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NESA NEWSLETTER

NATIONAL ENVIRONMENTAL SCIENCE ACADEMY

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From the Editor's

Dear Readers,

In the July issue of our Newsletter, we received several popular articles from diverse fields. All the authors deserve great appreciation for sharing articles in huge numbers. Please continue sending articles to our Publication team and share published newsletter with your friends also.

I would like to thank the Editorial team including Print, Designer and Publication committee for their efforts throughout the edition.

Your suggestions are always welcome for improvement.

Dr. R. S. Tomar
Editor-in-Chief

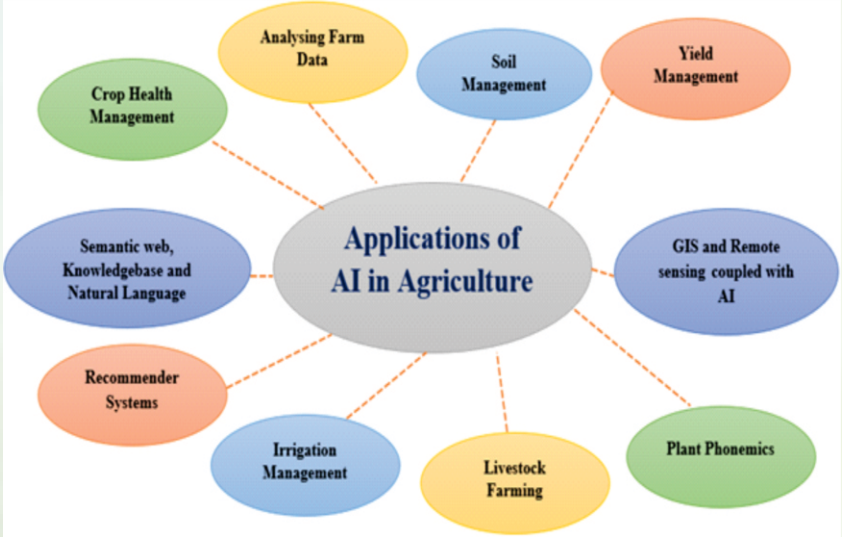
ARTIFICIAL INTELLIGENCE IN AGRICULTURE

Shashi Dahiya and Madhu
Division of Computer Applications
ICAR-Indian Agricultural Statistics Research Institute
New Delhi - 110012
E-mail: *Shashi.Dahiya@icar.gov.in*

1. Artificial Intelligence

Artificial Intelligence (AI) is a very old field of study and has a rich history. Modern AI was formalized by John McCarthy, considered as the father of AI. It is a branch of computer science, founded around early 1950's. Primarily, the term Artificial Intelligence (or AI) refers to a group of techniques that enables a computer or a machine to mimic the behaviour of humans in problem solving tasks. Formally, AI is described as "the study of how to make the computers do things at which, at the moment, people are better" (Rich and Knight, 1991; Rich et al., 2009). The main aim of AI is to program the computer for performing certain tasks in humanly manner such as knowledgebase, reasoning, learning, planning, problem solving etc. The Machine Learning (ML) techniques are the subset of AI which makes the computers/machines/programs capable of learning and performing tasks without being explicitly programmed. The ML techniques are not just the way of mimicking human behaviour but the way of mimicking how humans learn things. The main characteristics of machine learning is 'learning from experience' for solving any kind of problem. The methods of learning can be categorized into three types: (a) supervised learning, in which algorithm is provided with labelled data to learn and we get the desired output patterns (b) unsupervised learning, where algorithm is provided with unlabelled data and it identifies the patterns from the input data and (c) reinforcement learning where the algorithm allows the ML techniques to capture the learnable things on the basis of rewards or reinforcement.

2.1 Irrigation Management: To optimize irrigation AI based smart irrigation system have been used for enhancing the crop productivity. In these systems IoT sensors can be used for delivering valuable insights for watering the crops and use of pesticides & fertilizers. By utilizing remote sensing technologies and soil sensors, farmers can access the soil moisture level across the field. This information helps farmers apply water precisely where it is needed, avoiding



Applications of Artificial Intelligence in Agriculture

over-irrigation in areas with sufficient moisture and targeting irrigation to areas with higher water demands.

2.2 Crop Health Management: Crop health monitoring involves the use of various AI powered systems such as satellite imagery, drones, weather sensors, and IoT devices to provide real -time insights into crop health, growth patterns, and nutrient requirements. By using various computer vision techniques leaf disease & pest detection has been done. This technology can provide farmers with real-time data on crop growth and help them identify major issues before they become major problems.

2.3 Plant Phonemics: Computer vision systems are used to process digital images of plants. Using these techniques specific attributes of the plants has been detected for object recognition purposes. To predict the novel trends from large collections of crop phenotypes AI technologies are being used order to classify unique data, identify new patterns and features. Phenomics has been used for studying several phenotypic characters like spike detection and counting, yield forecasting, quantification of the senescence in the plant, leaf weight and count, etc.

2.4 Recommender Systems: AI recommender system with machine learning methods and algorithms can use historical information & scientific expertise to provide solutions to the agricultural problems and to improve the efficiency of the scientific workforce while also improving the accuracy of estimates of the amount of food produced.

2.5 Semantic web, Knowledgebase and Natural Language Processing: As we know Soil sensors, drones and local weather stations providing huge amount of data related to soil, weather conditions, yield estimation etc. Semantic web technology providing the meaning & context to this raw data. Agricultural processes are dependent upon interlinked knowledgebase for eg. Weather forecasting depend upon multiple parameters like humidity, temperature etc. Then using NLP algorithms with these semantic data & knowledgebases we can assist the agricultural domain by providing unique insights from data or by providing greater clarity to current agricultural processes.

2.6 GIS and Remote sensing coupled with AI: GIS and remote sensing has been used in various fields of agriculture like land use planning, land cover analysis, forest distribution, water distribution, water use pattern, crop rotation, and crop calendar analysis. When AI and machine learning are coupled with this technology land classification cab be done efficiently. From digital soil mapping to yield forecasting, from phenology detection to leaf area index a vast range of the area in agriculture can be handled by GIS and Remote sensing.

2.7 Soil Management: Soil analysis involves the use of AI algorithms to analyse data on soil samples to determine nutrients levels and recommend optimal fertilizers use. This technology can help farmers optimize their crop yields and reduce waste by identify the best type and amount of fertilizers to use. By analysing data on soil quality farmers can make informed decisions on which crops to plant and how to manage their fields.

2.8 Yield Management using AI: AI, Cloud Computing, Satellite Imagery and advanced analytics today has created an ecosystem for smart agriculture. The combination of these technologies allows farmers to achieve higher average yields and better control over farming.

2.9 Analysing Farm Data using AI: Thousands of field data points such as weather, temperature, water consumption, soil conditions etc. are captured on the ground every day with the help of sensors. This data can be analysed, and useful patterns can be extracted for prediction of these parameters in advance using AI techniques. This will improve farming accuracy and productivity.

2.10 Livestock Farming: Livestock farming involves the use of AI powered sensors to monitor the health behaviour and feeding patterns of Livestock. This technology can help farmers to identify any health problems before they become major problem and optimize seed and water usage. By monitoring livestock behaviour farmers can also identify any issues with feeding or watering systems. AI technologies can also be used to form waste management in feed management and to milk the animals

National Environmental Science Academy (NESA), New Delhi
206, Raj Tower-I, Alaknanda Community Centre, New Delhi-110 019
E-mail: infonesa88@gmail.com; nesapublications@gmail.com
Website: www.nesa-india.org

NOTIFICATION NO. 2

APPLICATIONS ARE INVITED FOR NESA ANNUAL AWARDS – 2023

LAST DATE: 30th September, 2023

This is to notify that applications are invited for the NESA Annual Awards 2023 from the Life Members of the Academy. The prescribed application forms for the following categories can be down loaded from our website: www.nesa-india.org • http://nesa-india.org/award-form-submission/

Separate applications should be submitted for independent awards. For detail guidelines the website of NESA may be approached by logging on.

The last date for the all the categories of awards is **30th Sept., 2023**. The venue and the brochure will he shared soon.

The categories of Awards are given as under:

(1) NESA FELLOWSHIP AWARD
(2) NESA INTERNATIONAL SCIENTIST AWARD
(3) NESA EMINENT SCIENTIST AWARD
(4) NESA INDIGENOUS TECHNICAL KNOWLEDGE (ITK) AGRICULTURE AWARD
(5) NESA SCIENTIST AWARD
(6) NESA ENVIRONMENTALIST AWARD
(7) NESA GREEN TECHNOLOGY INNOVATIVE AWARD
(8) NESA DISTINGUISHED SCIENTIST AWARD
(9) WOMEN EXCELLENCE AWARD
(10) NESA YOUNG SCIENTIST AWARD
(11) NESA JUNIOR SCIENTIST AWARD

Contact for more details:
Mobile : 98112 38475, 8527568320; 9971383650

GEOPOLITICS OF CLIMATE CHANGE AND ITS IMPACT ON BIODIVERSITY

S. K. Basu
PFS, Lethbridge Alberta Canada;
E-mail: *saikat.basu@alumni.uleth.ca*

The geopolitics of climate change and its impact on biodiversity are complex and interconnected. Climate change is a global phenomenon that affects ecosystems and biodiversity across the planet, but its impacts vary across regions due to factors such as geographical location, socio-economic conditions, and existing vulnerabilities.

species. The loss of biodiversity can have cascading effects on ecosystems, disrupting ecological processes and reducing overall resilience.

Geopolitical Implications: Climate change and biodiversity loss have geopolitical implications. Regions

Vulnerable Regions: Climate change disproportionately affects regions with high biodiversity, such as tropical rainforests, coral reefs, and polar ecosystems. These areas are home to numerous species and provide critical ecosystem services. Rising temperatures, changing precipitation patterns, and more frequent extreme weather events pose significant risks to the survival of many species.

Loss of Biodiversity: Climate change exacerbates the ongoing loss of biodiversity. Species unable to adapt or migrate quickly enough may face habitat loss, reduced food availability, and increased competition from invasive

rich in biodiversity may experience increased conflicts over resources as scarcity and competition intensify. Displacement of populations due to climate change impacts, such as sea-level rise or desertification, can also lead to social and political instability, exacerbating existing tensions.

Conservation Challenges: Climate change poses challenges for conservation efforts. Conservation strategies need to consider the changing climate and its impacts on species and ecosystems. Protected areas may need to be expanded or shifted to provide suitable habitats for species. International collaboration is crucial to address transboundary conservation challenges and promote sustainable management of shared resources.

Mitigation and Adaptation: Addressing climate change and its impact on biodiversity requires global cooperation. Mitigation efforts, such as reducing greenhouse gas emissions, are essential to limit further climate change impacts. Adaptation measures, including promoting ecosystem resilience and enhancing conservation efforts, can help mitigate the effects of climate change on biodiversity.

International Agreements: Several international agreements address climate change and biodiversity conservation. The United Nations Framework Convention on Climate Change (UNFCCC) and the Convention on Biological Diversity (CBD) aim to coordinate global action to mitigate climate change and conserve biodiversity, respectively. Collaborative initiatives like the Paris Agreement emphasize the need for collective efforts to combat climate change and protect biodiversity.

Economic Considerations: The economic dimension is closely linked to the geopolitics of climate change and biodiversity. Many countries depend on natural resources for their economies, such as agriculture, forestry, and fisheries, which are vulnerable to climate change impacts. Balancing economic development with sustainable practices and incorporating the value of ecosystem services into decision-making processes is crucial for long-term environmental and economic stability.

In summary, the geopolitics of climate change and biodiversity involve complex interactions between environmental, social, and economic factors. Addressing these challenges requires international cooperation, innovative conservation strategies, and sustainable development practices to ensure the protection and preservation of biodiversity in the face of a changing climate.

Photo credit: **Saikat Kumar Basu**

REDUCED GRAPHENE OXIDE: GREEN SYNTHESIS AND APPLICATION FOR DETECTION OF PLANT NUTRIENT STRESS

Monika Kundu*, Shipra, Prameela Krishnan, and Ananta Vashisth
ICAR-Indian Agricultural Research Institute, New Delhi
E-mail: *mkkundu07@gmail.com*

Introduction

Nanotechnology is one of heated and more researchable topic of today's scenario. It is challenging task to develop a micro thing such that it makes the daily chores of the people easy to handle due to its small size, further making some artificial intelligence devices such as sensors, fuel cell, energy storage and conservation. It also has vast implementation in treating various carcinogenic diseases and drug delivery. The main purpose of nanotechnology is itself suggested by its name, that is micro technology that uses various methods to raise the artificial intelligence level. Nanomaterials synthesised by chemical and conventional methods uses carcinogenic chemicals, high energy input and high pressure (Andraos, J et al, 2022). The volatile vapours, release of harmful gases causes greenhouse effect etc. These chemicals are a threat to environment and food chain is being disturbed which harm not only to humans who are exposed by various routes as respiratory track, dermal, nasal cavity but also to animals causing neurobehavioural and reproductive risk. Despite being this, they give good yield and morphology. Now a days the organic nanomaterials such as graphene oxide are gaining popularity due to their unique electronic characteristics and widespread use in sensing applications. Also the need to invent novel methods and techniques for reducing the consumption of harmful chemicals in the synthesis of nanomaterials is gaining acceleration. As a result of this green synthesis has now aroused inters

Green synthesis

In today's world, people are in need of one tap work, that is which can be controlled by micro remotes. This purpose is being resolved by nanotechnology. In order to fulfil the desires of the present generation, and also the need of future world, researches are being turned towards nanotechnology. Its versatile implementations and fast-growing demand have paved the way for innovative measures for the synthesis of higher quality nanomaterials. For the synthesis of nanomaterials, the green synthesis route is now a says very popular. It is an eco-friendly and sustainable method of using resources in a way as to reduce toxic waste, reduce energy consumption, use of ecological solvents as water, acetone, ethanol, methanol etc, biological agents such as bacteria, fungi, yeast and green catalyst (Bedlovičová, Z, 2022). It is cheap and easy to execute.

Advantages of green synthesis

- Reduces environmental pollution as involves use of eco-friendly methods
- Prevention of unnecessary waste as there is less byproduct produced
- Atom economic which means maximum use of atoms of reactants in order to gives maximum percentage of product and less intermediate formation (Ivanković, A et al, 2017)

- Use of less toxic solvents thereby preventing water pollution
- Use of less toxic and safer separating compounds like water, acetone and ethanol
- Minimization of energy that is use of low pressure and temperature
- Less hazardous product synthesis
- Use of renewable feedstock in order to prevent air pollution
- Less use of derivatives such as blocking and deprotecting agents because they will generate waste
- Use of more selective catalyst
- Chemical product should be designed in a way so that it is degradable thereby minimizing the hazardous risk
- Analytical methods need to be developed in order to prior get the information about the hazardous level of the product formed (Jessop, P. G et al, 2009)
- The chemical substance chosen should be such that there is less possibility for fire, vapour inhalation and explosions.

Figure 1: Principles of green chemistry (Yayayürük, A. E et al, 2019).

Synthesis method of green chemistry-

- **Ball Milling**

It is a ball milling process where a powder mixture placed in the ball mill is subjected to high-energy collision from the balls. A ball mill is a type of grinder used to grind or blend materials. It is a mechanical process. The size reduction is done by impact as the balls drop from near the top of the shell. The grinding media are the balls, which may be made of steel (chrome steel), stainless steel, ceramic, or rubber. The inner surface of the cylindrical shell is usually lined with an abrasion-resistant material such as manganese steel or rubber lining. Less wear takes place in rubber lined mills. (Kharissova, O. V et al, 2019)

- **Microwave irradiation-**

This is one of the clean, fast, time saving reaction as compared to conventional heating. The heat energy as needed by the reaction is used. The reactants must be chosen such that which responds to electromagnetic wave. It is a fast reaction as reactant and radiation are in direct contact.

- **Photocatalysis-**

It is a modification of photoreaction. The reaction takes place in presence of heat and catalyst. The electron gains energy and gets excited from ground to excited states. The catalyst speeds up the reaction. It participates in reaction without being consumed. (Kharissova, O. V et al, 2019)

● **Biological methods-**
It is a very efficient method to produce nanoparticles. It needs biological agents present in nature. Biology-based green chemistry methods consist of the use of bacteria, viruses, yeasts, plant extracts, fungi and algae, among which we consider plant extracts as most frequent and popular green routes. They only act as capping, deprotecting agents, so there is no need of toxic chemicals, cost effective, control on shape and size of particles. There is unlimited number of precursors present in the nature in order to initiate the reaction cleanly.

Graphene oxide in nanosensing
Graphene and graphene derivatives have been used to prepare various types of nanosensors due to their excellent sensing performance (e.g., high specific surface area, extraordinary electronic properties, electron transport capabilities and ultrahigh flexibility). Graphene oxide (GO) is a unique material that can be viewed as a single monomolecular layer of graphite with various oxygen-containing functionalities such as epoxide, carbonyl, carboxyl, and hydroxyl groups. So very widely the reduced form of graphene oxide is being used in different nanosensing applications such as food, water, soil, environment, industries,

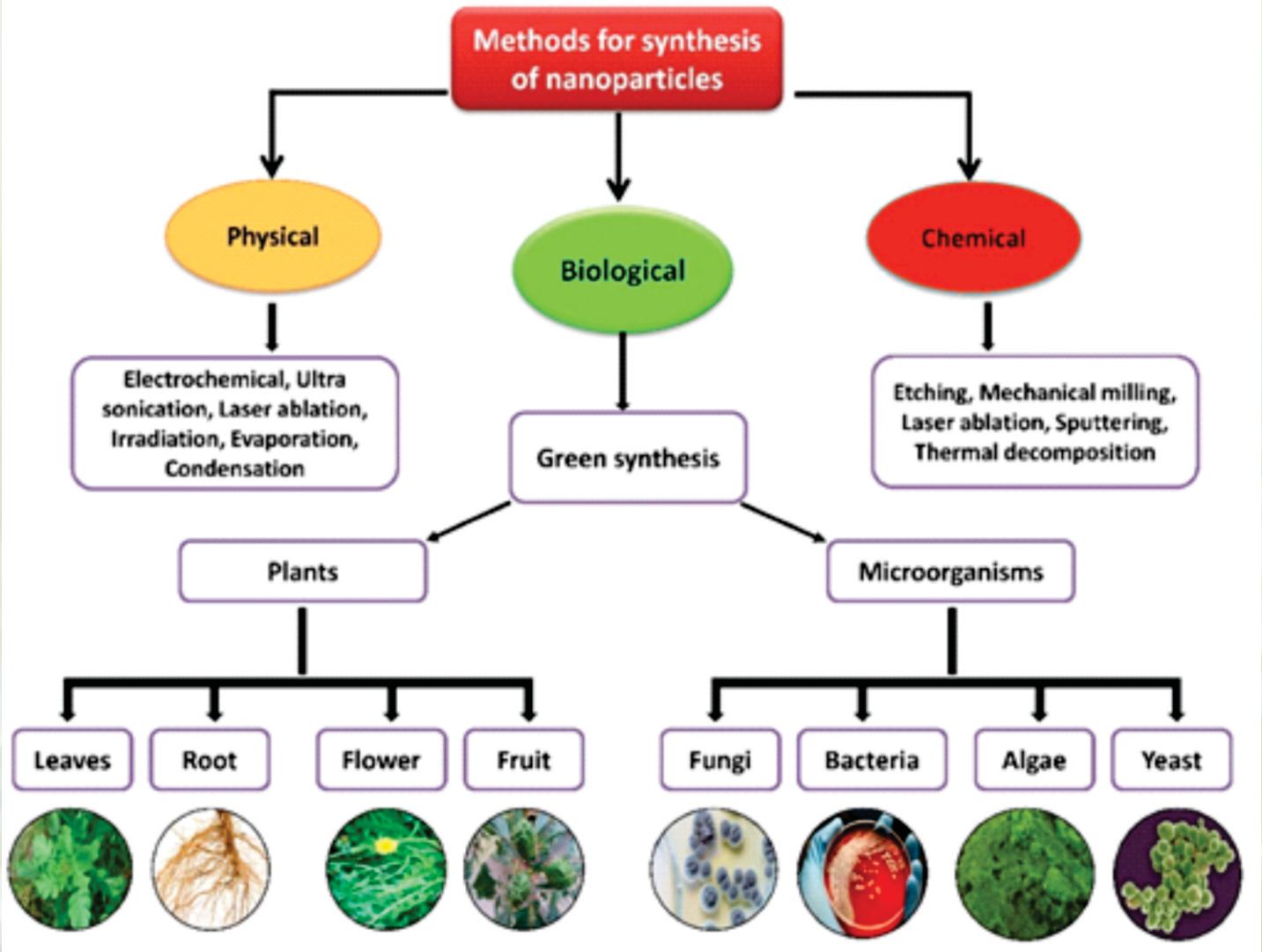


Figure 2: Different method of synthesis of nanoparticle (Khan, F et al, 2022).

Plant Nitrate Stress
Nitrogen is one of the major nutrients commonly applied as fertilisers. The prime factor influencing the formation and incorporation of amino acids and proteins in plant parts is acquisition and reduction of nitrate nitrogen. Nitrate (NO_3^-) is a form of inorganic nitrogen naturally occurring in soils (Kakraliya et al., 2018) Among various sources of soil nitrate are plant residues, animal manure, chemical fertilizers, rainfall etc. The soil nitrate content is crucial for the plant entire life. In this concern, to maintain appropriate nitrate nitrogen content in the soil for plant uptake, we should have rapid and precise methods and technologies, so that suitable management practice can be adopted avoiding plant nutrient stress. Nitrate levels in the

environment around us are of serious concern today. The high levels of nitrate levels in soil, water and food items are hazardous for plant and human health.

Conclusion

There is high need of the world to go clean, less toxic chemistry. The green chemistry has various better methods than conventional which can be executed at basic level. The environment demands need of green chemistry in order to prevent various disastrous calamities such as greenhouse effect, acid rain, glaciers melting, ozone layer depletion, fire explosion. The researchers themselves sometimes suffers chronic diseases as cancer, asthma, heart issues, respiratory problems, lung and kidney damage by inhaling the vapours, nanoparticles entering the body through various routes. The side effects are not seen such quick, it damages the body internally. In supramolecular chemistry and organic chemistry such as C-C bond, C-N, C-S bonds, cycloaddition, oxidation, reduction can be done by optimising conventional method and implementing green synthesis. The nanoparticles and their composite are synthesised by green chemistry. The nanomaterial of metal, non-metal and metal oxide can be synthesised. The new research originating is trying to go more and more towards green. Therefore, this article summarises at last that methods for the chemical reaction should be pre designed in a way that it prevents depletion of environment, health of researchers performing the reaction should be taken into consideration by choosing the precursors, designing the reaction conditions, checking the degradability of the product.

Acknowledgement: The authors are sincerely thankful to the DST-SERB for funding the research under core research grant

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ECONOMIC AND ENVIRONMENTAL IMPACTS OF BIOGAS: A CASE STUDY IN RIE, CAMPUS, BHUBANESWAR, ODISHA

Sanjeeb Kumar Das
Department of Botany
Regional Institute of Education (NCERT),
Sachivalaya Marg, Achrayavihar, Bhubaneswar-751022
Email: *Sanjeebdas75@yahoo.com/ dassanjeebbotany75@gmail.com*

IBiogas is one of the promising renewable energy sources that successfully implemented at domestic and industrial scales. This work presents a preliminary evaluation of the role and contribution of biogas as a sustainable energy source towards achieving the Sustainable Development Goals (SDGs).There are regular waste disposal problems in almost all Institutions like hostels, hospitals, convents, old age-homes, etc. where more peoples are staying together. In the same time the cooking fuel consumption of these Institutions is also very high. Fairly large quantities of firewood and other cooking fuels are consumed for routine cooking purposes. Regional Institute of Education, Bhubaneswar is a constituent unit of National Council of Educational Research and Training, New Delhi, caters to the educational needs of teachers of Eastern Indian region. It takes one step forward to minimize the Kitchen wastes. In our institute we have one canteen where daily a large amount of kitchen waste (40kg/day) is obtained which can be utilized for better purposes.

Biogas production kills two birds with one stone: It reduces waste and produces energy. In addition, the residues from the digestion process can be used as high quality fertilizer. This closes the nutrient cycle. By understanding the today's need of saving of energy, RIE, Bhubaneswar has taken an initiative & sets up Bio-Gas plant to process canteen waste.

The canteen caters to more than 1000 students daily and generates over 40 kg of solid and semi-solid waste, in the form of left-over food and remains of vegetables and fruits. It was a tedious task to pack the huge amount of waste in polythene bags and hand them over to the civic body almost daily. It is now easy to dump this waste & processed at the biogas plant after some segregation.

The biogas plant aims at addressing the issue of disposal of waste from the canteen and other parts of the campus in an eco-friendly manner.

Fig 1: Biogas Plant Inauguration at RIE, Campus.

FOOD & KITCHEN WASTE BASED BIO-GAS DIGESTER

The bio-gas produced from food waste, decomposable Organic materials and kitchen waste consisting of methane & a little amount of Carbon dioxide is an alternative fuel for cooking gas (LPG). Also the waste materials can be disposed off efficiently without any odour or files and the digested slurry from the bio-gas unit can be used as Organic manure is the garden.

The major components of the bio-gas plant are a digester tank, food crusher, an inlet for feeding the kitchen waste , gas holder tank, an outlet for the digested slurry, bio-gas purification system & the gas delivery system for taking out and utilizing the produced gas.

The project is also useful to have hands-on learning experiences in Bio-Gas plant construction and operation.

This is a basic prototype of a Bio-Gas system using the food waste, decomposable organic materials and kitchen waste to produce gas .The medium size biogas plant can be installed for the waste generated from different hostels Dairy farm and agricultural residues in the campus.

Table 1: Economic of Food & kitchen waste based Bio-gas Digester.

Sl No.	Description	Unit	Capacity of Bio gas Digester
1	Capacity of bio-gas Digester	CuM	4
2	Availability of kitchen waste /Day	kg	40
3	Waste Requirement/Day	Ltr.	40
4	Bio-Gas Generation /Day	CuM	4.13
5	Bio-Gas Generation/Month	CuM	110.35
6	Bio-Gas Generation/Day	Kg	2.41
7	Slurry Generation /Day	Ltr	50
8	Equivalent Bio Manure Production /Day	Kg	12
9	Equivalent Liquid Fertilizer Production /Day	Ltr	46
10	Cost of Bio-gas /kg	Kg	Rs. 2953
11	Cost of Bio manure /kg	kg.	Rs. 2025
12	Cost of Liquid fertilizer /Day	Kg	Rs, 1148
13	Area Required	Sq.ft	04ft × 7ft
14	Revenue Generated from Bio-Gas/Month	kg	Rs. 2953
15	Revenue Generated from Bio manure /Month	kg.	Rs.2025
16	Revenue Generated from Liquid fertilizer/Month	kg.	Rs.1148
17	Total Revenue Generated /month	Kg	Rs.6126

IMPORTANT DAYS IN THE MONTH OF JULY 2023

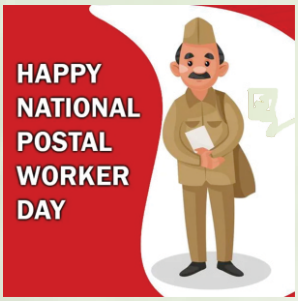
V. Sunitha
Department of Geology, Yogi Vemana University,
Kadapa, A.P. 516005
Email: *Vangalasunitha@gmail.com*

1st July – 'National Doctors Day

On July 1st, India celebrates Doctor's Day to recognize the value that doctors have in our lives. This day is intended to honour medical industry advances as well.

1st July – National Postal Worker Day

Every year on July 1st, National Postal Worker Day is commemorated to honour and show gratitude to all the men and women who routinely and tirelessly deliver all of our mail and deliveries.



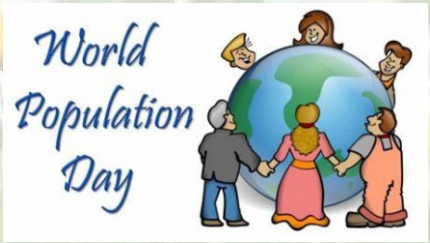
7 July - World Chocolate Day

On July 7, we commemorate the day that chocolate was introduced to Europe for the first time, back in 1550. Different nations observe World Chocolate Day on various dates.

9 July- National Sugar Cookie Day

It is celebrated on July 9 in honour of the well-known and delectable sugar cookie. The day honours the importance of sugar cookies in our lives as well as the tasty little treat they are.

11 July - World Population Day



Every year on July 11, World Population Day is commemorated to draw attention to the urgency and significance of population issues.

12 July - Paper Bag Day

Every year on July 12, people celebrate Paper Bag Day to recognise the significance of the development of the paper bag, which we typically take for granted. A teacher named Francis Wolle created the first machine for mass-producing paper bags in 1852.

15 July - World Youth Skills Day

Every year on July 15, World Youth Skills Day is observed to promote awareness of the value of technical, vocational education, and training as well as the development of other skills important to both national and international economies.

17 July - World Day for International Justice

Every year on July 17, people around the world mark World Day for International Justice. It is often referred to as International Justice Day or the Day of International Criminal Justice. Today, the developing system of international criminal justice is acknowledged.

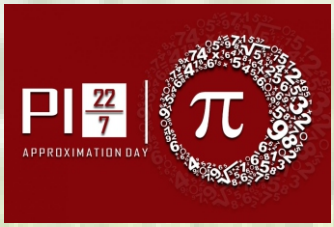
18 July - International Nelson Mandela Day

Every year on July 18, there is a celebration of International Nelson Mandela Day. The holiday honours Mandela's life and contributions in a lasting fashion that will result in the necessary transformations.

20 July - Moon Day

Moon Day honours the occasion of the first lunar landing in 1969.

22 July – Pi Approximation Day



Since Pi has a value of 22/7, it is celebrated on July 22 each year as Pi Approximation Day. In contrast, Pi Day is observed on March 14, which is close to

the value of 3.14 and also happens to be Albert Einstein's birthday.

22 July - National Mango Day or Mango Day

It is observed on July 22. Today is the day to learn some interesting facts about the sweet and juicy mango, including its history.

22 July (Fourth Thursday in July) - National Refreshment Day

Every year, on the fourth Thursday in July—which comes on July 22 in 2022—National Refreshment Day is honoured. This day primarily honours the enjoyment and coolness experienced during the hottest season of the year, the summer.

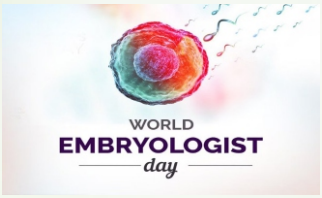
24 July - National Thermal Engineer Day

Every year on July 24, National Thermal Engineer Day is commemorated to highlight the significance of developing the thermal engineering field and to offer the electronics industry creative, excellent, and affordable thermal management and packaging solutions.

25 July – National Parent's Day (Fourth Sunday in July)

On the fourth Sunday in July, which falls on July 25 in 2021, National Parents Day is observed. This day is dedicated to all the parents who have a significant impact on the lives of their children. There are no words to describe how much they give up and love their kids unconditionally.

25 July - World Embryologist Day



Since Louise Joy Brown was the first child to be born via in vitro fertilisation on July 25, 1978, the day is commemorated annually as World Embryologists Day.

28 July - World Nature Conservation Day

Every year on July 28, people throughout the world celebrate World Nature Conservation Day to recognize how important a healthy environment is to current generations as well as a stable and productive society. Our natural resources must be preserved, managed sustainably, and protected.

28 July - World Hepatitis Day

Every year on July 28, World Hepatitis Day is commemorated to provide a chance to intensify regional, global, and national efforts to combat hepatitis. Additionally, this day serves to raise awareness of the hepatitis disease and the effects it has on those who have it.

29 July - International Tiger Day

Every year on July 29, people around the world celebrate International Tiger Day to raise awareness about the need to maintain tigers' natural habitats. Global Tiger Day is another name for today.

ENROLL YOURSELF TO NESA NEWSLETTER EDITORIAL BOARD MEMBER

Editorial board members of NESA newsletter will be revised for the year 2023. All the interested applicants may send their curriculum vitae to **Editor in Chief** by **15th August, 2023.**

MEMBERS ARE REQUESTED TO PLEASE PLANT ONE TREE IN YOUR NEIGHBOURHOOD AND SEND US A SMALL BRIEF WITH PHOTOGRAPH OF THE TREE / PLANT SO WE CAN PUBLISH IN THE NESA E-NEWSLETTER

National Conference

On

Recent Trends & Challenges in GREEN CHEMISTRY, POLLUTION CONTROL AND CLIMATE CHANGE [GPCC-2023]

14th – 16th December 2023

Venue: CSIR – National Botanical Research Institute, Lucknow

Jointly Organized by

National Environmental Science Academy (NESA), New Delhi

CSIR-National Botanical Research Institute, Lucknow

Thematic Areas of the Conference - GPCC-2023

Abstracts can be submitted under the following sub-themes

SUBMIT ABSTRACT
nesalucknowconference2023@gmail.com

1. Pollution and its Mitigation

- Air Pollution and Mitigation
- Water Pollution and Mitigation
- Soil Pollution and Mitigation
- Wastewater Utilization
- Waste Management

2. Climate Change

- Climate Change Mitigation
- Climate Smart Agriculture
- Renewable Energy
- Application of Remote Sensing and GIS

3. Green Chemistry

- Alternative and Efficient Sources of Energy
- Green Technologies for Zero-waste Processes and Products
- Green Nanomaterials for Environmental and Agricultural Applications
- Cleaner Production

4. Environment and Biotechnology

- Environmental Microbiology and Bioremediation
- Environmental Biotechnology

5. Natural Resource Management

- Biodiversity Conservation
- Environmental Degradation and Eco-restoration
- Geospatial and Ecological Modelling

6. Contemporary Areas

- Environmental Impact Assessment
- Environmental Risk Management
- Environmental Protection
- Environmental Sustainability and Development
- Environmental Education and Sustainable Developments Goals

IMPORTANT DATES

Conference Dates	14th to 16th December, 2023
Registration and Abstract Submission Starts:	10.07.2023
Last Date of Registration without late payment:	31.10.2023
Abstract submission Deadline:	31.10.2023
Intimation of acceptance of abstract:	07.11.2023

REGISTRATION

	Regular Registration (Till 31.10.2023)	Spot Registration* (After 31.10.2023)
Academicians & Scientists	INR 5000.00	INR 6000.00
Research Scholars/ Fellows	INR 2500.00	INR 3000.00
Students (PG)	INR 1500.00	INR 2000.00
Corporate Delegates	INR 10000.00	INR 12000.00

PAYMENT

Name: **National Environmental Science Academy**
Bank Name & Address: **Bank of Maharashtra, Kalkaji Branch, New Delhi-110019**
Account Type: **Current Account**
Bank Account Number: **60109889476**
IFSC Code: **MAHB0000974**

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CSIR-NATIONAL BOTANICAL RESEARCH INSTITUTE
Rana Pratap Marg, Lucknow-226 001 • www.nbri.res.in
&
NATIONAL ENVIRONMENTAL SCIENCE ACADEMY
206, Raj Tower-I, Alaknanda Community Centre, New Delhi-110 019
Mobile: 9811238475, 8527568320 (Gian), 99713 83650 (Rakesh Roy)
E-mail: nesalucknowconference2023@gmail.com; infonesa88@gmail.com
Website: www.nesa-india.org / www.gpcc2023.nesa-india.org/