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NESA NEWSLETTER

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Dear Readers,

Greetings!!

In September issue, we recount the various projects and popular articles. This issue includes Annual awards by Academy for its members actively involved in their field or events and activities organised by the Academy. NESA is well known for its environmental awareness activities.

I humbly request to all the members of the Academy to please plant a single tree on his/her birthday or any member of the family, friends and relatives and share the memorable pictures with us. We would like to include in our Newsletter and it will serve as an inspiration and motivation to many for making our Planet with the motto "Green and Clean Environment".

Once again, I express sincere and huge thank to all the persons who contributed writing the wonderful and inspiring articles, without which there wouldn't have been this newsletter issue. Please continue sharing such articles and share with your friends also.

I would like to thank President and General Secretary, NESA, New Delhi, and the Editorial team including Print, Designer and Publication committee for their nonstop support and efforts throughout this edition.

Hope this edition makes an interesting read. Please feel free to offer any suggestions for improvement.

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Report of National Conference on ENVIRONMENTAL POLLUTION & OZONE LAYER(NCEPOL 2021)



The inaugural session was organized as per programme scheduled dated 16th September, 2021 at 11 a.m. The following attended the inaugural session. Chief Guest of the function was **Shri Anand Sharma**, ADGM, IMD, Govt. of India, Lodhi Road, New Delhi. He delivered his special address covering air pollution, causes and Ozone depletion. **Prof. Javed Ahmad**, President, NESA welcomed the Chief Guest and esteemed dignitaries and introduced the Chief Guest. **Dr. Rakesh Goel**, Director Raj Kumar Goel Institute of Management, Delhi-Meerut Road, Ghaziabad formally did opening of the conference by introducing the aims and objectives of the institution and future of the technology. **Dr. D.R. Somashekar**, Director, Raj Kumar Institute of Technology, Ghaziabad (U.P.) also gave his remarks on latest developments in the field of Science and Technology. **Dr. Vikesh Kumar**, Director Academic also attended the function and release of e-abstract book was done by the Chief Guest and other dignitaries. **Dr. Laxman Prasad**, Group Director also graced the occasion and shared his experiences in the development of Science & Technology as well as the contribution of the nation in the past. Vote of thanks was delivered by **Dr. Shailesh Gupta**, Organizing Secretary & Coordinator from Raj Kumar Goel Institute of Technology.

After the tea break, the first invited talk was delivered by **Dr. Brijendera Pateria**, Director, Punjab Remote





Dr. Bhavika Kumar (PRSC) Ludhiana, Punjab. He pointed out that remote sensing can play big role in various fields. W.H.O. has also recognized the system and its beneficial role. He also pointed out the harmful effect of superadded particles in the air due to

industries, construction, heavy vehicles and green houses gases. He advised for taking excess to protect nature in an intelligent manner. He stressed on value based knowledge.

Prof. B. Rupini discussed radiation types in her lecture and classified Ozone as good and bad ozone, Human role: stewardship can play a faithful caring role in nature protection.

Prof. Umesh Chandra Kulshrestha, School of Environmental Sciences, Jawaharlal Nehru University, New Delhi delivered keynote address and discussed reasons for high Ozone and the need of measurements of chlorine and Hcl in ambient air in India.

In Technical Session 2: Dr. Deeksha Dave, Assistant professor, Environmental Studies, Indira Gandhi National Open University, New Delhi delivered an invited talk on Environmental Resilience and Sustainability.

Dr. Anita Jain, Head, Department of Botany, Vidya Bhawan Rural Institute, Udaipur, Rajasthan also gave an invited talk on conservation of biodiversity through protected areas network in Rajasthan.

Dr. Ravi Kishore, through poster presentation highlighted the circular economy and also discussed the role of polymer.

Dr. Vartika Jain also gave oral presentation on human corona virus sars-Cov-2. Also pointed out the transmission of virus through water.

Dr. (Mrs.) Monali from Bhavnagar spoke on constructed wet land for Municipal waste water.

Dr. Sunil Nehra, K. Suri & V.K. Verma spoke on Environmental Modelling.

Dr. Koyal Sur, V.K. Verma & B. Petriya delivered invited talk and discussed the air pollution burden on human. He has emphasized that air quality monitoring is very important.

Dr. Sarabjit Singh & Koyal Sur spoke on global warming which is gradually increasing year by year.

Dr. Birindera Kaur, Amir Latif and other spoke on solid waste management.

Dr. Bhavika Kumar & others spoke on cardiovascular diseases. In Technical Session 3 and 4, the following participated orally.

Dr. Alka Rani, Associate Professor, Hindu College, Moradabad also delivered an invited talk.

Dr. Jitendra Kumar Nagar, Assistant Professor, Dept. of Environmental Studies, Dr. Bhim Rao Ambekar College, University of Delhi, Yamuna Vihar, Delhi delivered an invited talk and highlighted the green house pollution & the diseases i.e. cancer, bronchitis asthma which are caused by the internal pollution, stubble burning (Agri waste) causes air pollution, So₂, No, No₂, Co are further accumulated in the air. Even the faeces of pigeons release harmful gases. Burning of 'Agar Batti' and mosquito coil are the main causes of indoor pollution. Rhinitis and respiratory infection are causes due to increasing trend in indoor pollution.



Dr. Suraj Kumar Tripathi, Associate Dean (Academics), School of Chemical Technology, Kalinga Institute of Industrial Technology, Bhubaneswar, Odisha also gave an invited talk on waste water treatment technologies. he discussed its capabilities to manage the antibiotic resistance.

Dr. Ravi Kishore from Faridabad also delivered a talk.

In Technical Session 5 dated 17th Sept. 2021 the following invited talks were held before the lunch time.



Prof. (Dr.) Tanu Jindal, Pro Vice Chancellor (R&D), Director, Amity Institute of Environmental Toxicology, Safety and Management delivered an invited talk on Ozone and Ozone depletion.

Prof. Abhay Pandey also gave an invited talk on factors that affect human health & environment. He highlighted the prevention i.e. pollution, coal energy; less use of air conditioners, less use of vehicles, for the preservation of wetlands and water harvesting. Industrial role (ecofriendly may bring good results in the area of environmental conservation).

Ms. Varshika Jindal and **Sejal Singh** CSL (ds), 2nd year students also presented through poster on waste water pollution & its treatment.

Prof. (Dr.) P.K. Kinra, Dept. of Climate Change and Agricultural Meteorology, Punjab Agricultural University, Ludhiana, Punjab delivered an invited talk on environmental pollution & Ozone

layer depletion. The adverse effects of air pollution are global warming, acid rains, health hazards and ozone layer depletion.

Dr. Rakesh Kumar Negi also discussed on the role of CFCs in his talk & UVS rays on aquatic ecosystems.

Dr. Pavan Kumar, Associate Professor, College of Horticulture and Forestry, Rani Lakshmi Bai Central Agricultural University, Jhansi, U.P. on impact of NO_2 on climate of Delhi. He has given a comparative data of lockdown and before.

Dr. Zahid Hameed Siddiqui, Asst. Professor, Tabuk University, Kingdom of Saudi Arabia delivered an oral talk on recycled water in Tabuk & reuse of waste water & its impact on the germination of chickpea (*Cicer aurientum*). He further pointed out the sulphate contents in higher quantity in the waste water of Tabuk.

Dr. Syed Shabih Hassan, Scientist Fisheries, Dept. of Fisheries Reserve Management, College of Fisheries, Guru Angad Dev Veterinary and animal Sciences University, Ludhiana, Punjab delivered an invited talk & also acted as Chairperson of this Technical session.

Dr. R.S. Tomar, Faculty, College of Horticulture and Forestry, Rani Lakshmi Bai Central Agricultural University, Jhansi, U.P. also delivered an invited talk on Genomic improvement of millets for changing environmental conditions.

He also discussed the nutrient contents of millets, global composition and its position at the top in India in comparison of rice and wheat. Finger millet (*Eleusine coracana*), *Ragi* was discussed in detail with its useful products.

Dr. Suman from Sharda University also delivered a talk on air pollution & health risk with vehicular traffic. She said that individual contribution can decrease the risk in increasing travel of traffic will have to be checked in future for the safety of the environment.

Dr. Auna Parcha, Dept. of Geology, J.M.I., New Delhi also delivered the oral lecture on air pollution. She further pointed out that burning of fossil fuel is one of the big causes of air pollution.

Dr. Roshan Mehta & J. Upadhyay from Guru Govind University, Rajasthan in his talk gave details of the analysis of water.

Dr. Ashok Kumar Yadav, R.K.G. Ghaziabad delivered a talk on biodiesel. He talked the source from *Jatropha* plant.

Dr. Mohit Arora, remote Sensing, Ludhiana talked on climate change.

Dr. Kumar also gave a talk in the last session of the conference.

Dr. Ravi Kishore, Director, Green forms delivered the last lecture of the session. He gave over view of the developments of the past in this area of Science & Technology. He further discussed challenges and prospects in future.

Valedictory Session held on 17th September at 5 p.m.

The dignitaries were welcomed by **Dr. Shailesh Gupta**, Organizing Secretary. The Chief Guest of this session was **Prof. (Dr.) Umesh Chandra Kulshrestha**, Dean, Dept. of Environment,

Jawahar Lal University, New Delhi. **Dr. Rakesh Goel, Dr. R. Somashekar, Dr. Laxman Prasad, Dr. R.K. Yadav & Dr. Umakant Chaudhary** were present in this session.

Dr. Umakant Chaudhary also delivered vote of thanks. Dr. Shailesh Gupta, Organizing Secretary also summed up and distribution of certificates was done by him and the Chief Guest.

Prof. Javed Ahmad, President, NESA also highlighted the contents of invited speakers and thanked the organizing committee and the participants of RKG Institute of Technology and Management, Ghaziabad, U.P. student, staff and media person.

He summarized the recommendation of the conference as given below. He appraised the delegates and dignitaries that papers were presented under the heads as invited talks, oral presentations and through posters.

The scientific deliberations were to upto the mark.

On the first day 18 presentations were held. On 2nd day 12 papers were presented before lunch.

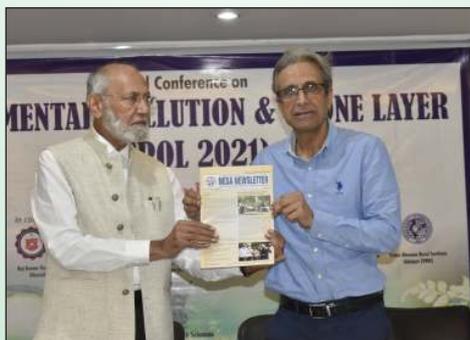
Five papers under poster session were presented after the lunch. About 35 papers were presented in two days conference.

The following recommendations are approved as under:

1. **More focus on ozone monitoring.**
2. **Start monitoring of Hcl and chlorine in air.**
3. **Individual role should be rewarded by local govt.**
4. **Stubble burning (from waste) should be checked by the Govt. agencies.**
5. **Burning of tyres & municipal wastes should be checked.**
6. **Dust in the air should be minimized.**
7. **Vehicular traffic is the biggest cause of air pollution.**
8. **Noise pollution should also be controlled by not permitting the fire crackers. Fire crackers should be banned.**
9. **Air quality monitoring stations should be installed in different zones of megacities.**
10. **Deforestation should be banned in future. Plantation drive should be encouraged by the Govt. and NGO's.**
11. **Clean energy should be permitted. Use of Gen-sets should be regulated.**
12. **Hydropower projects are responsible for the land slides in the hill states. These require intelligent caring & maintenance.**
13. **Green house gases are responsible for global warming and climate change. These should be monitored on regular basis A.Q.I. should be recorded on seasonal basis.**
14. **Plan of production of Energy from Coal should be prohibited.**
15. **Remote sensing may play a big role to take care of the environment.**
16. **Neighboring states to do more for clean air under joint venture.**
17. **States should give subsidy to the farmers for the purchase of bio-decomposer. Thus organic manure may further be added for increasing fertility of the soil.**



Glimpses of National Conference on ENVIRONMENTAL POLLUTION & OZONE LAYER(NCEPOL 2021)



Glimpses of Report of National Conference on ENVIRONMENTAL POLLUTION & OZONE LAYER(NCEPOL 2021)



ZEOLITES: THE BOON FOR FUTURE AGRICULTURE

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Abstract

In today's world the rapid urbanization, climate anomalies, water shortage and quality degradation in the face of rising food demand to feed a growing population need a more efficient agriculture system. In perspective, farming using zeolite which are abundant and environmentally safe, has gained popularity in recent years due to the diverse benefits they provide in agricultural operations. In this regards, this article summarizes the prospects of zeolite application in agriculture for attaining sustainability without comprising production.

Introduction

Zeolites are hydrated aluminosilicates of alkaline earth metals with very porous structure (United States Geological Service). Clinoptilolite is the most abundant type of zeolite present in the soils and sediments. The early research on the use of zeolites in agriculture took place in Japan in the 1960. The farmers of the Japan used zeolite to conserve moisture content in the soil. Zeolites are also utilized as heat storage materials, solar refrigerators (both absorber and adsorber), ion-exchanging elements, molecular sieving agents, and catalyzing agents in a variety of chemical processes. Natural zeolites are ideal soil ameliorating substances because they have a high water and nutrient holding capacity (WHC); they enhance infiltration rate, saturation hydraulic conductivity, cation exchange capacity, and reduce water loss through deep percolation. Several previous studies have shown that zeolites can improve soil characteristics such as water and nutrient retention, crop production, and heavy metal toxicity. This popular article provides an overview of the wide range of zeolites applications in agriculture, with a focus on soil properties, resource conservation, pest management, pollution control, and crop productivity.

Role of Zeolites in improving soil physical properties:

- Zeolite application in light textured soil reduces the bulk density which improves the water holding capacity and soil air porosity.
- Zeolites have high porosity which helps to improve soil structure and increase aeration in the soil which helps to promote root growth and increase the photosynthetic rate and chlorophyll content.
- Zeolites help to improve water-stable aggregates in the soil.
- Zeolite application also helps to improve saturated hydraulic conductivity in problematic soils.
- In dry puddled soil, zeolite treatment helps to minimize crack depth by 50%.

Role of Zeolites in water conservation:

- Zeolites may store more than their weight in water and therefore can act as a water reservoir in the soil, providing continuous supply of water.
- Zeolites can enhance water infiltration into the soil, as well as irrigation water rewetting and lateral spread in the root zone.

- Zeolites play an important role in improving water holding capacity which is very crucial in crop production, especially in arid and semi-arid regions where, it increases water efficiency from irrigation.
- In sandy soils, the use of zeolites would be ideal to reduce hydraulic conductivity and water transferability, resulting in minimal deep percolation and soil water loss.

Role of Zeolites in nutrient retention:

- The high CEC of zeolites attributes to high NH_4^+ sorption selectivity as a consequence of the electrostatic attraction between positively charged NH_4^+ and negatively charged sites in zeolite structure.
- Application of zeolite in combination with chemical fertilizer reduces N leaching and volatilization as well as retards the nutrients release in soil solution.
- Zeolites are alkaline in nature having negative charges which helps to improve soil P availability through lowering soil acidity, soil exchangeable Al and Fe and reduces the P fixation by metal oxyhydroxides.
- Along with N and P, zeolites have higher selectivity for K^+ , makes it difficult to remove K^+ from exchange sites and allowing for increased K^+ absorption by plant root hairs via ion exchange within root and zeolite.
- Application of zeolites as a slow-release fertilizer reduces the losses of K^+ by surface runoff and groundwater leaching.
- Zeolites also have nutrient retention ability in secondary nutrients such as sulphur. The presence of huge number of channels, pores and cages in the structure of the zeolite helps in holding the SO_4^{2-} tightly might be the reason behind the slow release of this secondary nutrient from surface modified nano-zeolite.
- Zeolite increases the micronutrient use efficiency as reported that ZnSO_4 released Zn up to 200 hours whereas micronutrients from nano-zeolites were releasing even after 800 hours.
- The increased availability of micronutrients in soil as a result of zeolite treatment leads to higher micronutrient content in plants.
- The zeolite coated fertilizer have greater potential for water absorption and retention as well as have capacity to slow down the rate of nutrient release from soil especially in sandy and sandy loam soil.

Role of Zeolites in environmental pollution management:

- Zeolite can operate as molecule gas sieves because of its specific channel size.
- It is reported that use of zeolite as an amendment reduces 27% of green house gas emission from duck manure.
- According to the reports, zeolite considerably reduced total N_2O emission from urine treated soils by 11%.
- Low nitrate and phosphate leaching from zeolite supplemented soil also helps to reduce groundwater pollution, surface water contamination and eventual eutrophication.
- By preventing the entry of nitrifying bacteria into its structure, zeolite inhibits fast mineralization and hence lowers N_2O emission.

Role of zeolite in remediation of contaminated soil:

- The addition of zeolite to the soil raises the pH, which enables heavy metal adsorption on its surface lowering the solubility and bioavailability of heavy metals.
- It is reported that the clinoptilolite (type of zeolite) effectively controlled the heavy metal solubility including cadmium and lead upto 72% and 81%.

Role of zeolite in waste water treatment:

- Zeolites are widely used as adsorbents due to their inexpensive cost, environmental friendliness and high selectivity for hazardous cations.
- Zeolite also helps to prevent the generation of new waste material.
- Clinoptilolite have the ability to adsorb colours, humic acid, phenols and phenol derivatives from water bodies.
- The clinoptilolite have ability to adsorb heavy metals throughout a wide temperature range (25-60°C), pH range (1-4), and agitation speed range (0,100, 200, 400 rpm).
- Zeolite is an excellent cation adsorbent because of its large surface area and high CEC.

Role of zeolite in crop management practices and yield increase:

- Application of zeolite helps to increase number of effective tillers and protein content in rice.
- The zeolite amendment considerably enhanced root characteristics in terms of root length, dry weight, root diameter and volume, total root surface area and root bleeding intensity in rice.
- Root characteristics that have been developed may improve nutrient transfer from the root to the above ground portions of the plant, resulting in increased biomass of grain production.
- It is reported that the additional supply of zeolites increased the leaf area index (LAI), leaf SPAD values, and photosynthetic efficiency in rice plants, which might be ascribed to its superior ammonium retention capacity and slow-release nature, which improves N availability to plants.
- In an upland crop production system, it is suggested that zeolite application facilitates a 25% decrease in the recommended fertilizer dose and retains a beneficial impact for 2-3 years.
- In saline condition zeolite amendment in soil responded well in barley crop, produced taller plants, and accumulated maximum plant biomass and more grain yield.
- Similarly in alkaline condition application of zeolite increased nutrient accumulation in plant tissues.
- It is reported that an additional supply of 10 ton zeolites ha⁻¹ with recommended fertilizer significantly increased the seed and oil yield in safflower.
- Not only in field crops or vegetables, zeolite induced soil enhanced mycelium mushroom production as well as quality characteristics.
- Number of scientific studies have established that soil applied zeolites have a substantial beneficial impact on cocoa fruiting, eye numbers in potato tubers, pod and siliqua number in pulses and oilseeds and overall growth of soybean, sweet potato, wheat, bean and safflower.

Role of zeolite in management of saline-alkaline soil:

- In most alkaline and saline soils the increased Na⁺ concentration disrupts the soil nutritional balance and osmotic control in plant tissues; zeolite increases the amount of Ca²⁺ cations in the soil, lowering the Na⁺/Ca²⁺ ration. The addition of Ca²⁺ from zeolite to the growth media reduces the buildup of harmful Na⁺ ions and aids in soil structure development by aggregating soil particles.

Role of zeolites as a pesticide:

- Application of zeolite found to be effective against maize weevil, pollen beetle.
- The dusting of natural zeolites has been successfully tested to control the aphid population in fruit orchard.
- Furthermore, nanoporous zeolites have been implicated as nano capsule in herbicide application, pest management and nanosensing for pest detection.
- Natural zeolites might be a low cost, dependable alternative to conventional pesticides in pest control.

Conclusion

The farming using zeolites may be a viable alternative for improving soil physico-chemical properties, nutrient retention in soil, remediation of heavy metal toxicity, waste water treatment and green house gas emissions. The aforementioned beneficial effects improve crop growth, productivity, and even quality characteristics of many agronomic and horticultural crops. Therefore, it is concluded that zeolites play an important role in agricultural input management in order to increase productivity, profitability and sustainability.

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As a result, a smart plant-wearable biosensor could be a game-changer for in-situ pesticide residue monitoring on crops, thereby encouraging the development of precision agriculture in the future. Such plant-wearable biosensors, can be attached to the surface of agricultural products, such as the surface of fruits or vegetables or plant leaves, and allows real-time and in-situ analysis of pesticides via electrochemical detection of target analyte. The plant-wearable biosensors allow rapid, in-field

analysis of various parameters to assist the precision agriculture. Such sensors are highly useful as novel technology for collecting the real time data of pesticide residues and other agricultural chemicals. The impact of ambient factors such as temperature and humidity can be the researchable areas for futuristic developments in this sector. Future applications of plant wearable biosensors include detection of nutrients, affect of pathogens, real time monitoring of plant volatiles, stress etc.

PRESENT STATUS, PRODUCTION CONSTRAINTS, QUALITY ASPECTS AND FUTURE RESEARCH STRATEGIES IN OILSEED BRASSICA SPECIES

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The oleiferous *Brassica* species, commonly known as rapeseed-mustard, are one of the economically important agricultural commodities. Rapeseed-mustard comprising eight different species viz., Indian mustard, toria, yellow sarson, brown sarson, gobhisarson, karanrai, black mustard and taramira, are being cultivated in 53 countries spreading all over the globe. The oil and protein content varies from 37 to 49% and 22-28%, respectively. The seed and oil are used as condiment in the preparation of pickles and for flavouring curries and vegetables. The oil is utilized for human consumption throughout the northern India in cooking and frying purposes. It is also used in the preparation of hair oils and medicines. It is used in soap making, in mixtures with mineral oils for lubrication.

PRODUCTION STATUS

The estimated area, production and yield of rapeseed-mustard in the world was 36.59 million hectares (mha), 72.37 million tonnes (mt) and 1980 kg / ha, respectively, during 2018-19 (Fig.1). Globally, India account for 19.8 % and 9.8% of the total acreage and production (USDA). During the last eight years, there has been a considerable increase in productivity from 1840 kg/ha in 2010-11



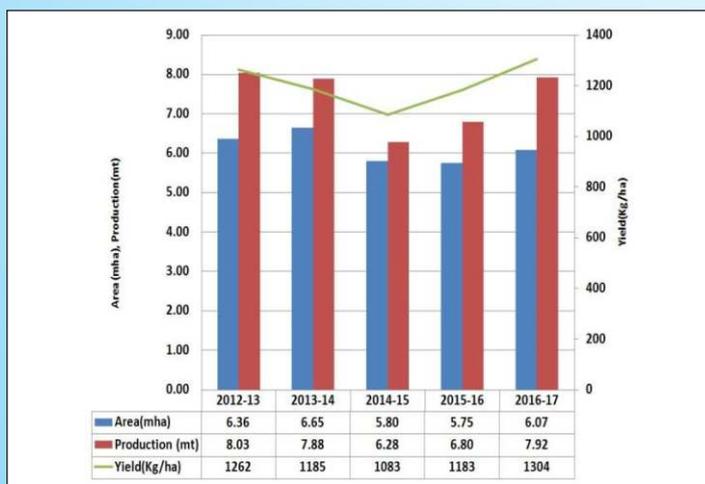
Fig. 1: Rapeseed-Mustard Production trends in World & India

to 1980 kg/ha in 2018-19 and production has also increased from 61.64 m t in 2010-11 to 72.42 m t in 2018-19.

CONSTRAINTS IN PRODUCTION

The rapeseed-mustard, which contributes nearly 80% of the total *rabi* oil seed production, is a vital component in edible oil sector. The rapeseed- mustard crops are diverse in their agro-climatic requirements and crop management practices. The production constraints facing each of the crops are also diverse in nature. The objective of raising domestic availability of edible oil can be realized only by increasing the productivity of these oilseed crops. Enhancing the production and productivity of the crop assumes significance; not only from the farmers' viewpoint but also for the edible oil industry and other vertically and horizontally linked enterprises. The major constraints faced by these crops are:

- Uncertainty of acreage of the crops due to several factors: climatic, biological, natural resources and policy decisions.
- Low and erratic rainfall leading to continuous moisture stress/ drought over the years. Seedling stage is most sensitive to moisture stress followed by flowering. Farmers are also not well versed with the moisture conservation techniques.
- Irrigation with saline and alkali-blended water in most of the areas of Rajasthan and parts of UP, Haryana and Punjab resulting in salinity builds up.
- Mono cropping in most of the major areas has led to soil deficiency for nutrients and built-up of soil borne pathogens.
- Stress caused by insect, nematodes, fungal, bacterial and viral pathogens, *Orobanche* and weeds collectively result in approximately 45% yield loss annually.
- High temperature during crop establishment (mid-September to early- November), cold spell, fog and intermittent rains during crop growth cause considerable yield losses by physiological disorder and appearance and



proliferation of white rust, downy mildew and *Sclerotinia* stem rot diseases and aphid pest.

- Farmer's reluctance in using balanced dose of fertilizers, poor adoption of plant protection measures to control pest, diseases and weeds and harvesting at improper time.

QUALITY ASPECTS

Rapeseed oil is used in the manufacture of grease. The oil cake is used as feed and manure. Green stem and leaves are a good source of green fodder for cattle. The leaves of young plants are used as green vegetable as they supply enough sulphur and minerals in the diet. In the tanning industry, mustard oil is used for softening leather. Rapeseed-mustard oil contains lowest level of saturated fatty acids among all vegetable oil, which is quite desirable for good health. Both the essential fatty acids (EFA) such as linoleic acid (C18:2) and linolenic (C18:3) are present in rapeseed-mustard oil. Rapeseed-mustard oil has high level of antioxidant, which retards growth of free radicals mainly responsible for disease like cancer and ageing. Glucosinolates present in seed meal has shown anticancer properties. *Brassica* species are very rich in phenolic compounds and glucosinolates.

The oil and protein content varies from 37 to 49% and 22-28%, respectively. The seed and oil are used as condiment in the preparation of pickles and for flavouring curries and vegetables. The oil is utilized for human consumption throughout the northern India in cooking and frying purposes. It is also used in the preparation of hair oils and medicines. It is used in soap making, in mixtures with mineral oils for lubrication. Rapeseed oil is used in the manufacture of grease. The oil cake is used as feed and manure. Green stem and leaves are a good source of green fodder for cattle. The leaves of young plants are used as green vegetable as they supply enough sulphur and minerals in the diet. In the tanning industry, mustard oil is used for softening leather.

Rapeseed oil is one of the oldest vegetable oils, but historically was used in limited quantities due to high levels of erucic acid, which is damaging to cardiac muscle of animals, and glucosinolates, which made it less nutritious in animal feed (Sahasrabudhe, 1977). Rapeseed oil can contain up to 54% erucic acid (CFR, 2010). Food-grade canola oil derived from rapeseed cultivars, also known as rapeseed 00 oil, low erucic acid rapeseed oil, LEAR oil, and rapeseed canola-equivalent oil, has been generally recognized as safe by the United States Food and Drug Administration (The Commission of the European Communities, 1980). Canola oil is limited by government regulation to a maximum of 2% erucic acid by weight in the USA and 5% in the EU (Humbert *et al.*, 2001), with special regulations for infant food. These low levels of erucic acid are not believed to cause harm in human neonates.

Rapeseed-mustard oil contains lowest level of saturated fatty acids among all vegetable oil, which is quite desirable for good health. Both the essential fatty acids (EFA) such as linoleic acid (C18:2) and linolenic (C18:3) are present in rapeseed-mustard oil. Rapeseed-mustard oil has high level of antioxidant, which retards

growth of free radicals mainly responsible for disease like cancer and ageing. Glucosinolates present in seed meal has shown anticancer properties. *Brassica* species are very rich in phenolic compounds and glucosinolates.

FUTURE RESEARCH PLANS: It would concentrate on the following key researchable areas to achieve quantum jump in production and productivity of rapeseed-mustard:

- Efficient utilization of rapeseed-mustard genetic resources.
- Exploitation of available heterosis in mustard and toria for further enhancing the yield potential.
- Developing high yielding varieties/hybrids with improved oil and seed meal quality for food, feed and industrial uses using conventional as well as biotechnological approaches.
- Development of thermo and photo-insensitive genotypes for diverse cropping systems under varied agro-ecological situations.
- Development of cultivars with high water and nutrient use and photosynthetic efficiency for different situations.
- Development of designer *Brassica* for different fatty acids profile & value-added product.
- Development of rapeseed mustard genotypes tolerant to various biotic (*Alternaria* blight, *Sclerotinia* rot, white rust, *Orobanche*, mustard aphid, painted bug) and abiotic stresses (drought, temperature and salinity).
- Production technologies for mustard based cropping systems under climate changes scenario.
- Bio-molecules, bio-remediation and bio-fertilization for environmental safety.
- Survey and surveillance of insect-pests, diseases and weeds under climate change.
- Remote sensing for energy-water balance, disease and insect-pest surveillance, forewarning and crop modelling.
- Bio-intensive integrated pest management (IPM) module development for major insect pests and diseases.
- Host-pathogen interaction and induced resistance for management of diseases.
- Impact of pesticide residues on the dynamics of soil flora, fauna and environment.
- Socio-economic, operational and institutional constraints in the transfer of technology, yield gap analysis and farmer's perceptions.
- Development of information technology (IT) based decision support systems, innovations in knowledge management and technology dissemination.
- Impact of policies (procurement, price, export-import, storage, incentives etc. And development programmes on area and production of rapeseed- mustard.

THE IMPORTANCE OF SUSTAINABLE AGRICULTURAL WATER MANAGEMENT

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Background

Water is a key input in practically every phase of agriculture, with a decisive effect on the final yield. If plants are not properly watered, even the best seeds and fertilisers will not reach their full potential. Animal farming relies on adequate water availability as well. Water resources are, of course, critical to the fishing industry. India has approximately 17% of the world's population yet only 4% of the world's fresh water resources. The rising demand for water resources by India's growing population, the deteriorating quality of existing water resources due to pollution, and the additional demands of serving India's spiralling industrial and agricultural growth have resulted in a situation where the consumption of water has reached critical levels. India is experiencing a prolonged water deficit as a result of its weak water resource management system and climate change. Due to rapid groundwater depletion and inadequate irrigation infrastructure, agriculture consumes 90% of water in India (1).

With the continual task of feeding and hydrating an ever-increasing population, water as a resource in agriculture is also reaching a tipping point. Increases in temperature, fluctuations in precipitation patterns and snow cover, and an increase in the frequency of flooding and droughts are all anticipated to occur as a result of climate change, hurting agriculture. According to one estimate, agricultural production will need to treble by 2050. With agriculture consuming up to 80% of freshwater, we must guarantee that water resources are used efficiently to provide social, environmental, and economic advantages (2).



Fig 1: Impact of sustainable agriculture and Farming practice (3).

THE VALUE OF EFFECTIVE WATER MANAGEMENT AND FARMING EFFICIENCY

Due to changes in land usage, weather patterns, and diminishing farm earnings, the world's area under cultivation has expanded by roughly 12–15 percent over the previous fifty years, but India has remained stagnant, if not declining. Changing weather patterns and irregular rainfall have also contributed to a significant increase in the area irrigated, with groundwater extraction accounting for the majority of the increase. Fresh water from

aquifers, streams, and lakes is the next major contribution. It is estimated that 2–3 litres of water per capita are sufficient for human consumption, and that 3,000 litres are required to meet one person's daily food needs. Sugarcane and paddy use more than 60% of the water used for irrigation in India, putting a lot of strain on the water cycle. For all of these reasons, it is critical to consider long-term irrigation water management (4).

The cyclical circulation of water through evaporation, transpiration, and precipitation is largely influenced by climate and land management. Because the water cycle has a net effect of zero, it is finite.

1. Freshwater scarcity: Freshwater accounts for only around 3% of the water available for agriculture and other uses, with oceans holding 97 percent of the world's water. Forests and croplands rely on freshwater to survive. Freshwater availability is being strained by rising population and changing eating habits, with roughly 60% of precipitation returning to the oceans.

2. Unpredictable rainfall: India's agricultural demands have historically been met by rainfall. Rainfall is believed to be responsible for more than half of the cultivable land. The reliance on groundwater and other sources for irrigation is increasing as the weather and rainfall become more variable (2).



Fig 2: Damaged paddy crop due to unseasonal rainfall (5).

3. Nutrient inadequacy and fertilizer application without regard for the environment: Soil degradation has an impact on crops' ability to successfully use water in agriculture. Primary nutrients such as nitrogen, phosphorus, and potassium, as well as micronutrients such as sulphur, zinc, and iron, are lacking in arid environments. Inadequate primary nutrient application by uninformed farmers causes imbalance and, as a result, increased deterioration. This mismatch results in inefficient water use, which has an impact on crop production.



Fig 3: K deficiency in Paddy (6).

4. Water conservation: Water conservation is important. In India, these traditions were ignored, and we are now suffering as a result of this blunder. Groundwater is rapidly decreasing. Rivers, which were once the lifeblood of agriculture and civilization, have dried up (2).

Strategies and activities that can aid in agricultural water sustainability include:

1. Best Irrigation Practices: Adoption With water supplies depleting, adequate technological, resource, and application management is required for efficient water usage. Agriculture can achieve long-term water management by:

- Water loss reduction
- Consumption of efficient irrigation systems
- Improved efficiency in increasing water use
- Adoption of new irrigation technologies and fertilizer application efficiency
- Agricultural benefits from the reuse of marginal waters (saline water, wastewater, and runoff water).



Fig 4: Water use efficiency through micro irrigation (7)



Fig 5: Farmer participating in Saline agriculture: Bangladesh (8).

2. Improved Agricultural Practices: Improper soil management, indiscriminate fertilizer application, and pesticide usage are all linked to sustainable water management and lead to groundwater degradation. Some efforts in these areas will go a long way toward attaining long-term agricultural water management: Tilling Techniques Reduced erosion, increased hydration, and the preservation of organic components in the soil are all benefits of

soil surface tillage, contour tillage, and conservation tillage. Mulching and the addition of organic matter to the soil. Conservation of soil moisture, better soil fertility, and reduced weed development are just a few of the benefits. Acidity of the soil is maintained. Soil pH is known as the "master variable" for soil because it affects plant nutrient availability, increases toxicity of some elements, and degrades the environment for beneficial bacteria, earthworms, and other species. Proper pH management could aid crop development by allowing for more intensive and deep roots, as well as increased soil water availability. As a result, soil acidity correction must be examined in depth on a local level through outreach and education.

3. Water conservation practices: Both on-site and off-site options are available. With the majority of Indian agriculture still reliant on the "rain gods," it's critical to protect and exploit this valuable (albeit unreliable) resource. On farms, water can be conserved by landform management, direct seeding of water-intensive crops, and encouragement of fallow management, among other things. Water harvesting, aquifer recharge, and storage are all examples of off-site water conservation for agriculture. Water harvesting and minor water storage measures can help to enhance water availability, particularly in places where rain-fed crops are grown.

4. Policy Intervention and Integration: Because of the complex and diverse nature of water resource management in Indian agriculture, water policy should be flexible enough to adapt to different situations and areas. Similarly, levying charges on the usage of water resources and power, particularly groundwater, requires a defined policy framework. When water scarcity is a problem, it is even more critical for farmers to grasp why water cannot always be a free resource in the long run. This is, however, a divisive and politicised matter (11).

5. High-Pressure Recharge Wells:

In a saline aquifer, high-pressure recharge wells and rainwater gathering systems deliver freshwater. These are cement-based above-ground open cylinder tanks. Rainwater from the rooftop is routed into the recharge wells via PVC pipes. Because the tank is elevated above earth, pressure is created, allowing harvested water to push salty water aside, resulting in freshwater pockets within the saline aquifer.



Fig 6: Series of Recharge wells at Bangalore (9).

Conclusion

It is critical that the agriculture sector contributes to preventing the situation from worsening by maximizing the use of available

technology and resources to improve water efficiency. It is necessary to explore improving policies, strategies, and regulatory measures to reduce water usage. Water users in the agriculture sector can be educated and orientated to convert to more water-efficient production methods, which can assist the country combat water constraint. Furthermore, enforcing best practices can assist current policymakers and planners in improving governance structures and better understanding critical indicators that can aid in data-driven decision-making. These issues can be better addressed if there are laws and processes in place that encourage the farm sector to



Fig: 7 Recharge ponds (10).

PROSPECTS AND PROBLEMS OF ORGANIC CULTIVATION OF SPICES IN HILL ZONE

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India is admired as 'Land of Spices' by cultivating more than 50 different spices. It occupies an area of 27 lakh hectares with an annual production of 27 lakh tons. Out of which 3.11 lakh tons (8 – 10%) of spices and its products are exported to more than 150 countries and earning foreign exchange of Rs. 3020 crores (2006-07). The Indian share of the world trade on spices is 45 – 50 percent by volume (25% in value terms). In Karnataka more than 17 different spices are being cultivated with an area of 2.90 lakh hectares. The major crops are pepper, cardamom, chillies, ginger, turmeric, coriander, treespices, tamarind etc. In hill zone of Karnataka more than 12 different spices are being cultivated with an area 55000 hectares (18.20%). The major crops are pepper, cardamom, tree-spices, vanilla, ginger, turmeric, chillies, etc. The hill zone of Karnataka comprises 23 taluks of 8 districts with an geographical area of 25.62 lakh hectares of which 5.98 lakh hectares are under cultivation. The zone is characterized by rolling mountains and deep valleys, altitude ranging from 700 to 1100m above MSL, annual rainfall of 2400mm and minimum temperature of 9.5°C (January) and maximum temperature of 35°C (April-May) and the relative humidity 50-100 percent.

In recent years organic cultivation of spices is gaining importance, since organically produced spices fetches a premium price (higher by 20 – 50%), safe food stuffs, better environment and sustainability therefore there is a tremendous scope. The agro-climatic conditions of hill zone is more favourable for cultivation

improve its water efficiency. India has to reconsider its existing practice of growing water-intensive crops like sugarcane and rice in locations where water is scarce. It should also revisit its regulations on the export of water-intensive products like rice and cotton. Water governance is harmed by a lack of appropriate enforcement and monitoring of existing water policies.

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of major export oriented spices and Western Ghat region is believed to original home of many of these spices. There is a good scope for cultivation of spices by adopting organic cultivation. Organic cultivation is a production system, which avoids or largely excludes the use of synthetically compounded fertilizers, pesticides, fungicides, growth regulators and live stock feed additives (Lampkin, 1990). Inorganic farming chemical inputs are replaced with the organic inputs and biologically active formulations it envisages a comprehensive agronomic management to improve the health and underlying productivity of the soil. The main goals of organic farming are to produce food of high nutritional quality, pollution free environment and to maintain long term fertility of soils. At present India exports around 50 tons of different varieties of organic spices. Export will get a significant boost in the coming years.

Feasibility (prospects) of organic farming in spices under hill zone

Organic cultivation of spices has great potential and more feasible in hill zone for the following reasons.

1. **Natural habitat of many spices in Western Ghats**
The Western Ghat (Hill zone) has the original home of many major spices such as pepper, cardamom, kokum, cinnamon, etc., therefore these spices are easily amenable for traditional system of cultivation because of their natural habitat adjust readily for the existing agro-climatic conditions of the zone. Pepper – Western Ghats of India, Cardamom – Evergreen forests of South India, Kokum – Tropical rain forests of Western Ghats and Cinnamon – Malbar and West coast
2. **Spices under cultivated in hill zone are more of export oriented**
Pepper (Rs.450 – 600 corers), Cardamom (Rs. 15 – 20 crores), Tree spices (Rs.150 crores), Ginger (Rs.40 crores) and Turmeric (Rs.44 crores) have great export potential in

international trade and also great demand for organically cultivated produce, hence these spices have great potential of foreign exchange, growers are definitely showing their interest to adopt organic farming in these spices without much hesitation. The research work on these crops is already initiated by IISR, ICRI and SAUs'.

3. Easy degradation of bio-mass and maintains of fertility to a larger extent

Applied bio-mass is easy degradable under hill zone because of high rainfall, higher soil moisture, maximum fauna in the soil, decomposition of added organic matter is easy and due to shade, reduced sunlight (35-40 K. lux) and temperature (25-30°C) losses of nutrients is comparatively less.

4. More scope for mixed/multistoried cropping and mixed farming

Pepper, cardamom, turmeric, ginger, tree spices are amenable for mixed/multistoried cropping in coffee, arecanut, coconut and cardamom plantations. Mixed farming is also easy with these crops since planting of grasses, fodder plants between interspaces and border of plantations provides food for animals (Dairying, piggery, rabbit rearing, poultry, sheep rearing). Diversification helps to realise higher and sustainable income.

5. Availability of maximum bio-gas plants

All most all houses situated in the plantation area are having bio-gas plants established for the gas for cooking and lighting purposes. Animals are maintained for supply cow dung for bio-gas plant besides milk purpose. The bio-gas slurry is serve as good organic source of manure for cultivation of crops under organic practices.

6. Wide scope for the preparation of organics

Raw materials required for the preparation of compost, farm yard manure, vermin-compost is wide in hill zone. Farm wastes like fallen dry leaves, straw, saw dust, coir pith, coffee husk, arecanut husk are available in large quantities. Many of the farmers, SH groups, NGOs' are involved in the preparation of composts and vermin-compost, thus it facilitate for promotion of organic farming.

7. Organic production of planting materials

In the zone planting materials such as pepper rooted cuttings, cardamom seedlings, cinnamom, nutmeg, clove, all spice are raised by using pot mixture/media/nursery bed with forest soil/red earth, in combination with sand, FYM/compost, coir pith, vermin-compost, rock phosphate, bio-fertilizers, trichoderma in different ratios or quantities. These plants adopts easily for organic cultivation practices.

8. Majority farmers are having smaller holdings

In coffee, cardamom, rubber, arecanut, coconut more than 90 per cent growers are small holders less than 5 – 10 hectares, the spices are cultivated as a mixed crops in these crops and it is more easy to divert their mind to adopt organic cultivation, because 60 – 70 percent farmers are even now are not applying fertilizers and pesticides for control of insect pests and diseases fully because of high cost.

Limitation/problems of organic cultivation of spices in hill zone

1. Sudden shift to organic cultivation bound to reduce the yield of spices.
2. Organic cultivation takes time to build-up soil fertility and balance ecosystem.
3. Spices are mainly growing as mixed/multi-storeyed cropping system entire plantation need to be converted into organic irrespective of spice crops or other crops.
4. Non-availability of adequate quantities of bio-fertilizers, bio-agents, botanicals, traps, etc.
5. Climatic conditions of hill zone are more favourable for the incidence of pests and diseases.
6. Regular usage of insecticides and fungicides in coffee, arecanut, ginger.
7. Lack of technical know-how and techniques involved in organic farming.
8. Lack of awareness and inadequate training programmes.
9. No separate domestic market is established for the sale of organic spices.
10. Research work on organic cultivation is still on infant stage.
11. Economics and cost-benefit ratios are not available.
12. Lack of adequate certificate agencies.



EACH ONE PLANT ONE



STAY SAFE



STAY HEALTHY



APPEAL

NESA Members are requested to send articles for publication in NESA Newsletter. It will be shared with all the readers. All individuals are requested to plant trees on your or family members Birthday and share the pictures with us to get print in our Newsletter. It is much needed in the present scenario to save ourselves and our Environment.

Editor-in-Chief, NESA Newsletter

जलवायु परिवर्तन का कीट-पतंगो पर संभावित प्रभाव सुनील¹, नमिता दास साहा², रमेश चंद हरित², अर्चना शर्मा¹

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सारांश

विश्व में प्राकृतिक एवं मानवकेंद्रित अवधि से वातावरण के बदलते परिवेश में कठिनाई जा रही है। वर्तमान में मानव गतिविधियों के फलस्वरूप भविष्य के वातावरण की इस नई परिस्थिति में कार्बन डाइऑक्साइड, ओजोन की बढ़ती सांद्रता एवं बढ़ता तापमान और वर्षा पदित में बदलाव का वैश्विक जलवायु, पौधों को सहन करना पड़ता है। आधी जैव विविधता और मध्य खंड परिस्थितिकी तंत्र एवं क्रिया को कीट-पतंग की उपस्थिति दर्शाते हैं। क्योंकि उनकी मजबूत संबंधिकरण को होस्ट पौधे, घातक किट पतंगो पर जलवायु परिवर्तन का प्रत्यक्ष या अप्रत्यक्ष रूप से उनको प्रभावित करते हैं और अपनी सहशिणुता के अनुरूप इनमें बदलाव होते हैं। तापमान बढ़ने का किट समुदाय पर विषम प्रभाव भी पड़ता है। क्योंकि यह कीट के जीवन वृत्त कारक जैसे जन्म दर, वृद्धि दर, जीवन काल को गंभीर रूप से प्रभावित करते हैं। जलवायु की बढ़ती गर्माहट के कारण फाइटोफागोस प्रजाति पलायन कर जाती है और अपने नए मूल पौधे से अपने कार्यवाहक पौधे के अनुरूप परिवर्तन कर लेते हैं। बढ़ती कार्बन डाइऑक्साइड की सांद्रता एवं तापमान की गर्माहट से भूरे प्लांटहोपर की बढ़ती और घटती जीवांकल का धन के परिस्थितिकी तंत्र के फलस्वरूप इसकी घाट जाती है। इसलिए जलवायु परिवर्तन के प्रभाव से फसलों का अनुरूपता तथा खाद्य सुरक्षा का सुरक्षित बचाव करना होगा।

प्रमुखशब्द: कीट, कीटजीवनचक्र, जलवायुपरिवर्तन

प्रस्तावना

आज वैश्विक गर्माहट ६ जलवायु परिवर्तन प्रमुख ज्वलंत वैश्विक वातावरण के लिए मुद्दा बना हुआ है। हरित गृह गैसों एवं जलवायु परिवर्तन के बहुत सारे प्रमाण जैसे तापमान का बढ़ना, वर्तमान में सूखा, असामयिक वर्षा, बाढ़ का आना या जलमग्न होना आदि। उत्तरी गोलार्ध पर इस शताब्दी के दौरान अधिकतम तापमान 1.5 से 5.8० सेल्शियस तक बढ़ाने की संभावना है। जलवायु कारक जैसे तापमान एवं वर्षा का बहुत अधिक प्रभाव कीट-पतंगों के विकास, प्रजनन क्षमता, जीवन यापन क्षमता पर कुप्रभाव पड़ता है। प्रजातियों के अनुमानित निजी प्रतिक्रिया के फलस्वरूप इनके आकर्षण, प्रतियोगी क्षमता, पूर्वानुमान एवं परजीवी, पहले के सामुदायिक आकार की बढ़ोतरी, संयोजनध्वंसरचना एवं कार्य में बदलाव होते हैं। फैलाव को प्रभावित करता है। तापमान बढ़ने से मुख्य रूप से कीट समुदाय को प्रभावित करता है क्योंकि यह इनके जीवन वृत्त के सभी कारको जन्म, वृद्धि दर और अंत काल तक को कुप्रभावित करता है। एक फील्ड आधारित प्रयोग में विभिन्न कारक (तापमान, कार्बन डाइऑक्साइड और पानी) देखने पर तापमान कीट समुदाय की संरचना को प्रभावित करता है। एवं इसके फलस्वरूप इनकी रचनाध्वाकार को विशेष रूप से प्रजाति और खाने के तरीको में भिन्न प्रतिक्रिया देखी गई। वर्तमान कारकों को जानने के लिए जलवायु के निरंतर बदलाव से पौधे-कीट समुदाय की बनावट में कैसे परिवर्तन होते हैं। पौधे-कीट समुदाय की बनावट एवं संरचना पर बाहरी कारक कैसे प्रभावित करते हैं। फाइटोफेगोस समुदाय के मुख्य चलन परपोषी पौधे के शारीरिक एवं रसायनिक लक्षणों में परिवर्तन हो सकते हैं। इस अध्ययन में, जलवायु कारको का पोषक पौधे एवं पौधे-कीट समुदाय पर

होने वाले प्रभाव वर्तमान एवं वातावरण के होने कि स्थिति का परीक्षण किया गया है।



चित्र: कृषि फसल के कीट (संदर्भ: राजस्थान कृषि प्रताप, अगस्त, 2017)।

बढ़ता तापमान एवं कीट आबादी

तापमान कीट-पतंगो के जीवन वृत्त को नियंत्रित करने वाला एक प्रमुख कारक है। क्योंकि कीटों को पोइकिलोथर्मिक(ठंडा-खून) जीव होते हैं, वातावरण का तापमान इनके शरीर के अनुसार होता है। इसलिए, इनकी जीवन अवस्था की विकास दर मुख्यतौर से तापमान पर निर्भर करती है। कुछ डिग्री तापमान का बदलाव लगभग सभी कीटों को कुप्रभावित एवं कीटों के जीवन वृत्त को कई रूप में प्रभावित करता है। प्रयोगशाला और मॉडलिंग के प्रयोग से समर्थन से धारणा है कि तापमान बढ़ने से कृषि कीट-पतंगो के जीवन भी प्रतिक्रिया होती।

भूमंडल की बढ़ते तापमान की प्रत्येक डिग्री के साथ-साथ कीट-पतंगो का जीवन काल घटता जाता है। जिंदगी की तीव्रता बढ़ने से, कीटों की आबादी तेजी से बढ़ती है। शीतोष्ण क्षेत्रों में, अधिकतर कीट एवं उनके विकास की अवधि सालभर में गर्म मौसम के दरम्यान ही होती है क्योंकि कौन से जलवायु कारको में मौसम को अधिक जगह परिभाषित किया जा सकता है, जलवायु परिवर्तन के प्रभाव को अधिक अनुमानित कर सकते हैं पूर्वानुमान के लिए जैविक और अजैविक कारको का सीमित संसाधन होने के कारण कम अनुमानित होते हैं (बाले एट अल, 2002)। पहले उदाहरण में, सामान्य पूर्वानुमान में तापमान बढ़ रहा है, कीट प्रजातियाँ भौगोलिक स्थान बदल कर गोलार्ध के नजदीक आ रही हैं या अधिक उचाई से इनकी आबादी एवं आकार बढ़ रहे हैं (बाले एट अल, 2002)।

जलवायु परिवर्तन के साथ बढ़ते तापमान में, फसल कीट-पतंगो की आबादी पर जटिल प्रभाव इस प्रकार है (दृप) भौगोलिक सीमा का परिचालन (पप) बढ़ती अधिक ठंड (पपप) आबादी विकास दर में बदलाव (पअ) बढ़ते पीढ़ी क्रमांक (अ) विकसित मौसम परिचलन (अप) फसलीय कीट-पतंगो में परिवर्तन का समकाल (अपप) आकर्षण बदलाव में भिन्नता (अपपप) प्रवासी कीट-पतंगो के बढ़ते जोखिम की स्थिरता और (प०) परपोषी पौधे की वैकल्पिक जानकारी एवं अधिक ठंड के परपोषी पौधे। लेकिन ये सभी प्रभाव अधिकतर अन्य वातावरणीय कारको के साथ-साथ तापमान का प्रभाव कीट को प्रभावित करते हैं (बाले एट अल, 2002)।

तापमान बढ़ने के कारण पहले से ही कीट प्रजाति विविधता और वितरण में बदलाव होते रहे हैं। विभिन्न पौधों की प्रजातियों के वितरण में अनेक परिवर्तन होते रहे हैं (हिकलिंग एट अल, 2005)। यह माना गया है की वैश्विक गर्माहट के कुप्रभाव से कोई विशिष्ट प्रजाति और समुदाय के प्रवर्तित सीमित आकार में बदलाव होते रहते हैं। एक कीट प्रजाति की

विकास की स्थिति उपलब्ध तापमान की भिन्नता पर निर्भर करती है (बाले एट अल, 2002)। कीट कार्याकी एवं मौजूदा परपोषी पौधे पर प्रत्यक्ष और तापमान अप्रत्यक्ष रूप से प्रभावित करता है। कुछ कीटों को अपना एक जीवन वृत्त पूरा करने में कई वर्ष लग जाते हैं। ये कीटों की प्रवृत्ति के लिए इनके जीवन वृत्त की प्रक्रिया में संतुलित तापमान विविधता की आवश्यकता होती है। कुछ फसल कीटों (रुको और जाओ) तापमान से संबंधित विकसित होते हैं, सुरक्षित तापमान अवधि के दौरान ही इनका तेजी के साथ विकास होता है। अगर अनुमानित तापमान 20 सेल्सियस बढ़ेगा तो प्रत्येक मौसम में कीटों की लगभग 1 से 5 अतिरिक्त जीवन वृत्त होंगे। गर्माहट अधिक ठंड के विस्तार को घटा देता है। कीट-पतंग अपने विस्तार के लिए शीतकालिक क्षेत्रों की ओर लौट जाते हैं। वर्ष के दरम्यान संभावित अतिरिक्त प्रजनन सहित, मौसम की गर्माहट के अनुसार संभावित विकास एवं भरण-पोषण का स्तर भी बढ़ जाता है (कैनेन, 1998)।

जहां संयमित शरद ऋतु लंबी होती है उस क्षेत्र में प्रवासी कीट जल्दी आने की संभावना होती है। तापमान परिवर्तित होने से परपोषी कीट आबादी के प्राकृतिक शत्रुओं की प्रतिक्रिया में बदलाव होने लगते हैं। जब परजीवी घटने लगते हैं तो परपोषी आबादी बढ़ने लगेगी, और जीवन अवस्था खत्म होने से पहले परजीवी बढ़ने शुरू हो जाते हैं। तापमान की बढ़ोतरी से परपोषी पौधों की जीवन अवधि तेजी से समाप्त होने लगती है तो परजीवियों के लिए अवसर घटने लगते हैं। तापमान के कारण किट-पतंगों की कुछ प्रजातियों के लिंग अनुपात में बदलाव होने लगते हैं, इनकी प्रजनन क्षमता भी कुप्रभावित होती है। इसलिए, तापमान परिवर्तन बाह्य (वातावरणीय) कीटों की अपेक्षा मृदा कीटों एवं उनके अपने जीवन वृत्त के महत्वपूर्ण भाग को अधिक प्रभावित कर सकते हैं। है क्योंकि यह वायु में तापमान परिवर्तित रोधक क्षमता की अपेक्षाकृत मृदा तापमान प्रतिरोधक क्षमता तीव्रता से फैलती है (बाले एट अल, 2002)। हल्की सर्दी में कीटों की मृत्यु होती है जबकि संतुलित उष्णिय सर्द तापमान इनकी आबादी बढ़ने के लिए उचित होता है (हररिंगटोन एट अल, 2001)। अधिक तापमान होने पर, माहु (अफीड) की सबसे कम प्रतिक्रिया देखी गयी फेरोमोन माहु पर संकट की चेतावनी होने से परजीवियों और परभक्षी का हमला के परिणाम स्वरूप परभक्षियों की तादाद बढ़ती है। विशिष्ट औसत तापमान बढ़ने पर, सरक्षित सर्दी और लंबी गर्मिया, माहु की आबादी बढ़ने और अनेक कीट-पतंगों के भूमंडलीय सीमा बढ़ाने, हमले की सीमा बढ़ाने के लिए सबसे उपयुक्त होता है। वहाँ पर नए किट पतंगों के आने की संभावना रहती है, संभवतः यह वैश्विक गर्माहट से तापमान बढ़ने के कारण यहाँ आना संभव लगता है। ये परिणाम दर्शाते हैं कि जलवायु गर्माहट, कीट समुदाय कि सरचना एवं आवास में सार्थक अंतर, लेकिन शाकभक्षी प्रजाति सरचना को कम से कम समय में तेजी से विघटित बदलाव कर समान भरण-पोषण नए स्थान पर विचरण कराते हैं।

बढ़ती कार्बन डाइऑक्साइड और कीट आबादी

जलवायु परिवर्तन के एक महत्वपूर्ण पहलू कार्बन डाइऑक्साइड की बढ़ती सांद्रता का पौधों पर प्रभाव अध्ययन है। पौधों की प्राथमिक आवश्यकता कार्बन है, बढ़ती कार्बन डाइऑक्साइड का स्तर के कारण कार्बन समावेश बढ़ने से वृद्धि बहुत तेजी से होती है। इस दशक में हरित गृह में उगाने वाले जानते हैं और कार्बन डाइऑक्साइड बढ़ाने से पौधे कि वृद्धि में बढ़ोतरी होती है। समान्यत, क्योंकि कार्बन डाइऑक्साइड अधिकतर फसल के पौधों कि प्रकाश-संश्लेषण क्रिया दर में बढ़ोतरी कर देता है, वैज्ञानिकों कि प्रथम सोच होती है कि कार्बन डाइऑक्साइड बढ़ाना ही विश्व को खाधान आपूर्ति का समाधान है। कार्बन डाइऑक्साइड बढ़ाने से सूखा सहनशील कई फसलों के पौधों की वृद्धि में बढ़ोतरी होती है। क्योंकि जब कार्बन डाइऑक्साइड मिलने से इसके पतियों के रंध (स्टोमेटा) खुलते हैं तो पानी

भाप बन कर उड़ जाता है और पति के आसपास कार्बन डाइऑक्साइड की बढ़ने से उसके रंध अधिक खुलने के आवश्यकता नहीं होती है। कार्बन डाइऑक्साइड बढ़ाने की परिस्थिति में सुझाव दिया था की, पौधे खराब दशा होने पर भी अधिक पैदावार देते हैं। अनपेक्षित, इस अनुमान को आशानुरूप सिद्ध नहीं किया जा सकता है। इसका एक कारण यह भी है की बढ़ते कार्बन डाइऑक्साइड का स्तर में उगाये पौधों को कीट अधिक खाते हैं परंतु उनमें पोषक तत्व के गुणवत्ता में कमी होती है।

समान्यतः कार्बन डाइऑक्साइड बढ़ाने से पौधे के ऊतकों में कार्बन से नाइट्रोजन का अनुपात बढ़ने से उनमें पोषक तत्व की गुणवत्ता घटने से कीटों के लिए प्रोटीन सीमित मात्रा में होने से ऊतकों में नाइट्रोजन तत्व घट जाते हैं। खाने में कार्बन से नाइट्रोजन अनुपात बढ़ने से शाकभक्षी कीटों की प्रतिक्रिया में उम्मीद के अनुसार आपूर्ति नहीं होती, पौधों में सुरक्षित रसायनों की सांद्रता और कीट-पतंगों के प्रजातियों के बीच प्रतियोगिता होती है। पतियों में नाइट्रोजन तत्व घटने से कीटों के खाने की आपूर्ति क्षमता बढ़ सकती है (होल्टोन एट अल, 2003), हालाँकि यह घटना हमेशा नहीं कभी-कभी होती है। इसलिए, पौधों में कार्बन डाइऑक्साइड बढ़ने से प्रजातियों के बीच-बीच में प्रतिक्रिया होती है।

कार्बन से नाइट्रोजन अनुपात बढ़ने से कीटों के ऊतकों का विकास धीमा हो जाता है और

पतियों की अवस्था बड़ी होने से परपोषी, फाइटोफेगास कीटों की हमलावर प्रतिकूलता बढ़ने से अधिक कार्बन से नाइट्रोजन अनुपात होने के साथ-साथ इनके विकास की अनुकूलता आ जाती है, उदाहरणतः पाइन सॉपलाइ (नेओडिप्रिओन लेकोण्टी), दर्शाते हैं की अधिक कार्बन डाइऑक्साइड सांद्रता के साथ उगाये गए पौधे से नाइट्रोजन उपयोगी क्षमता बढ़ जाती है। इसलिए, कम पोषक तत्व गुणवत्ता वाले पौधों के कारण अन्य कीट प्रजातियों में पोषण उपयोगी क्षमता बढ़ जाती है।

प्रपाती/ बाढ़

कीट-पतंगों की आबादी एवं इनके विकास पर पानी से प्रभावित होने के कुछ वैज्ञानिक प्रमाण भी मिले हैं। भारी बरसात के पानी कुछ कीट इसके प्रति संवेदनशील और मर जाते हैं या फसल बदल लेते हैं। उत्तरपूर्व अमेरिका के कुछ प्रदेशों में, प्याज थ्रिप्स प्रबंधन के वैकल्पिक चुनाव का विचार होना महत्वपूर्ण है। इसलिए, सर्द ऋतु में कुछ कीट मृदा में रहते हैं, कुछ क्रान्बेरी फल कृमि और अन्य क्रानबेरी कीट-पतंगों, बाढ़ से नियंत्रित आकलन के लिए मृदा का उपयोग किया गया था। जलवायु परिवर्तन होने के अनुमान से यह पूर्वानुमान है की अधिक तेजी एवं मात्रा में वर्षा होने का कीट-पतंगों की आबादी पर इसका ऋणात्मक प्रभाव होगा। तापमान, वर्षा परिवर्तन का समान प्रभाव से परभक्षी कीट, परपोषी और रोगाणु के परिणाम स्वरूप आचरण में त्वरित गंभीर बदलाव हो सकते हैं। जलवायु परिवर्तन के लंबी अवधि के दौरान अधिक नमी और उनके विस्तार से कीटों की संख्या बढ़ाने में कवकीय रोगजनक सहायक होते हैं और शुष्क अवधि में घटती है।

कीट पर कुप्रभाव और वैश्विक गर्माहट

वैश्विक गर्माहट परिणाम का कीटों पर कुप्रभाव होता है। स्ट्रेस पौधों पर कीटों का कुप्रभाव अधिक होता है सुरक्षित पद्धति के परिणाम स्वरूप कमजोर पौधे होते हैं और इस प्रकार कीट-पतंगों की संवेदनशील के स्तर में बढ़ोतरी होती है। उत्तर भारत में वैश्विक गर्माहट के प्रभाव से एच. अर्मिगेरा के शीघ्र आने, इसके परिणाम के रूप में उपज घट जाती है। जलवायु परिवर्तन के परिणाम से शरद ऋतु के दरम्यान कीट-पतंग की तीव्रता बढ़

जाती है, अन्य मौसम की तुलना में बसंत ऋतु में बड़ी संख्या में आबादी बढ़ती है। अनेक कीटों जैसे हेलिकोवेर्पा स्प. परवासी कीट हैं, और इसलिए जलवायु परिवर्तन के परिणाम स्वरूप नए क्षेत्र में जाने के बाद तेजी से वहाँ के मौसम के अनुसार अनुकूलन कर लेते हैं।

जलवायु परिवर्तन का कीट-पतंगों पर सहनशक्ति की अभिव्यक्ति

स्वयंपोषी पौधों की कीटों से प्रतिरोधक क्षमता ही एक पर्यावरण मित्रता का कीट प्रबंधन महत्वपूर्ण भाग है। इसलिए, कीट-पतंगों एवं उनके स्वयंपोषी पौधों के बीच जलवायु परिवर्तन एक परिवर्तित आकर्षण की कड़ी हो सकती है। भारत में उच्च नमी आर्द्रता पर ज्वार मिडगे की प्रतिरोधी क्षमता का आकलन, और केन्या का उपयुक्त तापमान में यह बढ़नी शुरू होती है। इस लाभ से वहाँ कीट-पतंगों के प्रभाव में बढ़ोतरी होती है और स्वयंपोषी पौधों के प्रतिरोधक क्षमता घट जाती है दबाव बढ़ने के कारण जलवायु अनुकूलन सहनशील उपलब्धता में कमी आ जाती है। जलवायु परिवर्तन भी बिना प्रतिरोधी फसल या प्रजाति पर कीट-पतंगों के आने की समस्या में सहायक होती है। नई फसल एवं प्रजातियों की जानकारी होने का लाभ मिलना चाहिए, नई वातावरण परिस्थिति के लिए एक संभव जलवायु परिवर्तन की प्रतिक्रिया अनुकूलन पद्धति का सुझाव होना चाहिए।

प्राकृतिक गतिविधियों पर जलवायु परिवर्तन का प्रभाव

वैश्विक गर्माहट के परिणाम स्वरूप कीट-पतंगों एवं स्वयंपोषी पौधों के बीच प्राकृतिक गतिविधियों में सापेक्षिक बदलाव होते हैं इसके फलस्वरूप कीटों की विशिष्ट प्रजातियों में दोनों उतार एवं चढ़ाव की स्थिति बनी रहती है। तापमान के बदलाव से विभिन्न वर्ग कीटों के दैनिक गतिविधियों की प्रणाली के समय में भी परिवर्तन होता है, कीट की प्राकृतिक आपदाओं के लिए प्रबंधन में प्रतिदिन की पारस्परिक क्रियाओं में बदलाव हो सकता है। भविष्य के कीट प्रबंधन में कार्यक्रम जलवायु परिवर्तन की गतिविधि एवं प्रभावशाली के विश्लेषण करने पर प्राकृतिक शत्रु एक महत्वपूर्ण मसला हो सकता है। अधिकतर कीटों की शुरुआत कृषि-परिस्थितिकी तंत्र से होती है, और इनके बहुत से सुझावों के प्रमाण के अनुसार कीट-पतंगों और प्राकृतिक शत्रुओं (रोगजनक, परजीवी और परभक्षी) की पारस्परिक क्रियाओं से जनसंख्या नियंत्रित हो जाती है। भरी बरसात के बाद सूखे की बढ़ती अवधि के दौरान पूर्वी असंख्यकृमि माइथिम्ना सेपेटा(वॉक) की जनसंख्या बढ़ती है। तापमान और कार्बन डाइऑक्साइड बढ़ने से माहू(अफीड) की संभावना बढ़ जाती है, इसलिए कार्बन डाइऑक्साइड बढ़ने से परपोषी दूरों में कोई बदलाव नहीं होता है। तापमान केवल कीटों के विकास को ही प्रभावित नहीं करता, अपितु परपोषी की प्रजनन क्षमता और इनके लिंग अनुपात को भी गंभीर रूप से प्रभावित करते हैं (दिल्लों और शर्मा, 2009)। कीट-पतंगों और उनके प्राकृतिक शत्रुओं के बीच आकर्षण का ध्यानपूर्वक अध्ययन और कीट प्रबंधन में प्राकृतिक शत्रुओं का उपयोग करते हुए उपयुक्त पद्धति का विकास करना होगा।

जैविक और कृत्रिम कीटनाशकों पर

जलवायु परिवर्तन का प्रभाव

जलवायु परिवर्तन के परिणाम स्वरूप कीट क्षति की विविधता में बढ़ोतरी होती है। उच्च तापमान से शुष्क मौसम को और अधिक सूखा बनाता है और वर्षा की तीव्रता और मात्रा में परिवर्तन, आर्द्र मौसम को वर्तमान में और अधिक नमी बढ़ाता है। वर्तमान वातावरण प्रदूषण, मानवीय स्वास्थ्य जोखिम, और कीट पुनरुत्थान की संवेदनशील तीव्रता पर कृत्रिम

कीटनाशकों के अनुपयुक्त उपयोग का प्रभाव होता है। पौधों के प्राकृतिक उत्पादन, कीट रोगकारी (एंटोमोपैथोजेनिक) विषाणुओं, कवकों, जीवाणुओं एवं सूत्रकृमियों और कृत्रिम कीटनाशकों के प्रति वातावरण अधिक संवेदनशील होता है। तापमान और पराबैंगनी किरणों बढ़ने से और सापेक्षिक आर्द्रता घटने से इनके नियंत्रण करने की प्राकृतिक पौधों उत्पादकता एवं जैविक कीटनाशक की क्षमता को तीव्रता से प्रभावित करती है। इसलिए भविष्य में वैश्विक गर्माहट परिस्थिति की कीट प्रबंधन उपयुक्त एवं प्रभावशाली नीति विकसित करनी होगी। किसानों को जरूरत है एक प्रभावशाली नीति की जिससे वह उपयुक्त पैदावार प्राप्त करते रहे।

कीट-पौधों के आकर्षण से परिणाम बदलने से निवेश लागत और लाभ के बीच का सापेक्षिक संबंध भी परिवर्तित हो जाता है। जलवायु लम्बी विविधता के परिणाम स्वरूप फसल उत्पादन पर कीट हानि विभिन्नता बढ़ने का असर इस की आर्थिक व्यवस्था पर भी महत्वपूर्ण प्रभावित होती है। तापमान और पराबैंगनी किरणों बढ़ने से, और सापेक्षिक आर्द्रता कम होने से इनके नियंत्रण नीति भी कमजोर हो जाती है और इसलिए, फसल उत्पादन एवं खाद्य सुरक्षा की समस्या को एक त्वरित आधारित दीर्घकालीन समाधान करना होगा।

जलवायु परिवर्तन के प्रभाव को कम करने की नीति/योजना

सस्य क्रियाएँ, प्राकृतिक शत्रु, स्वयंपोषी पौधों की सहनशीलता, जैविक कीटनाशक और कृत्रिम कीट नाशक को अब कीट प्रबंधन के लिए अधिकतर उपयोग करते हैं। फिर भी इनमें से कई कीट प्रबंधन पद्धति पर्यावरण के प्रति अति संवेदनशील हैं। भविष्य में वैश्विक गर्माहट की परिस्थितियों के अनुसार कीट प्रबंधन की असरदार नीतियाँ विकसित करने की आवश्यकता है।

स्वयंपोषी पौधों की संवेदनशीलता कीट प्रबंधन के लिए एक प्राकृतिक मित्र कारक महत्वपूर्ण होता है। जलवायु विविधता एवं कीट प्रबंधन के लिए सुरक्षित प्रजातियों में संवेदनशील की पहचान कर सहनशीलता का स्थिर समाधान करना पड़ेगा।

संक्रमित पौधों को कुछ प्रमुख कीट समस्या को नियंत्रण का विकास करना होगा। संयुक्त स्वयंपोषी पौधों का सुरक्षित पर्यावरण एवं स्थान का निपटारा करना पड़ेगा।

वातावरण शत्रुओं की बढ़ती गतिविधियों से बचने के लिए फसल विविधता एक प्रमुख प्रभावी पद्धति हो सकती है। वहाँ फसल प्रजातियों को वातावरण शत्रुओं के खाने से बचने की विकास की जरूरत है, कीट प्रबंधन के लिए फसल पद्धति को विविधता के अनुसार वातावरण शत्रुओं की पहचान करनी होगी।

जलवायु परिवर्तन के प्रभाव के अनुसार वहाँ के पर्यावरण में कृत्रिम कीटनाशकों की उचित जानकारी होना जरूरी होता है। इसलिए, जलवायु परिवर्तन के कुप्रभाव को कम से कम करने की रणनीति के तहत कीटनाशक उपयोग की योजना का विकास करना जरूरी है।

अंततः, कीट प्रबंधन पद्धति समावेश का उपयोग करते हुए हमें टिकाऊ फसल उत्पादन के लिए कीट प्रबंधन के प्रभावी विभिन्न कारकों और कीट वर्णक्रम, फसल पद्धति में बदलाव करना होगा।

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हर घर में पेड़ लगे और हरियाली चारों ओर हो।

APPLICATIONS ARE INVITED FOR NESA ANNUAL AWARDS 2021 HURRY LAST DATE 30 September, 2021



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A NEW EMERGING ART FORM IN THE SOCIAL MEDIA PLATFORM: 'ENVIROART' A NEW WINDOW FOR ENVIRONMENTAL AWARENESS

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EnviroArt has been already in existence but with the strength of social media being felt and recognized. EnviroArt is become more prominent and well recognized. This meme based art form thrives and is built on the ever expanding social media platforms in highlighting specific ideas and concepts, information, technology, news short videos, cartoons, memes, text messages, chats, emojis related directly or indirectly with our local, regional and global environment.

Since EnviroArt is engraved and evolved in the meme platform. It is therefore important for us to understand in clear terms what 'memes' are. According to the online Oxford Dictionary, memes are "an image, video or piece of text, etc., typically humorous in nature, that is copied and spread rapidly by internet users, often with slight variations." A very simple definition; but, it clearly portrays the basic architecture of the concept of meme. It is easy to design, extremely cheap or zero cost based modern art form, easily

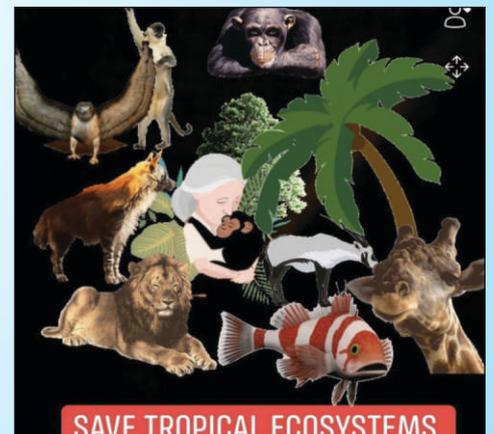
disseminated through social media platforms, readily accepted, admired and modified by a vast network of internet users across the planet.



It is quite important to emphasize on the fact that memes have earned a bad reputation in the realm of cyber security and trolling. Often some individuals or malicious groups use highly insensitive and objectionable memes to troll celebrities, politicians, high ranking officials or even ordinary citizens. Some of these are highly vicious in their languages and content used, as well as extremely disrespectful and damaging to the targeted victim or an organization as they become viral quickly on the internet due to repeated shares and forwarding by internet users accompanied with unacceptable and unparliamentary comments.

But the use of memes in portraying EnviroArt comes from an entirely different and positive perspective. The philosophy behind this comes from the dedicated love and care for our environment. Artists, amateurs and environmental enthusiasts promoting EnviroArt actually do an important service about educating the mass via internet and help increase their awareness regarding various local, regional and global environmental and ecological issues. Often a complex environmental issue is more easily interpreted and presented through a simple well designed meme than a big piece of text or an erudite lecture.

EnviroArt based memes thus play an important role in translating, transforming and disseminating environmental and ecological issues to a bigger audience due to the simplicity as well as a





humorous context added to such memes. It has become quite popular and currently looked upon as a pop culture like graffiti wall paintings that convey important messages related to environment to people. It has to some extent catalyzed the environmental movement among common mass through their innovativeness as well simplicity and colourful display from an artistic perspective. As more and more professional artists, amateurs and environmental enthusiasts are joining thus new trend, EnviroArt is slowly becoming increasingly popular among young netizens.

EnviroArt has therefore started a new movement globally in highlighting important environmental as well as ecological issues impacting our lives and livelihoods. From Global Warming and Climate Changes to Biodiversity and Conservation; from the challenges of anthropogenic pollution to illegal wildlife trade and black markets, EnviroArt has been playing a significant role in reaching out to public with an explosive force and rapid dissemination. Several of EnviroArt memes have become viral within a very short period of times with views, likes and shares numbering to several millions! The broad field of social media has provided an energies opportunity for EnviroArt to thrive, evolve and establish itself as a new wing of popular (pop) art in modern

and contemporary art circles, exhibitions, publications and business.

Several government and non-government agencies are also using EnviroArt to promote good practices to protect environment or to disseminate local or regional and even global environmental issues or concerns to their respective public or target audience. EnviroArt could even be made interactive by using special programming and Artificial Intelligence tools to make them more appealing and attractive for the public in the not so distant future. Some memes produced as EnviroArt and are vital in the virtual world are quite outstanding in their design and messages they deliver. Some examples of EnviroArt designed by myself are included with the article. I sincerely believe that thus new art form is here to stay and reach higher standards of excellence in the future through new innovations, unique designs, more participation by new generation of artists, commercial demands with industrial scale production along with our passion for protecting our environment.

Artist: Saikat Kumar Basu
All memes designed by author

हर घर में पेड़ लगे और हरियाली चारों ओर हो।



appeal

Let fight it together

PLEASE TAKE YOUR VACCINE!!

WEAR MASK - STAY HOME STAY SAFE

**PLEASE PLANT A TREE
FOR CLEAN AND BETTER ENVIRONMENT**

ACTIVITIES AND SPECIAL DAYS AT A GLANCE IN THE MONTH OF SEPTEMBER 2021

V. Sunitha

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1 September - National Nutrition Week

National Nutrition Week is observed from 1st September to 7th September to provide knowledge among people about the importance of nutrition and its importance for the human body, for better health.



2 September - World Coconut Day



This day also marks the anniversary of the founding of the Asian Pacific Coconut Community (APCC). Every year on

September 2nd, World Coconut Day is commemorated to raise awareness of the value of this crop in poverty alleviation.

3 September - Skyscraper Day

The 3rd of September is designated as Skyscraper Day. Skyscrapers are extremely tall structures that define the skyline of a city. The day commemorates a man's ability to create an industrial masterpiece.



5 September - International Day of Charity

Every year on September 5, the International

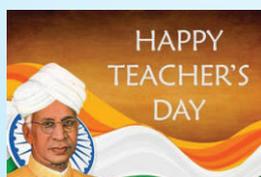
Day of Charity is marked to eradicate poverty in all of its forms and dimensions in order to realise sustainable development goals.



International Day of Charity

5 September - Teachers' Day (India)

Every year on September 5th, India commemorates the birth anniversary of India's second President, Dr. Sarvapalli Radhakrishnan. On this day, we honour and thank teachers for their contributions to the development of responsible citizens.



7 September - Brazilian Independence Day

Every year on September 7th, Brazilian Independence Day commemorates the country's founding. Brazil declared independence from the Portuguese on September 7, 1822. Brazil lost the monarchical government in 1889 and



became a republic, but the 7th of September was retained as the country's Independence Day.

8 September - International Literacy Day

International Literacy Day is observed on 8 September every year to make people aware of the importance of literacy which no doubt is a matter of dignity and human rights. Let us tell you that it is a key component of the UNs Sustainable Developmental Goals.



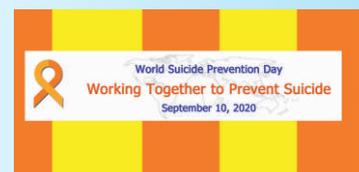
8 September - World Physical Therapy Day

Every year on September 8th, World Physical Therapy Day is commemorated to provide an opportunity for physical therapists from all over the world to promote awareness about the profession's critical role in enhancing people's well-being and health.



10 September - World Suicide Prevention Day (WSPD)

World Suicide Prevention Day (WSPD) is observed every year on September 10th to raise awareness about suicide prevention. This event is hosted by the International Association for Suicide Prevention (IASP). This event is also co-sponsored by the World Health Organization.



11 September - National Forest Martyrs Day

The date of September 11 has historical importance, and it was chosen as National Forest Martyrs Day as a result. On this day in 1730, over 360 Bishnoi tribe members led by Amrita Devi protested the destruction of trees. On the king's instructions, they were slain in Khejarli, Rajasthan, for protesting the destruction of the trees.

14 September - World First Aid Day



On September 14, World First Aid Day is commemorated to create public awareness about how first aid can save lives in times of crisis. First aid, according to the International Federation, should be available to everyone and an

integral aspect of developing communities.

14 September - Hindi Diwas

On this day in 1949, the Constituent Assembly of India proclaimed Hindi written in Devanagiri script as the official language of the Republic of India, and Hindi Diwas is commemorated.



15 September - Engineer's Day (India)



Engineer's Day is observed every year on September 15 in India to honour Indian Engineer Bharat Ratna Mokshagundam Visvesvaraya.

15 September - International Day of Democracy

On September 15, the day of Democracy is marked to remind people that democracy is important for all people. This day gives individuals the chance to express their views and the importance of democracy and the successful protection of human rights.



16 September - Malaysia Day

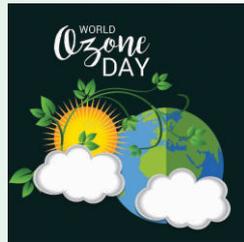


Malaysia Day, commonly known as 'Hari Malaysia,' is observed on September 16th. The Malaysian Federation was formed on September 16, 1963, when the former British colony of Singapore and the East

Malaysian states of Sabah and Sarawak joined the Federation of Malaya.

16 September - World Ozone Day

The 16th of September is designated as World Ozone Day. The Montreal Protocol was signed on this day in 1987. The United Nations General Assembly established World Ozone Day in 1994, and it has been observed every year thereafter. This day serves as a reminder of the ozone layer's depletion and the need to develop ways to protect it.



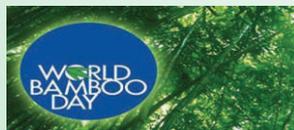
17 September - World Patient Safety Day



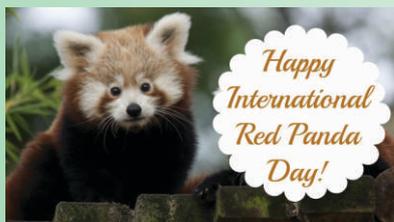
On September 17th, the day is commemorated. The 72nd World Health Assembly formed it in May 2019 after adopting Resolution WHA72.6 on "Global Action on Patient Safety."

18 September - World Bamboo Day

The day is marked on September 18th to raise global awareness to bamboo.



18 September (Third Saturday) - International Red Panda Day



On the third Saturday of September, it is commemorated. It falls on September 18 this year.

21 September - International Day of Peace (UN)

The United Nations' International Day of Peace is honoured on September 21st all throughout the world. It was initially marked in September 1982, and in 2001, the United Nations General Assembly passed

Resolution 55/282, designating September 21 as the International Day of Nonviolence and Cease-Fire.



21 September - World Alzheimer's Day

On September 21, World Alzheimer's Day is commemorated to promote public awareness about the difficulties that dementia patients experience. World Alzheimer's Month was established in 2012.

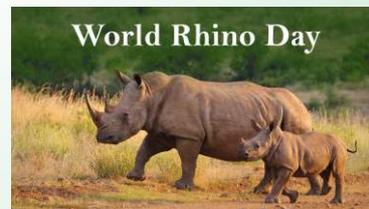


22 September - Rose Day (Welfare of Cancer patients)

On September 22nd, Rose Day is commemorated for the benefit of cancer patients, or to put it another way, this day symbolises the optimism that cancer patients have that their disease can be cured. This day is commemorated in honour of Melinda Rose, a 12-year-old Canadian girl who refused to give up hope after being diagnosed with a rare form of blood cancer.



22 September - World Rhino Day



Every year on September 22nd, it is commemorated. The day raises awareness and helps to create a safe natural habitat for this amazing creature.

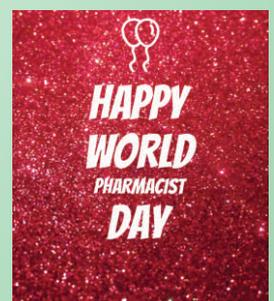
23 September - International Day of Sign Languages

The United Nations General Assembly declared September 23rd as International Day of Sign Languages. The day offers a once-in-a-lifetime opportunity to support and defend all deaf people and other sign language users' linguistic identities and cultural uniqueness.

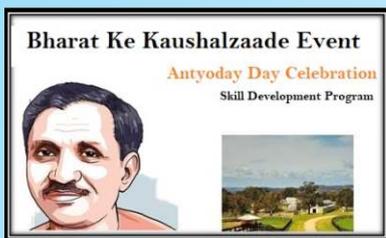


25 September - World Pharmacists Day

Every year on September 25th, it is commemorated. The annual World Pharmacists Day was established in 2009 during the International Pharmaceutical Federation (FIP) Congress in Istanbul, Turkey (WPD).

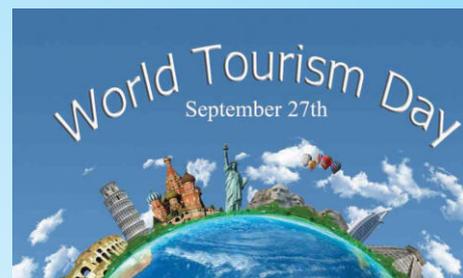


25 September - Antyodaya Diwas



The 98th birth anniversary of Pandit Deen Dayal Upadhyaya was commemorated in 2014 with the declaration of 'Antyodaya Diwas' on September 25th.

jobs and securing a future for millions of people around the world.



26 September - European Day of Languages

Every year on September 26th, the European Day of Languages is commemorated to raise public awareness about the importance of language study and the preservation of the language's heritage.



28 September - World Rabies Day



Every year on September 28th, World Rabies Day is commemorated to raise awareness about rabies prevention and to celebrate the success made in combating this terrifying disease.

26 September - World Contraception Day



Every year on September 26th, World Contraception Day is commemorated. It's a global effort aimed at raising knowledge about the various contraceptive options and empowering young people to make educated decisions about their sexual and reproductive health.

29 September - World Heart Day

Every year on September 29, World Heart Day is commemorated. This day raises awareness of heart disease and stroke, which are the top causes of death worldwide.



26 September - World Environmental Health Day

The International Federation of Environmental Health has declared the day. Every year on September 26th, the world celebrates World Environmental Health Day. This day is commemorated to bring attention to critical environmental health initiatives around the world.



30 September - International Translation Day



Every year on September 30th, International Translation Day is commemorated. This day is an occasion to recognise the contributions of language specialists. It also contributes to the unification of nations and

the maintenance of world peace and security.

26 September (Fourth Sunday) - World Rivers Day



The last Sunday in September is designated as World Rivers Day. It will be on September 26th in 2021. The day raises awareness about the importance of rivers and urges

people to enhance and save water in rivers all over the world. It is critical to protect our water resources.

27 September - World Tourism Day

Every year on September 27, World Tourism Day is commemorated to highlight the importance of tourism in creating

International Conference on
**Promoting Environmental Technologies for
 Waste Management and Sustainable Development
 (WMSD-2021)**

12-13 December, 2021

Venue: Hybrid mode (Online & at
 Auditorium, Campus-11,
 Kalinga Institute of Industrial
 Technology, Bhubaneswar, Odisha*)



ORGANIZED BY

IN COLLABORATION WITH



National Environmental
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BCKIC
 Bhubaneswar City
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 (An initiative by the Office of the Principal
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ENVIRONMENT & SOCIAL
 DEVELOPMENT ASSOCIATION

ABOUT THE CONFERENCE

Environmental and economic implications have compelled proper eco-friendly disposal of modern day wastes and also made it essential to come up with alternative waste management practices that reduce the environmental burden resulting from unwise waste disposal habits. Increasingly vigilant environmental regulators are imposing austere regulations for waste treatment prior to discharge coupled with escalation in the costs for direct disposal present two interrelated problems such as traditional practice of disposing waste loaded with pollutants need to be either discontinued or upgraded and incremental improvement in the waste management technologies, which has always been a game of playing catch-up with the regulations, have inflated infrastructure requirement and treatment cost significantly. Therefore, rather than continuing slow evolution, adaptation of a leapfrogging strategy could be more effective. Although a great deal of research in carried out in various academic and research institutions, their practical applications is rather slow. Additionally, proliferating global population coupled with high demand of commodities are depleting the natural resources in an alarming rate. Therefore, there is an urgent need not only to develop suitable waste disposal strategy but also to augment the waste recycling technologies for resource recovery in a circular economy model. International Conference on Promoting Environmental Technologies for **Waste Management and Sustainable Development (WMSD-2021)** aims to bring together leading academicians, scientists, researchers, industry experts and policy makers to exchange and share their experiences and on various aspects of Waste Management and Sustainable Development. It also provides a premier interdisciplinary platform for researchers, practitioners and educators to present and discuss the most recent innovations, trends, and concerns as well as practical challenges encountered and solutions adopted in the fields of waste management and resource recycling. Selected

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**EACH ONE PLANT ONE
 STAY SAFE WEAR MASK**

papers presented in the conference will be published in journals published by NESA or other suitable publishing houses. The conference will feature renowned speakers representing both academia and industry who are renowned experts in various thematic areas. Conference will include a start-up track session, providing opportunity to innovators to showcase new technologies.

SUB THEMES OF THE CONFERENCE

HYBRID WMSD-2021 (offers both an In-Person* and Virtual environment) WMSD 2021 invites papers with the following sub themes

- Agro-waste management
- Burning of the waste and Air Pollution
- Environmental Pollution and Public Health
- Plastic & Polymer recycling and reuse
- Start-up ecosystem in WMSD
- Polar and Marine Science
- Industrial waste management and Resource recycling
- Soil Pollution and Treatment
- Climate Change
- Wastewater treatment and Reus

The participants may send their abstracts by 30th November 2021 and full length papers by **6th December 2021** online to 2021wmsd@gmail.com The participants may present their papers in the Conference by oral/poster.

Interested applicants can register at www.bckic.in/wmsd2021