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NATIONAL ENVIRONMENTAL SCIENCE ACADEMY

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September 2018

"True teachers
are those who help us
think for ourselves."

Dr. Sarvepalli Radhakrishnan

5th September, 2018



Teacher's Day

The Way you teach...
The Knowledge you share...
The care you take...
The Love you shower...
Makes you...
The world's Best
Teacher...

National Conference on Chemistry for Human Health and Environment (CHHE)

Theme: *Designing Chemistry for a Sustainable Tomorrow*

Submit Abstract: gcnc.chem.du@gmail.com

15-16 December 2018

Venue: Conference Center, University of Delhi, Delhi-110007

Conference Highlights (Sub-themes)

- Earth Sciences
- Environmental Chemistry and Engineering
- Environmental Biotechnology
- Pollution Control Chemistry and Green Chemistry
- Environmental Toxicology and Mutagenicity
- Energy and Environment
- Applications of Environmental Chemistry
- Designing Chemistry for a Sustainable Tomorrow
- Plant Chemistry
- Agricultural Chemistry
- Environmental Design
- Environmental Hazards
- Environmental Biology
- Environmental Sciences



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2. Patents granted/Technology developed
3. Any award / recognition at National level.

AGE

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IMPACT OF CLIMATE CHANGE AND GLOBAL WARMING ON GLOBAL BIODIVERSITY AND WILDLIFE

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Climate change and global warming is now believed to be impacting several microclimate regimes around the planet and thereby different ecosystems and environments are being impacted negatively and exposing the biodiversity to serious challenges. Both flora and fauna are being impacted disrupting natural habitats drastically due to unexpected changes in weather patterns like negative impacts have been recorded on life cycle of pollinator insects like bees and several other terrestrial as well as freshwater, estuarine and marine invertebrates; various fishes, amphibians, reptiles, birds and mammals. Annual migration of several marine and land mammals as well as migratory birds are believed to be adversely affect. Late or early or abnormal migration patterns have been found to be affecting their nesting, breeding and foraging behaviors as well influencing their steady food supply vital for their existence. Undesirable mutations are also expected at molecular level due to such unprecedented stress even at the molecular level.

Taxa widely separated from one another are being exposed to one another now due to habitat transformation and habitat degradation. For example in higher northerly latitudes hybridization between polar bears and grizzly bears has now been reported and scientifically documented. Disruption of hibernation patterns of several mammals are also believed to be affecting their breeding and feeding cycles altering population dynamics. Warmer climate is helping insect pest populations to



thrive in suitable habitats putting their target host species into additional pest related stress and jeopardy and making them vulnerable to related pathological and physiological challenges. Irregular migration patterns are exposing to wildlife to extreme over exploitation by humans in different corners of the world challenging their existence. Altered breeding cycles are detrimental for others and making them vulnerable in their own surroundings. While some living organisms are thriving under such altered climatic parameters; others are suffering negatively due to the same impacts.

The growth of toxic algae and Cyanobacteria in both freshwater and marine habitats under varied and irregular climate change regimes, causing the loss of available oxygen these aquatic ecosystems are making several vertebrates and invertebrates equally endangered and losing to competition with other oxygen efficient organisms. It is important that we recognize that it also carries serious danger of jeopardizing global food security or

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25 December 1924 –
16 August 2018

Atal Bihari Vajpayee was an Indian politician who served three terms as the Prime Minister of India: first for a term of 13 days in 1996, then for a period of 13 months from 1998 to 1999, and finally, for a full term from 1999 to 2004. A member of the Bharatiya Janata Party (BJP), he was the first Indian prime minister who was not a member of the Indian National Congress party to have served a full five-year term in office.

He was a member of the Indian Parliament for over four decades, having been elected to the Lok Sabha, the lower house, ten times, and twice to the Rajya Sabha, the upper house. He served as the Member of Parliament for Lucknow, Uttar Pradesh until 2009 when he retired from active politics due to health concerns. Vajpayee was among the founding members of the Bharatiya Jana Sangh (BJS), of which he was the president from 1968 to 1972. The BJS merged with several other parties to form the

Janata Party, which won the 1977 general election. Vajpayee became the Minister of External Affairs in the cabinet of Prime Minister Morarji Desai. He resigned in 1979, and the Janata alliance collapsed soon after. The erstwhile members of the BJS formed the BJP in 1980, with Vajpayee as its first president.

During his tenure as prime minister, India carried out the Pokhran-II nuclear tests in 1998. Vajpayee sought to improve diplomatic relations with Pakistan, travelling to Lahore by bus to meet with Prime Minister Nawaz Sharif. After the 1999 Kargil War with Pakistan, he sought to restore relations through engaging with President Pervez Musharraf, inviting him to India for a summit at Agra.

He was conferred India's highest civilian honour, the Bharat Ratna, by the President of India, Pranab Mukherjee in 2015. The administration of Narendra Modi declared in 2014 that Vajpayee's birthday, 25 December, would be marked as Good Governance Day. He died on 16 August 2018 due to age-related illness

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impacts biodiversity and wildlife; but can also jeopardize the food security at the same time. Hence, it is important for all of us to think and understand the dangers of climate change and global warming and join hands throwing away all our differences to work together on a common platform. All stakeholders need to come forward and need to develop a comprehensive plan and strategy to protect local and regional biodiversity from detrimental changes.



economic activities linked to tourism (e.g. the invasion and eutrophication of sargassum in beaches of the Caribbean and Central America). For example plants and animals that are being subjected to negative environmental changes due to climate change and global warming are also removing human edible species out of our ecosystem at a rapid pace. These could have significant negative impacts on the availability of several food species from our natural ecosystems and environments in the long run. Therefore, climate change and global warming not only

Photo credit: S. K. Basu, W. Cetzal-Ix and P. Zandi

ICT BASED TOOLS FOR INTEGRATED PEST MANAGEMENT IN AGRICULTURE

Meenakshi Malik¹, Neelam Mehta¹, Avinash Singode² and Devraj³
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Integrated Pest Management (IPM) is an eco-friendly approach which aims at keeping pest population below the economic threshold level by employing all available alternate pest control methods and techniques i.e. cultural, mechanical and biological with emphasis on use of bio-pesticides and pesticides of plant-origin like Neem formulations. The use of chemical pesticides is advised as a measure of last resort when pest population in the crop crosses economic threshold levels (ETL). Suppression of pest population below economic threshold level through the adoption of feasible and affordable Good Agricultural Practices aiming least disturbance to the eco system and environment.

In agricultural research and development, the role of ICT is enormous from down to earth to the limit of the sky and localized to global scales of space and time offering information with security along with the value addition of data preservation for a single to manifold components of any given subject.

The National Centre for Integrated Pest Management (NCIPM) with its mandate of eliciting national pest scenario across crops vis-à-vis dissemination of IPM practices to the growers revolutionized the ICT-driven pest surveillance, often referred as e-pest surveillance and incorporated into various programmes operational across India.

Approach to use of ICT evolves from a specific vision of improvising the existing practices accounting the drawbacks associated. In an era driven by advancements in the field of information and communication technology (ICT) for livelihood and lifestyle privileges, vistas of its application are ubiquitous.

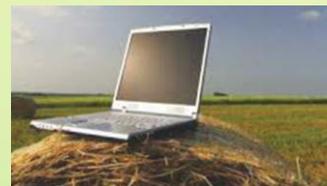
ICT (Information and communication technology) is an term that includes a communication device or application, encouraging radio, television, cellular phones, computer and network hardware and software, satellite systems etc as well as the various services and applications associated with them such as videoconferencing and distance learning.

IT AND PEST MANAGEMENT

The use of computers and computer software's in certain fields relevant to pest management has quite a long history. Earlier the computers were used for data collection, simulation and modeling in ecology in the early 1960s. Later, expert systems became another pest management field where researchers relied on the power of computers for simulations. However, these early applications of computers were mainly limited to research and academic arenas and were utilized by few highly trained professionals. There are few successful cases in which computers or computer software helped in solving real world pest management problems. The Internet and related technologies, such as the World Wide Web and database technology, in parallel with increases in computing speed, data storage and computational power in the 1990s, made a broad array of IT tools available for pest management uses. In fact, pest management came into a new era in terms of data and information distribution, education, training and collaboration during this period. The number of systems relating to pest management has rapidly increased. These information systems help users solve many real problems in pest management. A milestone in using IT for pest management during this period was the formation of several centralized pest management information resource centers, such as the CABI Crop Protection Compendia and the many information systems at the NSF Center for Integrated Pest Management (CIPM). Compendia on Crop Production, Forestry and Animal and



Livestock Production are each comprehensive information systems containing information useful for pest management. The compendia are one of the most important sources for obtaining pest management information in many countries around the world. Realizing the scope of these technologies in plant protection with multifold possibilities of centralization and decentralization, considering the roles and responsibilities of the stakeholders involved, various research centres have been involved in management of pests through latest technologies.



ICT has proved to be a powerful tool in pest forecasting as a prop to giving priority to prevention, as pest forecasting involves data acquisition, processing and information dissemination. ICT can also be very helpful in terms of enforcing integrated pest management (IPM). The application of a wireless sensor network in field monitoring and early warning of invasive alien weeds and of remote sensing and radar monitoring in IPM. The welfare of a nation and its citizens is dependent on thought processes led actions executed at policy and implementation levels. More often than not the advantageous features of ICT transform the structure and function of the organizations for their mandated services.

Leveraging individual and integrated services of agriculture to the farmers ensuring their efficiency, transparency and reliability at affordable costs is possible through use of ICT. Integrated pest management like ICT has many components of crop protection. Levels of IPM could be for a given crop or for a cropping and production system. However, based on the status of harmful organisms that need a continuous watch kept over them.

The indiscriminate and unilateral use of pesticides was the only plant protection tool during sixties and seventies for sustaining of agricultural production potential of the high yielding varieties under the intensive cropping systems. This has led to several ill-effects like human and animal health hazards, ecological imbalance, development of resistance in the pests to pesticides, pests resurgence and environmental pollution as well as destruction of natural enemies (bio-control agents) of pests and increased level of pesticides residues in soil, water, food with the increased use of pesticides.

Strengthening and Modernization of Pest Management Approach

In India it has become one of the components of this sub-mission with mandate to popularize adoption of Integrated Pest Management (IPM) through training and demonstration in crops inter-alia promotion of biological control approaches in crop protection



technology. Use of ICT in plant protection has obviated the drawback of non-availability of complete data sets on pests at one or a few places that make the spatial and temporal pest scenario compilations and exchanges highly difficult for the crop. Considering that large amount of research data that gets lost in the note books of the persons who recorded the data, carefully designed ICT-based pest surveillance not only brings convergence in measuring pests essential for comparison purposes but also fastened the pest scenario known on real time basis for instant recommendations of need-based pest management through advisory notifications. It is also well known that changes in technology are continuous and the sophistication levels of surveillance/ reporting tools are dynamic. Electronic gadgets and networking make pest surveillance and monitoring a commercial enterprise however with the continuous trainings and skill development made available. ICT would continue to play a greater role in effective use of data gathered over time and space in understanding changing pest scenario, effects and efficacy of pest management methods, effects of weather/climate change on crop-pest interactions and in development of forecasts and policies of plant protection. Evolving instant feedback mechanisms from farmers for aiding alternate pest/crop management planning is required to be attempted hereafter.

MARKER ASSISTED BREEDING FOR GENETIC CHARACTERIZATION OF GROUNDNUT

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The degree of morphological differences in agricultural crops requires specialized techniques to simplify characterization of functional diversity between them. Molecular markers represent one class of such technique, including restriction fragment length polymorphisms (RFLP), amplified fragment length polymorphisms (AFLP), expressed-sequenced tags (EST), Random amplified polymorphic DNA (RAPD), Sequence Characterized Amplified Region (SCAR), Simple Sequence Repeats (SSR), Single Nucleotide Polymorphism (SNP) and many more. Selection of desirable traits with help of molecular markers is known as Marker Assisted Selection (MAS). In the process of MAS, DNA-based markers are being effectively used for tracing favourable allele(s) across generations and identifying the most suitable individual(s) among the segregating progeny. In plant breeding, molecular marker data can be used for several purposes like germplasm characterization, diversity analysis, selection of parents for hybridization, testing for genetic purity, gene introgression, gene pyramiding, segregating population analysis, marker assisted backcrossing, foreground and background selection etc.

Some Facts about Marker Assisted Breeding:

- Marker-assisted breeding is a conventional technique that allows breeders to track favourable genes without using transgenic approaches
- It can be used to select plants that are desirable to crop improvement. It doesn't produce genetically modified organisms
- Marker-assisted breeding uses DNA markers associated with desirable traits to select a plant which can be used in a breeding program
- Foreground (identification of favourable gene/allele) and background selection (recovery of genetic background of popular variety) are most commonly being used in marker assisted breeding for crop improvement
- This approach reduces the time required to identify varieties with desired trait in a breeding program
- The marker is not the gene for the trait, but a genetic marker which is usually inherited with the trait
- Desirable traits include characteristics to be improved in crops such as disease resistance, size, abiotic stresses, high yield etc.

Genetic Characterization of Groundnut using Molecular Markers:

The cultivated groundnut (*Arachis hypogaea* L.) is an allotetraploid ($2n = 4x = 40$) with a genome size of 2891 Mbp and valued for high-quality oil and protein content. Significant progress in the area of molecular breeding increased the output of breeding approaches, due to low cost, time saving and more importantly its accuracy. Groundnuts are important protein crops in India grown mostly under rain-fed (Kharif season) conditions. It is grown in more than 100 countries and India

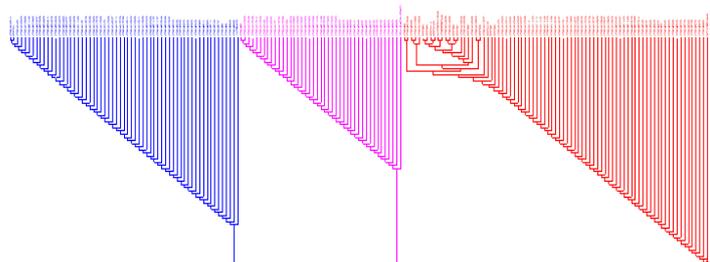


Fig. 1. Molecular characterization using gene based SNP markers of groundnut germplasm lines.

ranks second in groundnut production after China, followed by USA and Nigeria. In India, Groundnut is grown in three seasons i.e., rainy season (85% area), in post rainy season (10% area) and summer season (5% area). For development of improved varieties in groundnut, introgression of desired trait in the progeny can be done using trait-linked SNP marker and morphological traits phenotyping (Fig.1 & 2). One of the basic purpose of crop improvement is genetic characterization to get superior germplasms/improved line, which could be used in further breeding program for advancement of popular variety or to develop new variety. Gene based markers are exceptionally useful as they will be less in number, low experimental cost, easy data analysis, targeted trait can be evaluated easily. Several gene based markers for foliar diseases and high oleic acid contents have been reported in groundnut including SSR, CAPS and SNP. For genetic characterizations of genotypes and germplasms these markers can be utilized for phylogenetic analysis, tagging diseases resistant gene and mapping of useful traits.

Desirable properties of marker used in molecular breeding:

- ✓ It should be highly polymorphic
- ✓ Should give reproducible results
- ✓ Should have codominant inheritance (Able to differentiate dominant, recessive and heterozygous plants/genotypes)
- ✓ Evenly distributed in genome
- ✓ Easy data analysis
- ✓ Fast processing
- ✓ It should be easily available
- ✓ Data exchange should be easy

Future Prospects:

Marker Assisted Breeding can accelerate breeding process in progressive way in groundnut. For getting more efficient results both morphological and molecular methods should be used as marker will identify traits and its performance can be evaluated in field conditions.



Fig. 2: Morphological characterization of groundnut germplasms in field conditions.

COLORED POTATOES: A NEW OPPORTUNITY FOR THE GLOBAL NEUTRACEUTICAL AND FUNCTIONAL FOOD MARKET

S. K. Basu

UFL, AB Canad

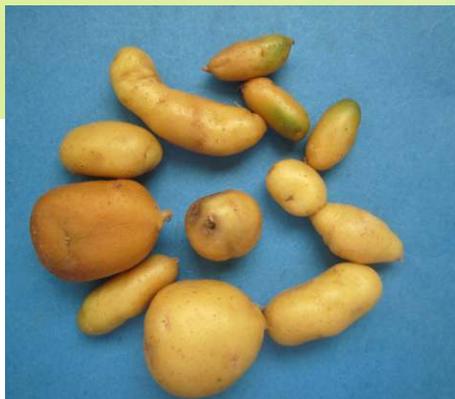
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Colored potatoes have been a new sensation in the global neutraceutical and functional food markets due to the available package of rich concentration of beneficial phytochemicals like carotenoids and flavonoids content in the colored potatoes; and the rich concentration of different antioxidants present in them.

Carotenoids and flavonoids are the natural bioorganic pigments present in colored potatoes that gives them the unique colors like red, pink, purple and violet; compared to the usual white and yellow skinned variety conventional potato breeds available and produced around the globe. The intensity of the color in the colored potato varieties depend on the concentrations of various carotenoids and



flavonoids present in them; and their proportional concentrations in different colored potato varieties and cultivars. Higher the concentration of these pigments; more intense coloration is observed in these different colored potato varieties. The different colored potato varieties also differ with their concentration of various antioxidants. All these important phytochemicals add high health benefits like high antioxidant values playing important role in preventing cancer. Such rich concentration of phytochemicals is also reported to increase the flavor of potatoes. Customers dedicated to the neutraceutical and functional food industries as well as organic produce are



showing an appreciable increase in global niche market share of colored potatoes across North and South Americas, EU, Australia and New Zealand, South and South East Asia, Far East and China. This new trend among potential customers with increased health awareness, inclination towards practicing holistic health and consuming healthy and nutritious, chemical free produce has opened up new opportunities for the colored potato producers around the world for

capturing the niche market with target high value customers.



PLANTATION DRIVE BY THE ACADEMY

The Academy Members are requested that whenever they plant a tree on their birthday or any other event, please send us the photographs with report so we can publish the same in our newsletter. This will inspire and encourage many more life members of the Academy to participate in the "Green drive" of the Academy.

Members are also requested to preferably plant a medicinal plant which can benefit each and every one around us. Also they can form a committee in their RWA for plantation of tree on weekends.

Dr. Shefali Gola
Editor, NESA E-newsletter

ROLE OF DECISION SUPPORT SYSTEM IN INTEGRATED PEST MANAGEMENT IN MANGO

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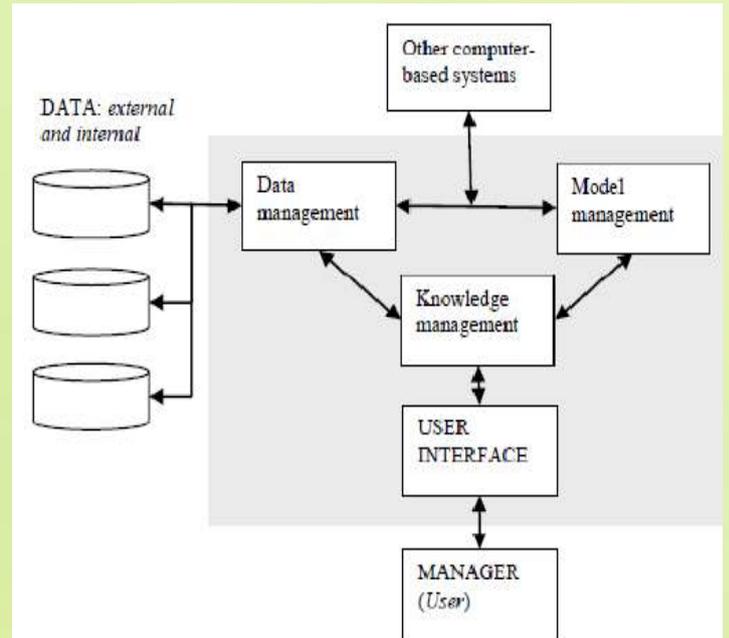
Integrated Pest Management (IPM) is such a technology, which combines multiple ecologically safer and economically sound pest control methods. IPM being knowledge intensive approach to crop protection emphasizes appropriate decision-making based on knowledge of interaction of the crop, pests, beneficial organisms that prey on pests and whole lot of other information. Pests cause significant losses to crop production in India. Excessive and irrational use of chemicals for pest control not only degrades the environment but also affects the human health due to presence of pesticide residue. An important goal in modern agricultural crop production is to develop less intensive and integrated farming systems with reduced inputs of fertilizers and pesticides and reduced use of natural resources. The main objectives of these systems are to maintain crop production both in quantitative and qualitative terms, maintain or preferably improve farm income and reduce negative environmental impacts as much as possible. IPM emphasizes on timely decision making that depends heavily on accurate and timely availability of information for field implementation by practitioners. The decisions such as selection and timing of pest management intervention if necessary are always contingent on correct information about the pests and its biology, level of pest of incidence and available management options.

ICT based DSSs can greatly help the farmers in accessing the relevant knowledge/information from the experts. Application of DSS facilitates the farmers in making timely and correct pest management decisions as and when required. ICT provides a wide range of DSS tools, which can be used and in fact many of them are being used extensively in IPM all over the world. DSSs collect, organize and integrate all types of information required for producing crops, then analyze and interpret the information and finally use the analysis to recommend the most appropriate action or action choices. Expert knowledge, mathematical models and timely data are key elements of DSSs and are used to assist producers both with daily operational and long-range strategic decisions. Computer-based DSSs have the potential to be important tools in the decision-making process for farmers and can potentially include all the requirements for practical implementation of IPM.

The innovative nature of new generation DSSs is based on:

- i) a holistic vision of crop management problems with the focus on all the different individual operation issues (e.g. pests, diseases, fertilization, irrigation, canopy management)
- ii) Provision of information on the focus of the decision in the form of easy-to-understand decision supports able to reduce uncertainty;
- iii) easy and fast access through the Internet
- iv) two-way communication between users and the providers, which make it possible to consider context-specific information.

The DSSs combine the advantages of simple DSSs which is low cost, ease to deliver in multiple ways and needs limited time requirements for learning and using. The other DSS which are sophisticated ones which has greater integration of knowledge, greater grower choice of management tools and greater consideration of associated risks. These DSSs are therefore easy-to-use tools that perform complex tasks efficiently and effectively. In addition, these systems use technology i.e. Internet, SMS, hand-held devices like mobile phones that are already available and known to most users. The delivery of these DSSs using the Internet also ensures efficient transfer of scientific knowledge into practical application. The use of the Internet also increases Decision-making in crop protection, the accessibility for the user and allows the DSS to be updated easily and continuously, so that new knowledge can be



rapidly and efficiently provided to farmers and allows users to maintain close contact with providers.

Development of DSS in various crops have been developed in ICAR but the DSS on mango according different Agro-Climatic zones for the management of insects/pests is being developed for the U.P. state by NCIPM as The Mango is king of all fruits and India is major producing and exporting country in world for the crop. There are number of insect pests damaging mango tree but the most abundant and destructive are mango hoppers, mealy bug, stem borer, fruit fly, mango nut weevil and play a major role in bringing down the fruit quality and yield. Various Integrated Pest Management Strategies should be adopted to control the population of insect/pests and to increase the production and productivity of the crop. Timely availability of right information to the farmers for decision-making can be a major step in management of the crop and helping the farmers at the critical stage of infestation.

Important Pests and Symptoms:

1. **Mango hopper:** The wedges shaped Nymphs and adult insects puncture and suck sap of tender parts, reducing vigour of plants and particularly destroying the inflorescence and causing fruit drop. Hoppers are widely distributed in all mango growing areas of India.
2. **Mango mealy bug:** The adult bugs are covered with whitish powder and colonize between bark of tree trunk, young shoots and panicles.
3. **Fruit fly:** The female punctures outer wall of mature fruits with the help of its pointed ovipositor and insert eggs in small clusters inside mesocarp of mature fruits.
4. **Inflorescence midge:** The larvae tunnel the axis of inflorescence and destroy it completely. Damage causes bending and drying of the inflorescences.
5. **Stem borer:** The damage is caused by grubs either to roots or stems. The grubs after hatching from eggs first feed on bark and make irregular cavities.
6. **Bark eating caterpillar:** The caterpillar spins brown zig-zag ribbon-like silken web on tree which consists of their excreta and wood particles.
7. **Shoot Borer:** Larvae bore into young tender leaves during August and freshly hatched caterpillar bore into mid rib.
8. **Leaf miner:** Most of the time, this pest is identified by the leaf miner damage. Frequently, it appears as yellow squiggly lines in the leaves.
9. **Shoot gall psylla:** Nymphs emerge during August September and suck cell sap from adjacent buds.
10. **Stone weevil:** Adult weevils (5-8 mm) are stout and dark brown, grubs are white legless and stumpy eggs are laid singly on the pericarp of tender marble sized fruits.

Important Diseases:

1. **Powdery mildew:** The characteristics symptoms of disease are white superficial powdery growth of the fungus noticed on the inflorescence, stalk of inflorescence, leaves and young fruits.
2. **Anthranose:** The disease manifests on the different parts as the earliest symptoms of the disease are the production of blackish brown specks on peduncles and flowers, small black spots on appear on the panicles and open flowers, which causes death of flowers, irrerregular brown to deep brown spots of various sizes scattered all over the leaf surface.
3. **Mango Malformation:** The most characteristic symptoms of malformation are the reduction and compact of internodes giving malformation a broom like appearance.
4. **Alternaria leaf spot:** Appearance of small, brownish circular spots on the surface of leaves identifies Alternaria.
5. **Bacterial canker:** The symptoms of the disease are noticeable only on old leaves. Initially, the lesions are angular, minute, irregular, yellow to light brown, scattered over leaf lamina.
6. **Stem end rot:** The fruit while ripening suddenly becomes brown to black typically at stem end.
7. **Root rot:** Infection occurs at below the ground level, the circular to irregular water socked patches. These patches enlarge and girdle the entire base of the stem.

Conclusion

The trend in agriculture is toward more complex, technologically based crop management, with greater regulation and supervision both by government and processors regarding the use of fertilizers, pesticides and other chemicals.

Application of ICT in IPM has already taken place all over the world and will continue to make tremendous influence on future IPM strategies. Timely availability of right information to the farmers for decision-making can either result in application of pesticides saving crop worth crores of rupees or in non-application of pesticides saving the cost of involved pesticides and the environment from being polluted besides saving the beneficial organisms. Thus in future it may not be possible to neglect the ICT components such as DSSs in IPM programmes. Given this dramatic change, DSS applications for IPM hold significant potential for advancing agricultural, the 1990s, mainly because farmers were unwilling to invest the time required to learn how to use new technologies. This is rapidly changing, however, as the Internet becomes more available, as technology improves and as farmer understanding of technology increases. The efficient use of ICTs, driven by improved access to Internet, is widely recognized as a key factor for increasing productivity and stimulating innovation throughout country. Thus, ICTs should promote entrepreneurship and economic progress in rural areas, thereby increasing the competitiveness of agriculture and forestry, diversifying the rural economy and improvement of the quality of life in rural communities as well.



“BEAT THE PLASTIC”-Participation in World Environment Day 2018 with MoEFCC

By
Amity Institute for Environmental Toxicology, Safety & Management & Amity Institute of Environmental Sciences.

AMITY UNIVERSITY celebrated WORLD ENVIRONMENT DAY, 2018 with MoEF&CC at Vigyan Bhawan, Delhi. This year India was the global host of United Nations for World Environment Day 2018 celebrations. The theme for this year’s edition was “BEAT PLASTIC POLLUTION” and the conference was mainly focused on combating single-use plastic pollution. The conference was named as "THE KNOWLEDGE COALITION". The theme urged various stakeholders like governments, industry, manufacturers, NGOs, communities, academics and public to come together and explored sustainable alternatives to urgently reduce the production and excessive use of single-use plastic. Plastics are polluting our oceans, damaging marine life, ecosystem and threatening human health as well. Different sessions were held on plastic pollution and its management, policies for combating plastic pollution etc. Exhibition on the theme was also put up where various states, ministries as well as industries showcased their works.

2.Objective(s) of the Event

1. To celebrate World Environment Day 2018 with MoEF&CC hosting United Nations at Vigyan Bhawan.
2. To showcase Amity's environmental initiatives and the research work going on in the field in environment highlighting our courses, projects, expeditions, conferences, workshops, awards etc.
3. Opportunity to meet environment dignitaries from all over the globe and discuss new technologies to fight plastic pollution through sustainable alternatives.
4. To show India's support to UN initiative to combat plastic pollution.

3. Planned Outcomes

A. Tangible Outcomes:

1. To represent Amity University (AIES & AIETSM) as Premier Education group in the event.
2. To attend the conference on Beat Plastic Pollution and learn about burning issues in environment and ways to combat them.
3. Putting up an exhibition stall to showcase research, courses, conferences, seminars, events, patents, prototypes of technology etc.

B. Intangible Outcomes:

1. Interact with delegates from all over the globe in the field of environment.
2. Listen to presentations made by dignitaries on Beat Plastic Pollution.
3. Learn about policies and regulations of India as well as other countries on Environmental issues.
4. Collaborate with other industries or institutes for research on Green Technology.

4. Achieved Outcomes

A. Tangible Outcomes:

1. Amity Institute for Environmental Toxicology, Safety and Management and Amity Institute of Environmental Sciences, representing Amity University participated with full zeal in this event.
2. The faculty, research scholars and students attended the conference from 1st- 5th June, 2018. Several parallel sessions included were having very relevant topics on current burning issues of environment with session topics as below:
 - i. Air pollution in Indian Cities,
 - ii. Himalayan Ecosystem,
 - iii. Plastic pollution and Management,
 - iv. Marine Litter etc.
 - v. Corporate sustainability & sustainable development goals
 - vi. Water to resource

- vii. Sustainable urban landscapes and smart cities
- viii. Extended producer responsibility
(Detailed session plan is enclosed).

All the people from the department attended different sessions of their interest areas and gained knowledge about the various initiatives taken all around the country and the world with case studies of success stories on plastic pollution and its abatement.

3. Amity University was the only university which has set up a stall at the exhibition from 2nd June- 5th June, 2018 and exhibited its environmental initiatives on research, academic programs, courses, conferences, seminars, events, patents, prototypes of technologies etc. Many delegates and visitors visited the stall and showed their interest in the research work that Amity is doing in the field of environment.

We displayed our green technology patents such as:

- Jindal, Tanu. 2013. Simple Lab/Field Lysimeter.
- Jindal, Tanu. 2013. Photochemical method for degradation of persistence pesticide.
- Jindal, Tanu. 2012. Low Cost Water Testing Kit.
- Jindal, Tanu. 2012. Development of natural pesticides from plants with acetyl cholinesterase inhibitory activity.
- Portable Water purifier
- Rootonics
- Biodegradable plastics
- Herbal Mosquito Repeller
- Rice husk sheet

We showcased the conferences/events/lectures organized by Amity University like:

- World Environment Day
- World Water Day
- International Earth Day
- Ozone Day and Environment Health Day
- Guest lectures, seminars, symposiums on environment
- International and National Conferences

We also exhibited awards received by AIES & AIETSM:

- Agro-Chemical Society Award to Dr. Khusbu Gulati, Dr. Shalini Thakur, Dr. Anuj Ranjan
- Editor of The Year Award 2017 by MTRES to Prof. Dr. Tanu Jindal
- Excellence in Research and Teaching Award 2017, Environmentalist of the Year, Scientist of the Year Award to Prof. Dr. Tanu Jindal by National Environmental Science Academy (NESA)

4. People showed keen interest in Water Testing Kit, Biodegradable plastic, Portable water purifier etc and inquired about the technology used for these research work. Water testing kit was a hit at the stall and all its information pamphlets were exhausted.
5. Delegates also discussed about our expedition to Antarctica and Southern Ocean and the research outcome of the expedition. Many exhibitors from industries, academics and students showed interest in collaboration at Amity University. They also registered their remarks in the visitor diary.
6. Amity students which are working as interns in various organizations like Chintan, GIZ, CSE etc also visited Amity stall and cheered up.
7. Visitors also inquired about different courses that are offered by Amity University especially Environment science and engineering which were

explained to them and also made them aware of the benefits of getting their wards to study in Amity.

8. We showcased our ongoing and new courses as below:
 - Ph.D. Environmental Sciences (Full Time, Part time)
 - Ph.D. Geo-Informatics and Remote-Sensing (Full Time, Part time)
 - M.Sc. Environmental Sciences
 - B.Sc. Environmental Sciences
 - M. Sc. Environmental Health Science and Management
 - M tech Water Technology and Management
 - PG Diploma in Environmental Impact Assessment & Auditing
 - PG Diploma in Disaster Management
 - M Tech. Environmental Engineering
 - M Tech. Geo-Informatics and Remote-Sensing
 - MBA Natural Resource and Management
 - Ph.D. Natural Resource and Management
9. **We highlighted our research projects on:**
 - i. Ministry of Earth Sciences (MoES)- Study of contamination of soil and water through heavily loaded unlined drains in Delhi –(2010-2014)
 - ii. Department of Science and Technology (DST)- Dissipation, leaching and persistence of Chlorpyrifos in three types of soils with different pH- (2009-2014)
 - iii. Ministry of Environment and Forests (MoEF)-Analysis of Surface and Groundwater pollution by Indiscriminate use of Agrochemicals (Pesticides) in selected Paddy, Cotton and Vegetable Growing Farms of India- (2009-2013)
 - iv. Screening of microorganism from Indian sector of southern ocean for antimicrobial activity with their molecular characterization under 10 th Indian Scientific Expedition to Southern Ocean (2017 till date)
 - v. Continuous Ambient Air Quality Monitoring Station (CAAQMS) by UP Pollution Control Board (UPPCB) (2017 till date)
 - vi. Participation in project entitled “Environmental Toxicological Studies and Monitoring with NCAOR for estimation of POP’s- (2014 till date)
 - vii. Mobile Phone and Tower exposure measurement and Biological Correlations, Department of Science and Technology- 2015 till date)
 - viii. Development of a Cost Effective Lysimeter & Method for Leaching Studies to Estimate Risk Assessment of Groundwater Contamination. Department of Science and Technology- (2015 till date)
 - ix. Performance evaluation of forward osmosis, membrane system for application within the agriculture and textile industries, DST
10. UN Global stall was a USP of the exhibition where they showcased about how our environment is getting degraded because of human activities with the focus on plastic pollution which was the theme of the event.
11. At the plenary ceremony of the event, Prime Minister Sh. Narendra Modi Ji addressed the people present there and told about marine litter, micro- plastic litter, reducing plastics in oceans etc. He showed support for UN initiative to combat plastic pollution.
12. Videos were showcased at the exhibition giving elaborate knowledge of Amity University, its facilities, research etc. In total 7 videos were exhibited on:
 - i. Amity Institute of Environmental Sciences and Amity Institute of Environmental Toxicology, Safety & Management.
 - ii. Amity Science & Technology Innovation Foundation (ASTIF)
 - iii. Amity Education Group

- iv. Amity Agricultural Initiatives
- v. Amity Solar Energy Project
- vi. Amity movie for conversion of dumping ground to a eco-friendly park by students and 5 presentations
- i. *Amity Institute of Environmental Toxicology, Safety & Management (AIETSM)*
- ii. *Amity Institute of Forestry & Wildlife (AIFW)*
- iii. *Amity School Natural Resources & Sustainable Development (ASNRSD)*

13. Profile of Amity University was published in Exhibitors booklet issued by MoEF&CC.

B. Intangible Outcome:

- 1. Made contacts with many industry people, ministries, educationalists, students etc. who would like to collaborate with Amity University.
- 2. People were interested in the technologies that are developed by Amity University especially Water testing kit for commercialization.

5. Actionable Progressive Outcomes

A. Tangible Outcomes

- Amity University got an opportunity to showcase its environmental initiatives at an international level which gave a lot of exposure to the faculty, research

scholars and students. Amity would keep participating in such events for even better outreach and learning now with MoEF&CC and United Nations.

- To know about successful case studies on Beat Plastic pollution
- To meet and listen to dignitaries in the field of environment like Ms. Marina Walter, Sh. Manoj Gangeya etc.
- To know global issues of environment and policies by Dr. Eric Solheim (UN Environment Head), Dr. Harshwardhan (Union Environment Minister), Mahesh Sharma (State Minister), Diya Mirza (UN India Ambassador) etc.
- To learn about alternatives to plastic and plastic pollution
- To learn and get aware about ways and research on recycle and up-cycle plastics

B. Intangible Outcomes

- Contacts taken during the exhibition will be further reached for collaboration in the field of environment and research.
- Environment Industries will be contacted for student internships.
- Environment related ministries and industries will be further contacted for project collaborations.
- Dignitaries who were met at the conference will be called to Amity University for Guest lecture or talk for students.

OZONE LAYER: AN ELIXIR OF LIFE

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The earth and its atmosphere system are surrounded by a protective layer called the stratospheric ozone layer 15-35 km above the surface of the earth. This is a highly specialized gaseous blanket covering earth and thereby protecting it from the harmful impacts of Ultra Violet (UV) radiation by absorbing 98% of the UV rays before reaching earth's surface. Chemically each ozone molecule is composed of three oxygen atoms. Unfortunately due to global increase in human population and the rapid expansion of industry release of chlooflourocarbons (CFCs) once extensively used in the refrigeration and air conditioning industries, aerosols and plastic products have been interacting with this protective blanket and depleting the zone layer over several decades. The CFC molecule contains highly reactive atoms of inert gaseous elements like fluorine and chlorine. The CFCs are virtually indestructible molecules and can stay in the earth's atmosphere for a considerable long period. However, once they interact with the ozone layer they start getting depleted into their corresponding atomic forms releasing the deadly chlorine atom. This highly reactive chlorine atom on its turn cleaves one oxygen atom from each ozone molecule producing chlorine monoxide; thereby breaking down the ozone molecule. One chlorine atom is estimated to destroy 100,000 ozone molecules and thus initiates a disastrous chain reaction drastically depleting the ozone layer or the protective blanket against the harmful UV radiations. The rates of depletion of the

protective ozone layer has been variable over time and space and turned extremely serious over the past five to six decades to generate deadly holes in the ozone layers named as ozone holes. Some of the most deadly and prominent ozone holes have been detected over parts of Greenland, Australia and Antarctica. The extreme lower temperature of the polar region, particularly over Antarctica further hastened the ozone depletion resulting in significant thinning of the protective ozone blanket over the icy continent with serious impacts on her fragile ecosystems. Several leading international space agencies such as the NASA and European Space Agency have been extensively monitoring these ozone holes and assessing their impacts on the life of animals, plants and humans as well as the natural ecosystems. The deadly ozone holes have been allowing harmful UV radiations to reach the earth's surface with detrimental impact on human health like increased incidences of cataracts, suppression of the immune system, skin cancer and related carcinogenic disorders mediated via unwanted mutations in the DNA of living organisms with long term impact on human and animal lives. Harmful UV radiation impacting normal growth and reproduction of crops and plants have serious consequences for future global agriculture and forestry as well as disruption of the vulnerable global ecosystems and biodiversity. Therefore, the depletion of ozone layer is an important international issue that impacts all developed, developing and under developed nations. The signing of Montréal Protocol by UN member nations completely banning the use of CFCs under a prescribed format have been a welcome action that has reduced the level of chlorine in upper atmosphere and thereby slowly curbing the current rate of ozone depletion. It is therefore important to have more such global collaboration, cooperation, coordination and communication (4Cs) among UN member nations to deal with serious future global environmental and ecological challenges.



EVENT / CONFERENCES

Following are the details of some important conferences:

1. IASTEM- 460th International Conference on Environment and Natural Science (ICENS) at London, United Kingdom on 18th - 19th September, 2018. <http://iastem.org/Conference2018/UK/5/ICENS/>
2. International Symposium on Recent Trends in Agriculture, Biodiversity and Social Sustainability (ABSS 2018). 30th September & 1st October, 2018 at Botanical Survey of India (BSI) Auditorium, Chetham Lines, Allahabad, U.P., India. <http://prayagsangam.org/gdcsaidabad.org>
3. ISER-448th International Conference on Chemical and Environmental Science (ICCES) at Hamilton, Hamilton, New Zealand 6th - 7th October, 2018. <http://iser.co/Conference2018/NewZealand/5/ICCES/>
4. International Conference on Renewable Energy, Green technology & Environmental Science (ICREGTES) on 7th October, 2018 at New Delhi, India. <http://www.asar.org.in/Conference2018/10/NewDelhi/ICREGTES/>
5. International Conference on Advances in Agricultural, Biological and Applied Sciences for Sustainable Future on 20th - 22nd October, 2018 at Moot Court Conference Hall, Swami Vivekanand Subharti University, Meerut, Uttar Pradesh, India. <http://agriinventionjournal.com>
6. International Conference on Recent Advances in Medical, Medicine and Health Sciences (ICRAMMHS) on 11th November, 2018 at New Delhi, India. <http://wrfer.org/Conference2018/11/NewDelhi/ICRAMMHS/>
5. National Conference on Chemistry for Human Health and Environment (CHHE) on 15th - 16th December, 2018 at Conference Center University of Delhi, Delhi 110007. <http://greenchem.du.ac.in/www.nesa-india.org>

APPEAL TO LIFE MEMBERS

NESA Life Members are requested to submit short articles for the NESA e-Newsletter that are consistent with NESA's objectives to improve environment. The articles should focus on topics related to environment and facilitate communication and discussion among researchers, academicians and students. The articles for October edition can be submitted to nesapublications@gmail.com before **25th September, 2018**.

Dr. Shefali Gola
Editor, NESA E-newsletter

To,

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