnar nitrogen dioxide (NO2) and sulphur dioxide (SO2) over northeast India. Satellite-based ozone monitoring instrument (OMI) sensor data from 2005–2019 are used for the measurements of tropospheric (NO2) and sulphur dioxide (SO2) columns and Moderate Resolution Imaging Spectroradiometer (MODIS) for Fire radiative power (FRP) for the possible emission sources of the pollutants. OMI-derived temporal and spatial distributions, annual changes, and trends in the seasonal cycle are identified for NO2 and SO2. The time series scatter plots (2005-19) and the annual average of NO2 and SO2 have shown a rising trend over the study region. The monthly means of columnar level of NO2 reveal strong seasonality with maximum value in winter (DJF) and pre-monsoon (MAM) and minimum in monsoon (JJA). Coal-based thermal power plants and anthropogenic emissions of biomass burning as slash-and-burn cultivation, forest fires, and fossil fuel combustion are responsible for the higher values of NO2 in this region. Seasonal high values are found in winter with a peak in March and the annual mean values vary from 0.94-2.64x1015 molecules/cm2. SO2 column amount exhibit opposite seasonality with the highest in the post-monsoon season (SON) and winter season (DJF) and the lowest in the monsoon season (JJA). The combustion of fossil fuels in cooking activities, oil refineries, and the brick-kilns in the winter season are the main factors for higher SO2 in northeast India. Seasonal high values are observed in the winter season with a peak value in December and the annual mean values vary around 0.03-0.09 DU. A strong association is observed between mean FRP and tropospheric NO2 and a weak correlation with the SO2 column amount. This study highlights the need to develop proper ground-based monitoring stations for all the criteria pollutants.

Keywords: Hotspots, MODIS, northeast, OMI, and satellite.

Investigations on biomedical waste impacts on the environment in COVID-19 pandemic

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ABSTRACT

The global pandemic of COVID-19 culminated in escalating biomedical waste worldwide, and the management authorities are struggling with waste treatment. Predictably, a large population might be avast amount of COVID-19-related biomedical waste. Biomedical waste is distinct from normal trash or general waste, and it also produces hazardous waste. Biomedical waste, such as safety suits or personal protective equipment (PPE), masks, gloves, and shields, would damage the environment in the long run by creating microplastic pollution. These actions have considerably enhanced the quality of ambient air and water. The difficulty of biomedical waste identification,handling, and disposal must be heightened so better management practices, and protocols can be established. Disposal ofthis waste is additionally an environmental concern, as covid-19 wastes are classified as infectious and can potentially cause thespreadof communicable diseases. Unsound management of this waste could cause unforeseen "knock-on" effects on human health and the environment. A case study on the generation of biomedical waste due to Covid–19 and handling of thisbiomedical waste in Visakhapatnam city.

Keywords: Biomedicalwaste, Covid-19, Communicable diseases, Treatment methods.

To explore the biosurfactant production potential of microorganisms inhabiting phyllosphere of seasonal flowering plants in Uttar Pradesh (India)

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ABSTRACT

The floral parts provide diverse habitat for the microbial community. Industrial biotechnological applications of microorganisms residing in floral parts (phyllosphere) have not been exploited enough. The study explored the biosurfactant producing potential of bacteria residing on the floral phyllosphere. Ten seasonal flowering plants from Meerut district of Uttar Pradesh (India) were taken as samples for the study. Sample processing and enrichment were carried out in order to isolate microorganisms of interest. Aerobic batch fermentation was performed for production of biosurfactant. Screening methods viz, oil spreading assay, drop collapse assay and microplate were employed for determination of biosurfactant activity. E24 emulsification index was employed for quantitative estimation surfactant activity. In order to analyse production, growth and production curves were constructed using UV spectrophotometer. Primary screening procedure revealed microbial flora exhibiting varied colonial and morphological characteristics. The variations give evidence of different genera or species. All the cultures isolated exhibited biosurfactant production. Clear diauxic curves were obtained indicating the uptake of oil and thus production of biosurfactant. The biosurfactant production potential was analysed by quantitative methods. Crude biosurfactant from bacterial isolates under study have given different values in different oils used for experiments. This indicates specificity and/ selectivity owing to the chemical nature of biosurfactants. Based on observations, culture accession number- SPS 8.3, SH 7.3, SDB 5.3 and SDE 9.3 can be taken as potential candidates for further physicochemical and molecular analysis. The study is one of its kind wherein phyllosphere microbial community of seasonal plants of the region has been analysed for biosurfactant production. The study has given promising results for future research and a green approach for environmental and medical applications.

Keywords: Biosurfactant, Phyllosphere, Bacteria, Production, Industrial Biotechnology, Green approach.

Analysis of Sustainable Agriculture in India

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ABSTRACT

Sustainable agriculture is cultivating in a sustainable ways meeting society's present food and textiles requirements without compromising the ability for current or future generations to meet their requirements. It is based on understanding of ecosystem services. Sustainable agriculture consists of environment friendly methods of cultivating that allow the productions of crops or livestock without damage to natural system or human. There are different types of methods of sustainable agriculture through which sustainability of agriculture can be achieved. These are Traditional agriculture, Indigenous agriculture, Organic agriculture and Regenerative agriculture, Sustainable irrigation, Permaculture, Agroforestry, Horticulture, mixed farming, multiple cropping, Crop rotation, Ecological farming and Organic farming. Indigenous agricultural practices adopted by locals largely depend on traditional knowledge, common in agricultural system to preserve biodiversity, ecosystems and useful in maintaining sustainable food and human health. Farmers possess a vast pool of indigenous knowledge in livestock management which reduces external input dependency by utilizing different renewable farm resources as agricultural practices. These agriculture farming have an important role in nature conservation and rural development and contribute to maintaining ecosystem of particular region which leads to sustainable use of biodiversity conservation. Sustainability of agriculture is a matter of concern for different stakeholders. The challenges encountered by Indian agriculture are due to economic, social and agro-climatic/environmental dimensions. The sustainability strength in agriculture comes due to vibrancy of these dimensions. The main purpose of this paper is to analyses the different method of sustainable agriculture and also analyses the dimensions through which sustainability of agriculture can be measured.

Keywords: Biodiversity, Human development index, Sustainable agriculture, Sustainability dimension.

Tracking India's performance under the Clean Development Mechanism

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ABSTRACT

Clean Development Mechanism (CDM), a flexible carbon offsetting scheme outlined by the Kyoto Protocol, is a method of reducing Green House Gas (GHG) emissions using functional and efficient technology. The present work examines India's performance in the "Clean Development Mechanism" quest and a way forward.

India's commitment to CDM regulation is not well clearly stated. Indian government neither actively encourages nor inhibits CDM project implementation among regions. India is widely recognized as the Non-Annex I nation for CDM proposed project. Non-Annex I nations lack legally enforceable objectives for reducing emissions. In terms of CDM project development, India ranks second in the globe, after only China and Brazil. Through a proactive National CDM Authority (NCDMA), India played a critical role in promoting the growth of CDM projects. CDM projects in India are focused on more industrialized states. India is excelling, as it is one of the major hosts of such clean development initiatives in the world. From 2003 to 2011, India's Authorized National Authority for the Clean Development Mechanism recorded a total of 2,295 projects, representing for almost one-quarter of the world average. Due to the compliance of reducing the carbon emissions at the source from all sectors and reap the long-term development advantages of CDM operations has made India a potential location for global investments and the transfer of cutting-edge clean technology. If the correct plan is implemented, India might contribute to "climate mitigation" while simultaneously leading in economic development.

Keywords: CDM projects, carbon offset, GHG, India, Kyoto Protocol, NCDMA.

Study on aquatic community structure of a Lentic water body of Baniyapur, Saran

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ABSTRACT

The geographical region of Bihar is blessed with huge aquatic water resources and Contain plethora of wetlands, rivers, lakes, pond and puddles which help in the generation of aquatic food resources to feed the ever growing population of Bihar.

Here, this paper explains the ecological study of a Lentic water body situated in Baniyapur block of Saran district. The mentioned aquatic lentic water body is full of Species diversity but needs immediate Conservation so as to maintain the natural rythm of the same to exploit sustainably in the future generation. It has more than 42 Species of fish diversity with ornamental and food Species.

Keywords: Lentic water body, Fish diversity, Ornamental fish species.

Novel COVID-19: A Comprehensive Review on History, Transmission and Preventive Measures of COVID-19

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ABSTRACT

Coronaviruses are zoonotic. That means before developing in humans first they evolve in the animals. Coronaviruses can be spread through respiratory droplets in human this phenomenon is called 'wet stuff' that spread through the air when you cough, sneeze, or talk. Corona viruses are a family of encompassed, single-stranded, positive-strand RNA virus. Coronavirus may affect the neurological, respiratory, enteric, and hepatic systems. Their viral RNA genome ranges from 26 to 32 kilobases in length and it can be isolated from various animal species, such as, birds, livestock, and mammals such as camels, bats, masked palm civets, mice, dogs, and cats. The researchers found that bats are the most likely reservoir for SARS-CoV-2 because they are very similar to a bat coronavirus. There is no evidence of direct bat-human transmission, however, suggesting that an intermediate host was likely involved between bats and humans. There were two prototypes of human Corona virus, OC43 and 229E, both etiologic operators of the normal virus. COVID-19 is the seventh individual from the group of Corona virus that contaminate people. Here we have summarised a short prologue to Corona virus about their history, pathogenicity and current avoidance method of transmission and treatment systems.

Keywords: Severe acute respiratory syndrome (SARS), COVID-19, MERS-CoV, zoonotic, RT-PCR.

Impact of Developmental Activities on Geodiversity of Parbati River Basin, North-Western Himalayan Region, India

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ABSTRACT

Geodiversity is simply the diversity in the underlying as well as overlying features of any landscape i.e., the earth itself. Elements of geodiversity are one the fundamental factors influencing the Land Use Land Cover (LULC) pattern along with biodiversity and occurrence of geo-hazards in the mountainous Himalayan region. Taking into consideration linkages between the geodiversity and LULC, mapping geodiversity becomes more important in highly pristine and diverse regions such as Hindu Kush Himalayas as it could lead to better land use planning strategies. Parbati river is the largest and an important left bank tributary of River Beas at Bhuntar. In the present study geodiversity of Parbati basin is assessed using grid-based quantitative assessment methodology based on calculation of partial numerical indices of geodiversity. Partial numerical indices- geology, geomorphology, hydrology and pedology were computed using the 10 thematic layers of various elements of geodiversity such as- landform, lithology, mineralogy, relief etc. Geodiversity of the basin is classified into 5 classes and very high and high geodiversity region are mainly concentrated in the western part of the basin and along the higher stream order channels. The non-institutional development activities in the basin are carried out in a haphazard manner and the proper process of town planning and development is missing. Horticulture and tourism related activities are the two important sources of livelihood for the natives. Findings show that the increase in these two activities along with hydropower project development has dramatically changed the LULC pattern of the basin over the years. The change in LULC poses a threat to geodiversity elements of the basin which can be harnessed for purposes including- geo-tourism, scientific research, educational value and recreational activities.

Keywords: Geology, Geomorphology, Geo-tourism, Hindu Kush Himalayas, Land Use Land Cover (LULC).

Variable Pressure Foaming on Functionality and Structure property correlation in Polyurethane Foam

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ABSTRACT

The production cost of flexible polyurethane foam is significantly dependent on the cost of polyol, which constitutes the largest percentage of materials used in foam production with the characteracterics to induce superior mechanical properties. Suitable fillers that are relatively cheap can be introduced in the foam as replacement for polyol. Certain compositions of filler have deleterious effect on some relevant mechanical properties of the foam.

This paper investigates the Effects of Variable Pressure Foaming on functionality and structure property correlation in polyurethane foam using different percentage of inorganic fillers at different pressure in flexible polyurethane foam for the dual purposes of achieving sustained mechanical properties of polyurethane foam and reduction in the production cost by using the VPF Technique.

Government restrict the use of certain auxiliary blowing agents like chlorofluorocarbon, trichloroethane, carbon dioxide, methylene chloride, acetone, pentane and water.VPF machine, in which we can make different densities of foam without adding auxiliary blowing agents which are banned in the Europe and other countries. These blowing agents are highly carcinogenic and ozone depletors, which are also harmful for human beings health and green house effect. Water is a natural blowing agent, producers have tried to raise the water level substantially as a ABA agent, With the high exotherm associated with high water level formulations, there is so much urea formation that it is difficult to make flexible PU foams and inferior foam quality and durability, scorching in the foam and pose a fire hazard during foam manufacturing. For the rapid cooling process it required excess Toluene Diisocyanate usage and allowed excess TDI vapour to be released into the atmosphere. In VPF, enclosed chamber and the exhaust is vented through carbon beds, it filters the TDI fumes which are very harmful for human beings health and for the environment. Foams can be achieved by foaming under vacuum, thus substantially reducing the water level and TDI usage.

VPF technique offers a unique combination of environmental friendliness, superior product consistency and unique foam properties. It provides us with a platform for new product technology and a reliable process to meet the increasingly stringent environmental regulations.

Keywords: Flexible polyurethane foam, Low cost fillers, Superior product consistency, Reduce production cost, Variable pressure.

Decolourization of textile azodye Red-4 by Microbial consortium isolated from sewage water sample of RK Puram Lake

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ABSTRACT

Textile dyes are important organic pollutants and they pose a threat to the environment because of their stability and ability to resist microbial degradation processes. These dyes are released into the waste water systems, impact the flora and fauna of released water bodies disrupting the aqueous ecosystems. Dyes released into water bodies are known to cause water pollution due to their ability to release toxic materials by undergoing oxidation, reduction, hydrolysis etc. Therefore there is a need for alternative, environmental friendly and cheaper solutions that could effectively degrade the textile dye pollutants. The present study was aimed with an objective of screening microorganisms which could effectively decolourize the textile dyes. Enrichment culture technique was done to isolate the organisms from sewage water that has the capacity to decolourize the azodye RED-4 which was extensively used for dyeing. The organisms capable of decolourizing the textile dye were isolated and tested on minimal salts medium using azodye as sole source of carbon. The isolated organisms after enrichment were labelled as DR1,DR2,DR3 respectively. When individual bacterial species were tested they were not able to decolourise the dye. But 100% effective decolourization was seen when Microbial consortium of three isolates were used within 72 hours demonstrating the mutualistic association of three isolates for decolourization.

Keywords: Decolourization, Microbial consortium, Textile dye.

Novel techniques for enhancing shelf life of vegetables

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ABSTRACT

Vegetables contain high amount of moisture and the rate of respiration is also high therefore vegetables are highly perishable in nature, so after harvest they require proper handling and storage to preserve their quality and get full advantage of their health benefits. In India, due to improper and poor post harvest practices nearly 30-35% of its total production is lost. The major factors of post harvest losses are physiological and biochemical processes, microbial decay, high perishability and sub-standard postharvest handling infrastructures. So, it is very important to reduce the postharvest losses of vegetable by applying modern technologies. Some of the major steps for checking postharvest losses are proper handling of the produce, pre-cooling, washing and disinfection before storage. Hot water treatment, irradiation and use of edible coating are also an effective way for reduction in quality loss and suppressed pathogen infection. Apart from these, various plant growth regulators have been used, most common being 1-MCP in okra, 6-benzylaminopurine (BAP) , MeJA, CaCl2, KMnO4 in many vegetables that reduce physiological loss in weight, delay senescence, maintains chloroplast activity, declines chlorophyll degradation and helps in production of protein and nucleic acid. Out of these 6- BAP, which is a first generation synthetic cytokinin is more eco-friendly and cost effective option of increasing shelf life of commercial vegetables.

Keywords: Vegetables, shelf life, post harvest losses, modern technology.

The proximate composition of the muscle of a freshwater airbreathing catfish, *Clarias batrachus* (Linn) during summer & winter months

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ABSTRACT

The proximate composition of the muscle of antero-dorsal portion of *Clarias batrachus* (Linn) weighing 136.5 ± 15.6 & 144.5±63.4 gm weight groups during summer & winter months respectively were analysed. During the study, moisture (77.64±0.27&77.78±0.29%), ash (1.22±0.05 &1.30 ±0.04%), total protein (19.08± 0.13 & 19.16±0.11%), glycogen (1.10 ±0.3 &1.14 ±0.05%), fat (0.42± 0.02 &0.50 ±0.04%), free fatty acid (3.70±0.21&3.38±0 18 mg/100gm), non protein nitrogen (222 ±13& 154 ± 10 mg/100gm.α-amino nitrogen (28.95 ±1.07 &42.20 ± 1.05 mg/100gm) and total non volatile base nitrogen (18.10±1.11&13.96 ±0.91 mg/100gm) have been recorded during summer & winter months. Though, the fish weight, moisture, ash, total protein, glycogen & fat contents were slightly more during winter than summer months, but they were not recorded statistically significant. Whereas, non protein nitrogen and total volatile base nitrogen were recorded significantly ($P<0.05$) more during summer than the winter months and while amino and nitrogen content was significantly ($P<0.01$) more during winter than summer months, indicate that the shelf life of fish is comparatively more than summer months.

Keywords: Proximate composition, *Clarias batrachus*, Muscle, Statistically significantly.

Therapeutic potential of plant derived formulation for treatment of cervical cancer

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ABSTRACT

Purpose: Cervical cancer (CaCx) is multifactorial, a multipath-driven disease so the remedy of CaCx also requires an advanced approach based on stage & persistent infection of Human Papillomavirus (HPV). At an earlier stage, CaCx tumor is cured by surgery or radiation while for intermediate & later stages combined modality approach is needed. Over last decade, our group has been working towards depicting the significant anti-cancer and anti-HPV activity associated with pure compounds of herbal origin (curcumin, berberine), through nature or environment which involved the usage of the clinical preparations derived from these plants.

Research method: In our study, we evaluated the anti-CaCx and anti-HPV activities of certain plant derived-homeopathic preparations (HP) in vitro on HPV positive (SiHa and HeLa) and HPV negative (C33A) cervical cancer (CaCx) cell lines. Initially, we screened the anti-proliferative MTT assay and anti-oxidant activity by DPPH and ABTS assay and estimated the total phenolic content by TPC assay. We further analysed in-silico via molecular docking using AutoDoc, PyMol and Discovery Studio. The molecular mechanisms were also determined via using FACS, western blotting and fluorescence microscopy.

Result: HP mother tincture (MT) and 30C potencies of plants Berberis aquifolium (BA), Berberis vulgaris (BV), Mentha piperita (MP), Curcuma longa (CL), Cinchona officinalis (CO), Thuja occidentalis (TO) and Hydrastis canadensis (HC) were shows their anti-proliferative and anti-oxidant activity againt cervical cancer cell lines with HPV specific manner. Further, the molecular mechanisms were determined via examination of multifactorial action of BAMT, the most promising lead on CaCx cells. BAMT induced cell death and G1 growth arrest in CaCx cell lines irrespective of the HPV status of cervical cancer cells. Molecularly, these homeopathic preparations target oncogenic transcription factors of STAT3 and AP-1 family that resulted in diminished oncoprotein expression.

Conclusion: In this study, we investigated plant-based drugs against CaCx and HPV. These phytomedicine has shown potential anti-cancer and anti-HPV activity in the case of cervical cancer with reveling molecular mechanisms including cytotoxic effect, cell cycle arrest, and transcription factor regulation with downregulation of viral oncoprotein. Plants-based agents have been always a pivotal source for finding novel therapeutics in oncology. Further, we will investigate the role of berberine plant extract (green synthesis) of silver NPs to increase efficacy with low side effects against cervical cancer.

Study on aquatic community structure of a Lentic water body of Baniyapur, Saran

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ABSTRACT

Analysis of the Impact of Land use / Cover Change on the Environment in Jaunpur District, Uttar Pradesh Vikash singh (Research scholar) Department of geography , M.B.G.P.G. College Haldwani, Kumaun University Nainital 263001 , Uttarakhand Abstract : At present time land use / cover change has become a very important and growing issue . Land use involves the management and moderation of natural environment into built environment according to the way of human being such as settlements and semi habitats Natural resources including water , soil , plants , animals etc. are majorly affected by land use Those issues are closely linked to natural and human processes that they have direct affected on sustainable development . The present study explains land use change pattern and help to understand environmental issues of land use / cover change of district Jaunpur, Uttar Pradesh , India . The study area categorized into some different classes of land use as like a built up area forest, agriculture land , wastelands , water bodies etc.

Keywords: Land use, Land cover, Resources , Environment , and Sustainable.

Estimation of severity, DNBR and NDVI mapping for dry deciduous forest of central India using google earth engine

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ABSTRACT

This abstract main focus on the forest fires have been an emerged as a global concern over the years because they cause major degradation or losses of the country's forests. Forests play a vital role in the functioning of all the ecosystems, which is maintain the environmental factors on the earth. In India, major forest fires occur in the dry deciduous forest of central India. State of Madhya Pradesh is one of the top listed Indian states with highly registered MODIS fire points in 2021 year. The major fire season in Madhya Pradesh is starting from February to June. For instance, however forest fire serves to shape the ecological structure of the forest if severity is low, it is also devastating when severity is high. We have estimated the loss and severity of forest fires based on the two important indices such NDVI and DNBR, which indices as a NDVI (Normalised Difference Vegetation Index) and DNBR (Difference Normalised Burn Ratio) from Sentinel-2A satellite images were calculated through a machine learning programme (GEE). In this study, NDVI indicted the condition of the forest cover or vegetation growth before and after the fire, and DNBR showed the severity of the fire in a selected forest division of Madhya-Pradesh. The results of study area can be understanding of the effect of forest fire, losses of forest, what impact on the forest health etc.

Keyword: GIS, NDVI, Forest Fire, Sentinel-2A data.

Multispectroscopic investigation of interaction of the protein with size varied hydrophilic MPA-CdSe QDs at the nano-bio interface: an insight from α-Amylase

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ABSTRACT

Despite unprecedented nanoscience developments, little is known about the interactions of low-dimensional nanostructures with biomacromolecules. Their interactions can affect the properties of nanomaterials as well as biomacromolecules. Understanding this nano-bio interface is a prerequisite for using nanoparticles and biomolecules for bioengineering. This study investigated the interaction of alpha-amylase with different sizes of luminescent, hydrophilic mercaptopropionic acid (MPA) capped CdSe quantum dots (QDs) using various spectroscopic techniques such as UV-Vis, fluorescence spectroscopy, and circular dichroism at pH = 7.4. From the results, the Stern–Volmer quenching constant (Ksv), binding constant (Kb), and binding sites (n) were calculated for the protein. A starch-iodine assay has been used to determine the functional changes in the enzyme in the presence of different sizes of MPA-CdSe QDS. The results suggest that QDs size has an essential role in protein–quantum dots interactions and that each type of size affects protein structure and function differently.

Keywords: Semiconductor QDs; hydrophilic; α-Amylase; structure & function; modulation.

Photocatalytic Degradation of Coralene Red BEL dye by using Synthesized Magnesium Zinc Aluminate Nanoparticle In Pesence of UV light

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ABSTRACT

Colored dyes are the substances used to coloring the cloths and are increased in our environment, causing potential harm to environment. The textile industry is the largest consumer of the dye stuffs. The World Bank estimates that 17 to 20 % of industrial water pollution comes from textile dyeing and finishing treatment given to fabric. In the present study, the MgZnAl2O5 nanoparticles were prepared by solution combustion method using urea as a fuel. The prepared Nanoparticles were characterised by XRD, UV-Vis absorbance Spectroscopy, SEM. The result suggested that, the average particle size was found to be 23nm and band gap was found to be 3.0eV. The optimal catalyst concentration was found to be 0.09g/10ml with dye concentration 30ppm and the pH 9 was maintained by 0.1N HCl and 0.1N NaOH. The maximum degradation was found to be 97.83% in 300min. The method of photocatalytic degradation of Coralene Red BEL is more helpful in treating Coralene Red BEL dye containing textile effluents.

Keywords: Coralene Red BEL , MgZnAl2O5, Nanoparticle, Photodegradation, UV light.

Comparative study of trace metals in wind blown dust and soil in Kandahar, Afghanistan

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ABSTRACT

Metal contamination in roadside soil and dust in urban areas is a major concern due to their significant risk to human and environmental health and their transport via air and water. The objectives of this study were to evaluate the total metal concentrations (Cd, Co, Cr, Cu, Fe, Mn, Ni, Pb, V, and Zn), contamination levels, source identification, and ecological risk due to windblown dust (WD) and soil of Kandahar city, Afghanistan. The average concentration of Cd, Cr, Cu, Ni, Pb and Zn in WD exceeded their corresponding values in Upper Continental Crust (UCC; considered as background here), while in Cd, Cr, Cu, Fe and Ni exceeded UCC in soil samples. High concentration of metals in WD and soil of Kandahar city is primarily attributed to vehicular emissions and fossil fuel burning. Average contamination factors (CFs) values in WD samples varied as Cd > Zn > Cr > Cu > Pb > Ni > Fe > Mn > V > Co while in soil as Cd > Cr > Ni > Cu > Zn > Fe > Mn > V > Pb > Co. Both WD and soil samples are heavily contaminated for Cd (CFs > 6). Pollution Load Index values indicated moderate to heavy load of metals in WD and soil samples of Kandahar city. According to Geo-accumulation Index (Igeo) WD samples are uncontaminated for Co, Fe, Mn and V, uncontaminated to moderately contaminated for Cr, Cu, Ni, Pb and Zn and moderately to heavily contaminated for Cd. Whereas soil samples were uncontaminated for Co, Cu, Fe, Mn, Pb, V and Zn, uncontaminated to moderately contaminated for Cr and Ni and moderately to heavily for Cd. In WD samples Fe, Mn, V showed minimal enrichment, Co, Cr, Cu, Ni, Z minimal to moderate, Pb moderate to significant enrichment and Cd significant to very high enrichment. While in soil samples, Co, Cu, Fe, Mn, Pb, V, and Zn showed minimal to moderate enrichment; Cr and Ni showed light to moderate enrichment and Cd as significant enrichment. Both WD and soil samples had low ecological risk for Co, Cr, Cu, Mn, Ni, Pb, V, Zn except Cd, which showed medium to extremely high risk in WD and medium to high risk in soil samples. Risk index (RI) indicated that WD samples fall under low to the high-risk range while soil samples fall under the low to moderate risk range.

Keywords: Contamination factor (CF), Pollution load index (PLI), Geo accumulation index (IGeo), Enrichment factor (EF), Ecological risk (Er).

Fruit and Seed Variations in *Terminalia bellirica* Populations in Himachal Pradesh

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ABSTRACT

Terminalia bellirica is one of the most important species of the Combretaceae family, and its Sanskrit term vibheetaki signifies "Fearless". It is commonly referred as Bahera. It is a unique herb used for the preparation of "Triphala" along with Terminalia chebula and Emblica officnalis and used as a health harmonizer. Variability studies are the prerequisite and are of paramount importance for deploying tree improvement strategy. Study was conducted to know the variation of fruit and seeds among different populations. 12 populations were selected from its zone of occurrence in Himachal Pradesh. Among populations, fruit length (33.31 mm), Seed length (30.85 mm), seed breadth (17.20 mm) and seed weight (3g) was observed maximum for Jachh population. Fruit breadth was maximum (9.60 mm) in Shanimazra. Fruit weight was found maximum (24.20 g) in Bangarh. Fruit length (20.63 mm), fruit breadth (7.81 mm), fruit weight (12.95 g), seed length (18.71 mm), seed breadth (8.75 mm) and seed weight (2.16 g) were found minimum for Khaggal- 1 population. Variation due to population was found maximum (5.58 mm) in fruit diameter and minimum (0.01 g) in seed weight. Repeatability due to population was found maximum (0.45 mm) for fruit breadth and minimum (0.07 g) for fruit weight. Genetic advance due to population was found maximum (2.28 mm) for fruit breadth and minimum (0.03 g) for seed weight. Genetic gain due to population was maximum (10.87 mm) for fruit diameter and minimum (0.67 g) for fruit weight.

Key words : Terminalia, Variations, Fruits, Seeds, Repeatability, Genetic gain.

Leaf surface wax chemicals in *Trichosanthes anguina* (Cucurbitaceae) cultivars mediating short-range attraction and oviposition in *Diaphania indica*

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ABSTRACT

Larvae of *Diaphania indica* (Saunders) (Lepidoptera: Crambidae) causes complete defoliation of *Trichosanthes anguina* L. plants, commonly known as snake gourd or serpent gourd, and reduces crop yield. Females lay eggs on leaf surface, and therefore, leaf surface wax plays an important role as short-range attractant and oviposition stimulant. So, it is necessary to find out whether leaf surface wax chemicals (alkanes and free fatty acids) from three *T. anguina* cultivars (MNSR-1, Baruipur Long and Polo No.1) could act as short-range attractant and oviposition stimulant in D. indica females. Twenty n-alkanes from n-C14 to n-C36 and 13 free fatty acids from C12:0 to C21:0 were detected in the leaf surface waxes of three *T. anguina* cultivars. Heptadecane and stearic acid were predominant among n-alkanes and free fatty acids in all cultivars, respectively. Females showed attraction towards one leaf equivalent surface wax of three *T. anguina* cultivars against solvent controls (petroleum ether) in Y-tube olfactometer bioassays. A synthetic blend of heptadecane, eicosane, hexacosane and stearic acid, a synthetic blend of hexacosane and stearic acid, and a synthetic blend of pentadecane and stearic acid comparable to amounts present in one leaf equivalent surface wax of MNSR-1, Baruipur Long and Polo No.1, respectively, served as short-range attractant and oviposition stimulant in *D. indica*. Females exhibited equal egg laying performance towards the above three synthetic blends when these blends were tested against each other, and hence, these blends could be used as lures in developing baited traps in semiochemical based pest management strategies.

Diversity and Richness of Bird Species in Saran District, Bihar, India

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ABSTRACT

Birds are a dynamic species and natural bio-indicator of the richness of biodiversity of any area. Mixed vegetation of rivers, forest cover areas, and wetlands provide a suitable site for bird's habitat and it indicates ecosystem quality. Saran District is moderately healthy diversity and richness of bird species, which is a good indicator of ecosystem quality. Rivers and wetlands increase the number and diversity richness of bird species in Saran District. The diversity richness of bird species in Bihar and in Saran District is gifted and influenced by many green belt areas and rivers basin of Ganga River, Ghagra River, Gandak River, Bhagmati River, Kosi River, Mahananda River, and Daha River. Due to supporting environment, number of bird species and riparian bird species number are in moderate amount. Point count methods were laid out for counting the bird species richness. During the time period of survey, a total number of 158 species of birds belonging to 53 families, 20 orders have been recorded. Out of which 111 species were resident, 45 species were winter migratory birds, and only 2 species were summer migrant. Order Passeriformes show the highest number of bird species than order Accipithiformes. Family Corvidac and family Ardeidac shows the healthy number of populations. Family Psittacidac shows lower number of populations. Hence this study was to obtain diversity and richness of bird species in Saran district and to prepare a checklist of birds and to compare bird diversity.

Keywords: Diversity, simplification, moderately, riparian, resident, migratory.

The Daha River is in Danger due to Bio-medical Waste (BMW), Siwan, Bihar, India

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ABSTRACT

A major problem arises in current time is bio-medical waste (BMW) due to mushroom growth of health-care facilities (HCF) for betterment of health all over the globe. This massive amount of BMW, either in solid form or liquid form, imposes a burden upon its immediate environment and causing numerous problems like arise of nosocomial infections and diseases, emergence of antibiotic resistant bacteria, and it is a potent pollutant for whole globe. This paper aims to focus upon liquid/waste water biomedical waste which is directly released into water ecosystem/city side rivers without any scientific treatment. In my present study nearly 10 % health-care facilities (HCF) equipped with effluent treatment plant (ETP) for waste water treatment process (WWTP) in the town, while 90% of hospital's drainage system is directly mixed into domestic drainage system without any scientific treatment and finally released into Daha River of Siwan (Bihar). In this way potential diseases causing micro-organisms are reached to Daha River through all over the town, and pollute whole environment of the town and finally change the chemistry of river water. In my study, the microbiological investigations of Sadar Hospital waste water (drainage water) and Daha River water both show the presence of Total coliforms (TC), Fecal coliforms (FC), Fecal staphylococcus (FSc), and E. coli. So, this paper linked the microbiological findings between waste water sample of HCF and Daha River water.

In this study the average value of BOD was 3.96 mg/L which is higher than permissible limit, and the average value of COD was 29.33 mg/L which is very high in compare to permissible limit. The high value of BOD and COD clearly indicate that the Daha River is a highly polluted River. Along with liquid BMW, the massive amount of solid BMW (more than 3 tons of biomedical waste are released daily according to data collection, DHS of Siwan, Bihar) is thrown here and there in the town in open area also change the chemistry of underground water because the chemical present in it leach-out and finally reached in the ground water-level. So, we should aware about it and the government should take a strict action for proper and scientific treatment of BMW.

Keywords: ETP, Leach-out, burden, WWTP, Daha River, permissible limit.

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