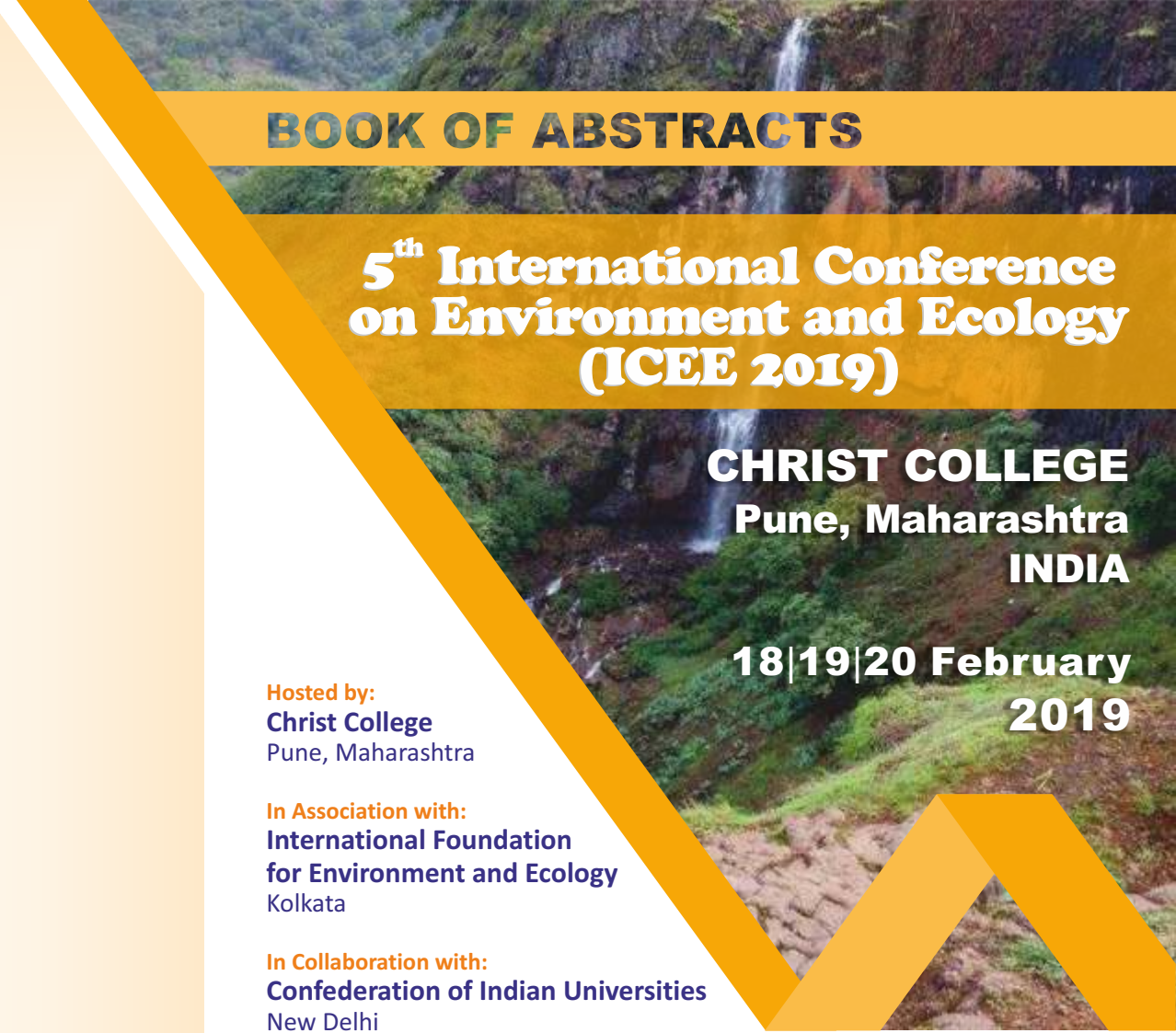

BOOK OF ABSTRACTS

5th International Conference on Environment and Ecology (ICEE 2019)

CHRIST COLLEGE
Pune, Maharashtra
INDIA

18|19|20 February 2019

Hosted by:
Christ College
Pune, Maharashtra

In Association with:
International Foundation for Environment and Ecology
Kolkata

In Collaboration with:
Confederation of Indian Universities
New Delhi

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ISBN: 978-93-5346-886-6

MAKE INDIA CLEAN AS WELL AS CLEANING UP TECHNOLOGIES

www.icee.net.in

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International Foundation for Environment and Ecology

International Foundation for Environment and Ecology (IFEE) is an autonomous non government and non political organisation has been established on the auspicious occasion of the World Environment Day on 5th June 2014 based on its incorporation as a Charity under the Central Act II of 1882, Government of India head quartered in Kolkata, West Bengal with the main objective 'To Protect Our Mother Earth'.

The motivation for the establishment of this organisation has been based on the issues of environment protection and education discussed in the deliberations at Founes in 1971 and later at Stockholm in 1972 , Rio de Janeiro in 1992 , Johannesburg in 2002, Copenhagen in 2009 and also on the resolutions and recommendations of the Intergovernmental Conference organised by UNEP and UNESCO.

The activities of IFEE will include the strategies for creating more researches on environment among the globe for ensuring environmental protection and simultaneously encouraging a balanced and a sustainable growth in all countries of the world by using clean as well as cleaning-up technologies through new and emerging techniques for climate change management, environmental and disaster education, , waste management, green business and technologies besides strengthening of diplomatic relations among nations for protecting our Mother Earth.

The idea is also to promote environmental education among the school and the college going boys and girls by “Catching Them Young” and for designing appropriate technologies to ameliorate environmental problems.. This will be possible as IFEE has the qualified inventory of experts for establishing universities, colleges, institutions, schools and other training enterprises in different countries with the latest equipment and infrastructure for conducting formal, informal, open, distance, online, internet and webbased environment-centric programmes in all countries of the world.

Activities of IFEE

IFEE encourages environmental development and protection through the spread of universal quality education and supports the involvement of communities and citizens in the endeavour. The activities of IFEE are discussed below.

1. Consultancy to different institutions and universities at national as well international level with a view to solve environmental problems.
2. Launching of Bachelor’s, Master’s and Doctoral Degree Programmes through mutual and technical cooperation for initiating study and research based activities in the areas of, geoinformatics, bioinformatics, human rights, disaster management, sustainable development, ecology and environment and other allied fields.
3. Conducting environmental impact assessment along with pollution monitoring and control in sugar, leather, petro-chemicals, pharmaceuticals, cement, paper, rubber, steel, thermal power plants and mining industries.
4. Collaboration for scientific and environmental research work for promoting technological innovations in different fields related to environment.
5. To institute, honour and award persons and institutions for their immense contribution and dedication to protect and conserve the environment and promoting the path of Sustainable Development.

Areas of Activities

1. Scientific, Social & Environmental Research
2. Environmental Education & Literacy
3. Environment and Human Rights
4. Sustainable management of hazardous waste and substances;
5. Enhancing environmental awareness and promoting transparency and public participation in decision-making, and access to justice in environmental matters,
6. Promoting effective engagement of women and youth in environmental activities;
7. Supporting disaster preparedness, prevention, response and recovery at community level as well as at national level

International Conference on Environment and Ecology

IFEE organise every year an International Conference on Environment and Ecology at top-notch universities of India in collaboration with Confederation of Indian Universities (CIU), New Delhi since 2015.

The purpose behind the conference is to generate new knowledge related to understanding the background and causes of different ecological and environmental events and calamities at the local and global levels and at the same time set the groundwork for future conferences and publications on environmental and ecological issues. The conference is an ideal forum and platform where all the environmental experts, students, scholars and academicians come together and unanimously decide for the appropriate technology for protecting the Mother Earth.

In the year 2015 ICEE was organised in Kolkata, 2016 at Bharathiar University, Coimbatore, Tamil Nadu, in 2017 it was organised in ST Xaviers College, Ranchi, Jharkhand and 2018 the 4th ICEE has been organised at Gauhati University, Assam.

Awards of IFEE

IFEE recognizes the contribution of scientists, academicians, researchers in the field of science and environment. IFEE has instituted several awards to motivate and further the spirit of the talented ones in the field of science and environment. The selection of the awards is considered mainly on the basis of the merit.

For Colleges/ School/ Institute Category

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Christ College, Pune, Maharashtra

Christ College, Pune is a noble venture by Carmel Vidya Bhavan Trust formed by the members of the congregation of the Carmelites of Mary Immaculate (CMI), the first indigenous religious congregation in India.

Having a great legacy in the field of education, Christ College strives to impart quality education without distinction of religion, caste or creed. Inspiring them to become men and women of integrity, the motivated faculty ensures that the students are trained in tune with the latest developmets in the subject.

The college is affiliated by Savitribai Phule Pune University, Maharashtra.

Confederation of Indian Universities (CIU), New Delhi

As we approach the Twenty first Century, a number of major challenges face women and men around the world as they interact with one another as individuals, groups, and with nature. Globalisation of trade, of production, and of communications has created a highly interconnected world. Yet the tremendous gaps between the rich and the poor continue to widen both within, and between nations. Sustainable development remains an elusive long-term goal, too often sacrificed for short-term gains.

It is imperative that higher education offer solutions to existing problems and innovate to avoid problems in the future. Whether in the economic, political, or social realms, higher education is expected to contribute to raising the overall quality of life, worldwide. To fulfill its role effectively and maintain excellence, higher education must become far more internationalized; it must integrate an international and intercultural dimension into its teaching, research, and service functions.

The most significant feature of education for mother earth protection in the 21st century is not so much what the French call li explosion scolarie, but the knowledge explosion, which has expanded the catchment areas of learning so fast that it takes only a few years now for the state-of-the-art in any field to become obsolete. Different modes and types of communicating for advancement of knowledge are fast changing and becoming more than sophisticated. In this technological era knowledge can easily be dispensed technologically and electronically. Teachers and formal school structures are becoming less important, and the conventional age limits on the learning process are becoming blurred.

Viewing the urgent need for mutual and technical cooperation among the Universities in India, exchange of information, export

and import of educational know-how and consultancy, control on duplication of efforts and wastage in higher education, vocationalisation of existing careers besides strengthening the financial health of the existing Universities for implementing educational programmes having social, cultural, technical, economic and positive contents for the optimum development of our country, the “Confederation of Indian Universities (CIU)” has been established with the cosponsorship of selected university level institutions in India.

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Abstract of Keynote Address

Effects of Climate Change on Biodiversity

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Since the industrial revolution, human actions have caused average global temperatures to rise by almost 1°C. Levels of carbon dioxide and other heat-trapping greenhouse gases in the atmosphere are higher than they have been at any point in human existence and are still increasing. Over the coming decades, global temperatures will continue to rise. But we don't yet know how much and how fast will they rise.Scientists warn that 1.5°C of warming will likely have catastrophic impacts. Extreme weather events – from floods and storms, to droughts and heatwaves – bringing huge social and economic costs. Melting ice causing sea levels to rise, flooding coastal cities and whole island nations. Water scarcity and crop failures causing food shortages and unprecedented movements of people within countries and across national borders. Huge, irreversible damage to nature, potentially leading to mass extinctions.

Diversity can be measured in three dimension Ecological diversity-different habitats, niches, species interactions, and Species diversity - different kinds of organisms, relationships among species and Genetic diversity- different genes & combinations of genes within populations.Biodiversity, the diversity of living things on Earth, is a critical measure of the Earth's health. Biodiversity provides immense direct benefits to humans including food, water, clean air and medicine. Maintaining biodiversity provides greater food security, opportunities for economic development, and provides a foundation for new pharmaceuticals and other medical advances. Because of the rapid climate change species extinction rates in the future are very difficult to predict. However, with immediate and decisive action to mitigate climate change, losses of biodiversity can be

minimized and humans can continue to reap many of the benefits nature provides. Lass of biodiversity due to climate chance will drastically lower the quality of life for humans and will take millions of years to reverse.

As climate change alters temperature and weather patterns, it will also impact plant and animal life. Scientists expect the number and range of species, which define biodiversity, will decline greatly as temperatures continue to rise. The loss of biodiversity could have many negative impacts on the future of ecosystems and humanity worldwide.

Greenhouse gases, such as carbon dioxide, absorb heat from sunlight and preventing it from escaping back into space. Temperatures raises as the level of greenhouse gases rises in the atmosphere. Climate Change predicts by 2100, temperatures may rise as much as 6 degrees Celsius (11 degrees Fahrenheit). Though the Earth's climate has changed in the past, the rapid severity of this change will directly affect ecosystems and biodiversity

Rising temperatures already affect the world's polar region. Diminishing ice packs reduce the habitats of polar bears, penguins, puffins, and other Arctic creatures. As the ice melts, it increases the sea level, which will affect and perhaps destroy ecosystems on coastlines. Changes in temperatures will also cause shifts in mating cycles, especially for migratory animals that rely on changing seasons to indicate their migration and reproductive timing.

Effects on Biodiversity : As biodiversity decreases, there will be far-reaching effects. Disruptions in the food chain may greatly affect not only ecosystems but also humanity's ability to feed an ever-growing population. For example, losing diverse insect species will decrease plant pollination. Additionally, this may decrease humanity's ability to produce medicine, as extinction claims more and more key plant species. Biodiversity also protects

against natural disasters, such as grasses that have evolved specifically to resist the spread of wildfires.

Changes to ecosystems as a result of climate change are likely to have significant and often negative social, cultural and economic consequences. However, there is still uncertainty about the extent and speed at which climate change will impact biodiversity and ecosystem services, and the thresholds of climate change above which ecosystems are irreversibly changed and no longer function in their current form. Tipping points are points at which a system passes from one steady state to another. These are used for either climate tipping points or ecosystem tipping points. An example of the latter is Amazon forest dieback.

Rainfall impacts the balance of plant types in a specific area. Shifts in climate patterns can also alter soil type, affecting which plants thrive and don't in certain regions. As a result, some species are left behind, particularly ones that have long life cycles and disperse more slowly, such as arctic and alpine plants. The adaptability rates can cause some species to be lost, and others to move. There is also the impact of invasive species, which adapt more quickly to the environmental conditions where native species might struggle.

Temperature, rainfall, and the length of day affect phenophases, or the timing of plant life cycle phases. Seasonal variations impact these phases, but climate change is altering temperature and rainfall patterns, extending growing seasons and shifting them.

Warming temperatures and loss of oxygen in the sea will shrink hundreds of fish species—from tunas and groupers to salmon, thresher sharks, haddock and cod—even more than previously thought, a new study concludes.Because warmer seas will speed up their metabolisms, fish, squid and other water-breathing creatures will need to draw more oxygen from the ocean. At the same time, warming seas are already reducing the availability of oxygen in many parts of the sea. Climate change also affects the breeding of many fish species and this will reduce the fish

population. Body size of fish decreases by 20 to 30 percent for every 1 degree Celsius increase in water temperature. When temperatures rise, species shift their location.

Mitigation : Climate change affects virtually all natural and economic systems. This interaction between climate change and biodiversity, land degradation, forests, chemicals and waste, and international waters points to the importance of recognizing climate change implications in everything we do.

The GEF has the unique ability to support natural solutions developed with systems thinking that takes advantage of synergies to seek multiple global environmental benefits across Conventions while reducing trade-offs and duplication.

GEF support for climate change mitigation efforts touches on a range of sectors, including:

- Power: ensuring access to low and zero carbon energy solutions, such as solar, wind, small hydro, biopower and geothermal energy.
- Cities and Transport: investing in sustainable transport, as well as clean energy solutions for buildings and consumers
- Forests: targeting the sources of deforestation to ensure forests continue to provide environmental, social and economic benefits.
- Agriculture: promoting practices that reduce land degradation issues and enhance soil quality, while reducing greenhouse gas (GHG) emissions from the sector.
- Manufacturing: improving energy efficiency and reducing emissions
- Waste: reducing GHG emissions from landfills coupled with reduction in release of chemical pollutants and contamination.

Food Security and Safety under Climate Variables

Traditional Knowledge About Some Fruit: A Survey Report

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Traditional knowledge refers to practices of indigenous and local communities. Traditional knowledge is very ancient. In recent past years public awareness is enhanced towards the protection of traditional knowledge. Since time immemorial, plants served as the best source of medicines to treat different diseases. Medicinal plants are rich of secondary metabolites and are of source of drugs (in Homeopathy, in Ayurveda, in Unani, in Siddha, in Allopathy etc. Fruits are seed bearing organ of plants formed from ovary after flowering. Although we are rich in plant wealth but utilization and maintenance of biodiversity on long term basis without destroying habitat is needed, so our coming generations can use them. Overall aim is to promote traditional knowledge and biodiversity conservation for future use.

Keywords: *Traditional knowledge, Medicines, Fruits, Biodiversity.*

Impact of Frontline Demonstrations on Adoption of Improved Practices of Sunflower

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Front line demonstration (FLD) is an appropriate means for demonstration as well as transfer of improved agricultural innovations to the farming community. Under centrally sponsored scheme on oilseed production technology under NMOOP scheme, AEEC, Lingsugur has conducted 32 front line demonstrations in farmer's fields during 2017-18 over an area of 12.8 ha on sunflower production technology to transfer the latest technologies among the farmers of Lingsugur taluka of Raichur district. The overall yield trend in FLD ranged from 785 to 1095 kg/ha with an average of 950 kg/ha which recorded 20.42 per cent higher yield than the farmers practice plot. Obviously, this can be attributed to improved technology as well as improved varieties. The yield levels were considerably low under local practices because of considerable variations in the extent of adoption of recommended package of practices depending upon the amount of risk involved in terms of cost, convenience, skill and knowledge about the concerned practice. The productivity was better over local practice under demonstrations. Hence, sunflower production technology have a broad scope for increasing the area and production at each and every level i.e., Farmers, State and National level.

Keywords: *Sunflower, FLD, technology, production*

Effect of Malathion and an Effluent on Pod Weight Per Plant and Seed Yield Per Plant in Two Soybean (*Glycine max L.)* Varieties

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Introduction: Agricultural chemicals are being used extensively by the farmers, for obtaining high crop yields by controlling pests and diseases and eliminating weeds. But the Indian farmers, do not realize that their indiscriminate use may have adverse effect on the crop plants as well as on nontarget organisms.

Objective: This investigation deals with the effect of one pesticide (Malathion) and a sugar factory effluent on pod weight per plant and seed yield per plant on two varieties of Soybean (*Glycine max L*.) namely Bragg and Birsa-1.

Methodology: The normal concentration used during crop cultivation under field conditions was used as the medium dose for Malathion. Effluent was diluted to 10%, 25% and 50% with diluted water and filtered after proper shaking. Seeds of two varieties of Soybean (*Glycine max L.)* namely Bragg and Birsa-1 were presoaked in distilled water. 100 seeds were then treated with three concentrations namely 0.10%, 0.20% and 0.40% for Malathion and 10%, 25% and 50% for effluent for two hours and then sown in experimental field in two replications along with the control after thorough washing.

Results: Pod weight per plant showed marked reduction in all the treatment doses of both the varieties as compared to the control, being lowest in their high concentration. Dose dependent inverse relationship was observed in Bragg variety for Malathion treatments. However, no definite correlation was observed in variety Birsa-1. Both the varieties did not show any correlation for effluent also. However, variety Bragg showed marked reduction as compared to control.

For observation on seed yield per plant both the varieties showed marked reduction as compared to that of control for both Malathion and Effluent. The Malathion treatment of variety Bragg showed gradual decrease in seed yield with increase in concentration whereas in Effluent all the treatment doses showed a very narrow range of variation. In variety Birsa-1, Malathion and Effluent treatments showed a narrow range of variation.]

Conclusion: Differential adverse response to various treatments was more evident in case of variety Bragg than in Birsa-1 which could be attributed due to their genetic difference. It is therefore important to use pesticides very judiciously. The only available remedy thus, is to go in for biopesticides and organic farming.

Keywords: *Birsa-1, Biopesticides, Bragg, Effluent, Malathion treatment, Pod weight per plant, Seed yield per plant, Soybean.*

Yellow Mosaic Disease of Mungbean in Chhattisgarh is Caused by *Mungbean yellow mosaic India virus* (MYMIV)

Mahesh M. Mahajan, Bhimeshwari, S, Sridhar, J, Ashish Marathe and P.N. Sivalingam

ICAR-National Institute of Biotic Stress Management Baronda, Raipur, Chhattisgarh, India

Yellow mosaic disease (YMD) is one of the important and prioritized diseases of mungbean in Chhattisgarh. Recently, the YMD incidence recorded in Chhattisgarh was reported to be 21-94 % and in the experimental farm of ICAR-NIBSM, the YMD incidence was recorded 100 %. The virus isolates found transmissible to healthy mungbean plants through whitefly. In the present study, yellow mosaic disease infected leaf samples were collected from the field and stored at -80°C. The genomic DNA was extracted from these samples following CTAB method and PCR was carried out using universal primers for begomovirus PAL1c1960/ PAR1V722. Approximately 1.1 Kb DNA fragment was amplified with genomic DNA extracted from symptomatic samples, suggesting their association with begomovirus. Similarly, genomic DNA extracted from these samples was subjected to PCR with Mungbean yellow mosaic india virus (MYMIV) and Mungbean yellow mosaic virus (MYMV) specific primers. The positive amplification obtained with DNA A and DNA B specific primers to MYMIV but not with primers specific to MYMV. This suggests that the begomovirus infecting yellow mosaic disease in Chhattisgarh is caused by MYMIV. DNA A genome of Raipur isolate cloned by rolling circle amplification and sequenced. Partial sequence of cloned component of DNA A results confirmed that yellow mosaic disease of mungbean in Raipur, Chhattisgarh is caused by *Mungbean yellow mosaic India virus*.

Keywords: *Begomovirus, Mungbean Yellow Mosaic India Virus, Polymerase Chain Reaction, Whitefly, Yellow Mosaic Disease*

Characterization of Black Soil Amended With Tea Waste and Their Effect on Seed Germination of *Triticum Aestivum*

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A study was conducted for evaluating the characters of black soil collected from local agricultural field when amended with tea waste and also investigated their effect on seed germination of *Triticum aestivum*. Different treatments of soil with tea waste (0%, 25%, 50%, 75%, and 100%) in three replicates were prepared and incubated for 10 days. After 10 days incubation, soil alone shows the highest pH. With increase in tea waste concentration, pH decreased from 6.78 to 4.32. Moisture percentage found to be highest in soil + tea waste (1:1) which concluded that equal concentration of tea waste with that of soil improves the water holding capacity. The chloride content was calculated to be highest in soil+ tea waste (3:1) as compared to others. In case of organic carbon content, soil with tea waste (1: 3) showed the highest content as compared to other treatments except from that of tea waste alone. The phosphate was calculated to be highest in soil alone whereas there was a gradual decrement in phosphate quantity on applying tea waste with increased in concentration might be due to lowering of pH. Soil with tea waste (1:3) contained highest concentration of bicarbonate. From day 1 to day 10, there was a gradual reduction in carbon mineralization for all the treatments. Carbon mineralization was found to be highest in soil alone. Soil amended with tea waste result in low carbon mineralization concluded negative influence of tea waste for breaking of complex compound for utilization by plants. The results for studying the effect of matrices on seed germination proved that the untreated tea waste act as an inhibitor for seed germination of *Triticum aestivum.* Seed germination was absent in all the treatments containing tea waste after 10 days, whereas the seeds germinate within four days in soil alone. The piece of

work concluded that the tea waste which contains cooked tea, milk, sugar and ginger have the capacity to change characters of agriculture soil effectively and also the components either one or many might be responsible for providing negative influence on seed germination of plant taken under consideration. The main reason behind the result might be the acidic condition developed by tea waste or it might be the constituents of tea waste which interfere for providing basic nutrients for seed germination. Further research should be carried to determine the responsible constituents so that the tea waste should be treated accordingly before applying in the agricultural land. The overall conclusion of the study is that tea waste after stabilizing could be used in alkaline soil to increase its fertility and nutrient content.

Keywords: *Untreated tea waste, pH, Organic carbon, Carbon mineralization, Phosphate level, Seed germination.*

Quantitative Estimation of Aflatoxin and Pesticide Residues from Ginger (*Zingiberaceae*) as Obtained in the Selected Area of Mysuru District, Karnataka

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H.D Kote and Hunsur taluk of Mysuru is the major ginger (*Zingiberaceae*) cultivated district in Karnataka state. Totally 40 samples were collected directly from the farmers of different villages of H.D Kote (n=15) and Hunsur (n=25) taluks. During the cultivation of ginger (Zingiberaceae) the farmers are used the pesticides in each stages, for high yielding purpose. This study was revealed that to measure the amount of pesticides present in the final product. Aflatoxin is produced by the fungi aspergillusflavus and it having properties of nephrotoxic, teratogenic, carcinogenic, and immunosuppressive. It can be determined by the reliable method like HPLC (column symmetry C-18; 4.6X250 mm) used with detection by florescence (excitation 364 nm, emission 465 nm). Like that the organophosphors also determined by GC (column summery RTX-5; 30m) the level can be indicated in ppb and ppm respectively.

Keywords: *Ginger (Zingiberaceae), Aflatoxin, Pesticides, Organophophorous.*

Quantitative Estimation of Reducing Sugars from Papaya (*carica papaya*) Peels by Novel Spectrophotometric Technique

Venkatesh R and Chandraju S

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The mixture of alkaline copper tartarate and potassium ferrocyanide was found to be useful in the spectrophotometric determination of reducing sugar from papaya peels by hydrolyzing the polysaccharide by varying the concentration of acid, temperature and time of exposure. The absorbance formed at 670 nm was proportional to the concentration of copper with reference to Cu-glucose equivalence table; quantitative estimation of reducing sugar is arrived. The novelty in this method is utilization of Cu (II) oxidative state instead of reduced Cu (I) for analysis which makes it different from usual standard methods. This method is rapid, convenient with a minimal relative percentage error i.e. 0.8%.

Keywords: *Reducing sugar, Spectrophotometric estimation, Potassium ferrocyanide, Minimum error.*

Study On Resource Use Efficiency of Direct Seeded Rice In North-Eastern Karnataka Region

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Rice *(Oryzae sativa L.)* is the world's most important crop and is a staple food for more than half of the world's population. In India, rice is grown in an area of 44.6 million ha with a production of 109.5 million tonnes and average productivity of 2.62 tonnes per ha. In India rice is commonly grown by transplanting seedlings in the puddle soils which is less economically feasible compared to Direct Seeded Rice. Hence the most promising option for the future is to adopt direct sowing of rice in place of transplanting. Globally 23.00 per cent of rice cultivated is being observed as direct seeded (Rao *et al*., 2007). This paper examines the resource use efficiency of Direct Seeded Rice with respect to transplanting method of paddy cultivation. Resource use efficiency analysis assumes greater importance in ascertaining whether production at the farm level could be increased profitability to an optimum level by making re-allocation of existing resource use pattern. The direct estimates of production function were used to test the efficiency of different production inputs under Direct Seeded Rice and transplanting method of paddy cultivation. Factors of production were used in excess quantities except in case of organic manures than the recommended doses and the resources used in transplanting method were more than that of the Direct Seeded Rice method. And the efficiency of resources show significant results for fertilizers, plant protection chemicals and herbicides in DSR and Allocative efficiency for resources such as farm yard manure, fertilizers, land area and seeds in Direct Seeded Rice have indicated positive and more than unit value for MVP:MFC.

Keywords: *Direct Seeded Rice (DSR), Resource use efficiency, input use, Allocative efficiency etc.*

Development and Evaluation of IPM Modules for the Management of Guava Fruit Fly

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Field studies were carried out during *kharif* 2016 and summer 2017 at Udyanagiri, UHS, Bagalkot, Karnataka, India to evaluate IPM modules against fruit fly in an already established guava orchard of variety Sardar (L-49). Among four modules, the mean fruit damage was significantly the lowest in M3 (0.68%) followed by M2 (1.19%) and M1 (2.21%) and were on par with each other during *kharif* 2016. During summer 2017, M3 recorded significantly lowest damage (0.59%) followed by M2 (0.92%) and M1 (2.41%) but were on with each other. The highest per cent protection was afforded by M3 (95.76 and 96.76, respectively) during 2016 and 2017. The average fruit yield over the years of experimentation revealed significantly the highest fruit yield (8.13 t/ha) from M3 followed by M2 (7.32 t/ha) and M1 (5.31 t/ha). Among the four modules, highest B:C was from M3 (7.65) followed by M2 (6.67) and M1 (4.91).

Drought Mitigation Strategies Onyield and Economics of Pigeonpea (*Cajanuscajan*L.Millsp)

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The field experiment was conducted at Zonal Agricultural Research Station (ZARS), University of Agricultural sciences (UAS), Gandhi KrishiVigyana Kendra(GKVK), Bengaluru from 2015 to 2017.The experimentwas conductedunder kharif season as rainfed crop with ten treatments replicated thrice under randomized complete block design(RCBD),using BRG-2 variety of pigeonpea. The soil of the experimental site was red sandy loam in texture belonging to the order *Alfisol*. The soil pH was 6.5 with an electrical conductivity of 0.2 dSm^{-1}. The soil organic carbon content was low (0.42%). The soil was low in available Nitrogen (204 kg ha^{-1}), medium in available Phosphorus (29.5 kg ha^{-1}) and available Potassium (203 kg ha^{-1}). The treatment details are T_1 - Seed hardening with $CaCl_2$ (2%) at the time os sowing, T_2-Vermicompost applied to soil before sowing @ 2.5 t/ha, T_3–Farm Yard Manure (FYM) applied to soil @5 t /ha + 2% KH_2PO_4 spray at flowering + 2% KNO_3 spray at pod development stages, T_4 -Mulching in between the crop rows with organic residues @ 5t/ha, T_5 -Pusa hydrogel applied to soil @ 2.5 kg/ha, T_6 -Seed hardening with $CaCl_2$ +Pusa hydrogel @ 2.5 kg/ha, T_7 -Vermicompost @ 2.5 t/ha + Pusa hydrogel @ 2.5 kg/ha, T_8 -FYM @5 t /ha + Pusa hydrogel @ 2.5 kg/ha + 2% KH_2PO_4 spray at flowering + 2% KNO_3 spray at pod development stagse, T_9 -Pusa hydrogel @ 2.5 kg/ha +Mulching with organic residues @ 5t/ha, and T_{10} – Control.

The results (mean of three years) revealedthat aplication of pusa hydrogel at 2.5 kg/ha + Mulching with organic residue at 5 tonnes/ha recorded significantly higher pigeonpea grain yield(2180.3 kg/ha) but it was on par (2095.0 kg/ha) with vermicompst applied at 2.5 tonnes/ha + pusa hydrogel at 2.5 kg/haand also onpar(2025.0 kg/ha) with FYM @ 5tonnes/ha +2% KH_2PO_4 at flowering +2% KNO_3 spray at pod development stage + Pusa hydrogel @ 2.5 kg/ha. Similar trend was observed with yield attributing factors and B:C ratio also.

Farmer's Knowledge Level and Adoption Behaviour for DSR Method in North Eastern Karnataka Region

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Rice *(Oryzae sativa L.)* is the world's most important crop and is a staple food for more than half of the world's population. In India, rice is grown in an area of 44.6 million ha with a production of 109.5 million tonnes and average productivity of 2.62 tonnes per ha. In India rice is commonly grown by transplanting seedlings in the puddle soils which is less economically feasible compared to Direct Seeded Rice (DSR) method. Hence the most promising option for the future is to adopt direct sowing of rice in place of transplanting. Globally 23.00 per cent of rice cultivated is being observed as direct seeded (Rao *et al*., 2007). In order to adopt the DSR method of paddy production the farmers' first need to have the proper knowledge about the agronomic practices and pests and diseases in order to make maximum profit with optimum input use and higher yields. This paper examines the knowledge level of the sample farmers on agronomic practices, major pests and diseases involved in DSR paddy production and the source of knowledge and reasons for adoption of DSR. The results of the paper depicted that the majority of the respondent DSR farmers had the complete knowledge about the agronomical practices and pests and diseases and the major source of knowledge about DSR in the TBP and UKP command areas of North Eastern region of Karnataka. Major source of information for adoption were Public sector organizations such as RSK's, ADA and JDA offices followed by the Agricultural Universities and the least number of farmers have adopted DSR method on the basis of knowledge acquired from mass media. Progressive farmers have also played a major role in transmission of DSR method in both the command areas. The major reason for the adoption of DSR in the study area was found to be the savings accrued in nursery cost.

Keywords: *Direct Seeded Rice (DSR), Knowledge level, Adoption, Transmission process.*

Bio-Efficacy of Bio-Pesticides on Citrus Crops

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Among the various insect-pests, *Papilio demoleus, Phyllocnistis citrella* and *Diaphorina citri* are the regularly occurring insect-pests in citrus orchards. Experiments were carried out in Horticulture Garden of C.S.A. University of Agriculture and Technology, Kanpur. *Bacillus thurangiensis* products- Dipel, Biolep and Neem products- neem oil, neem nool and achook were used in different concentrations and persistence toxicity in and LT50 were calculated to assess their Bio-efficacy. It was found plant originated insecticides neem oil 0.5, 0.75, 1.0 persisted upto 5, 9, 9, days, neem gold 0.05, 0.75, 1.0 up to 11, 11, 17 days and achook 0.05, 0.75, 1.0 up to 7, 11, 11 days, respectively. Residual toxicity and lethal time was found in neem formulations- neem oil at 0.5 per cent, neem gold of 0.75 per cent and achook 1.0 per cent gave significant decrease in probit value per unit of dosage. Relative efficacy of neem oil was higher (1.245) as compared to neem gold (1.0%). It was concluded that Dipel, biolep and neem based insecticides can be used at flowering and fruiting stage of plants. They are treated as safer insecticides in nursery plants intercropping may be taken in to practice in citrus plantations.

Keywords: *Papilio demoleus, Bacillus thurangiensis, Neem Oil, Neem Gold, Achook, Dipel, Biolep.*

Changes In Cloud Cover Over India And Its Impact On National Food Security

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Cloud cover is an important meteorological parameter for weather forecasting. India is experiencing thinned and reduced low cloud cover over the last 50 years (between 1960 and 2010). Low clouds (attained the height of 0-2 km) are declining through all the seasons, however, its declination during the monsoons (June to September) is a great matter of concern because monsoon season solely contributes nearly 70 per cent annual rainfall and over half of farming in India is still dependent on rains. Relying on the report published by India Meteorological Department (IMD) in the journal Mausam, this paper tries to show how thinning of the low cloud cover could affect the national food security. Low flying clouds usually bring bulk of rainfall but this cloud cover is reducing by 0.45 per cent per decade on average, which means less rain and more heat. During the monsoon season, the thickest low cloud cover was recorded in 1961 (46.7%), and the thinnest in 2009 (33.5%). Spatially, central India, southeast peninsula and west coast has observed decrease in low cloud cover in monsoon season while northwest India and Indo-Gangetic plains have found increase in low cloud cover during winter and summer seasons. Low cloud cover variability with associated climatic parameters like maximum temperature, diurnal temperature range and numbers of rainy days etc regulates the total rainfall amount, intensity and pattern. Poor agricultural production causes decreased food availability and rural people due to their low affordability could not buy food which in turn affects absorption. India's hunger and malnutrition levels are still very high; therefore, the country must finds its way to adapt to a thinning low cloud cover. The mechanism contributing to the increasing/decreasing low cloud cover over India is unknown and uncertain at present but they are important agents in climate change. Farmers have to learn to cope with the changing climate by storing water, changing crop patterns and other suitable methods for sustaining agricultural productivity.

Keywords: *weather, low cloud, monsoon, rainfall, agricultural production*

Impact Of Environmental Factors On Population Dynamics Of Red Cotton Bug, *Dysdercus Cingulatus* (Fabricus) In Muzaffarpur, Bihar (India)

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Bihar is one of the largest producer of fruits and vegetables in the country. The total area under vegetable cultivation in Bihar is about 5.00 lakh ha with annual production of about 7.6 million tones. Red cotton bug *Dysdercus Cingulatus* is a serious pest of cotton in U.P., Bihar, A.P. , Tamil Nadu & Maharashtra. This also infests malvaceous, solanaceous and cucurbatecous and causes economic loss to the growers by its adults and hymphs both. They feed upon flowers and developing fruits and affect the crop yield and quality of fruits. Studies on population of pest in relation to environmental factors especially temperature and relative humidity were made in the field condition. Four hosts viz. Datura, Pilibuti, phut and wax gourd were selected for study. It was observed that the number of pests on Datura varied from 22 to 48 showing the minimum and maximum in May and March respectively. In hottest month of may when temperature was averaged 32.03 ^{0}C and relative humidity was 48.39%, population was minimum(22) and in March (temperature-24.23^{0}C and RH was 8.17%) population was maximum (48). The number of pests on pilibhuti varied between 18 to 44 having the minimum in may and maximum in march. In case of phut the observations were recorded for seven months from plantation to fruiting period. Range of average temperature was 16.20^{0}C - 32.03^{0}C and RH from 48.39% to 82.0%. Population of the pest varied between 15 to 50 in May and November respectively. Higher temperature (32.03^{0}C) coupled with lower humidity (48.39%) had direct bearings on the breeding activities resulting lower Population. In case of wax gourd the observations were recorded for six months from October to March. In these months, the number of pests varied between 27 to 41. The temperature ranged between 16.2^{0}C and 26.36^{0}C while the relative humidity varied between

75% to 82.0% during this period. The minimum population of pest (27) was observed in January when temperature was 16.2^{0}C and RH was 82.0% white the maximum population of pest (41) was observed in the month of October when temperature was 26.36^{0}C and RH was 75.0% . Form the statistical analysis, it was also clear that there was impact of temperature and relative humidity on the population dynamics of the pest.

Keywords: *Red Cotton Bug, Dysdercus, Cingulatus, Temperature, Relative Humidity, Population dynamics, Pest, Muzaffarpur*

Intensity of Foraging Activity in Subterranean Termites at Dummugudem Forest Region, Bhadradri Kothagudem District

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Seasonal wood degradation activity of termites five species *of Odontotermes feae (Wasmann), O. obesus (Rambur), O. wallonensis (Wasmann) Microtermes obesi (Wasmann), and Coptotermes hemi (Wasmann)* were studied at Dummugudem forest region, in Bhadradri Kothagudem district of Telangana, India for two years from June, 2017 to September 2018.Termite wood degradation was increased in during April to June, gradually it decreased in July to October then again increased from November to March. The relationship of a biotic factors indicate that wood decomposition activity of *O.obesus O. feae and O. wallonensis , Microtermes obesi, and Coptotermes hemi* was significantly correlated with minimum temperature, relative humidity and rainfall India is basically an agricultural country with most variable climate conditions and different geographic features. A variety of cereals, oil seeds, pulses, vegetables and horticultural crops are being cultivated in the country. Maize, groundnut and cotton are three important crops cultivated in kharif/rabi and kharif respectively in Telangana region. These are damaged by various species of termites in different zoogeographical regions. In Telangana, the termites belonging to the genus *Odontotermes* have been reported damaging crops.

Keywords: *Termites, Environment, Odontotermes, climate condition*

Change In Cropping Pattern And Food Inscurity : A Case Of Nandurbar District In Maharashtra

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Recent health survey has indicated that the health status of India women and children needs a lot of improvement. The condition of rural and tribal women and children is far from normal. Malnutrition and resulting hunger deaths is prevalent in many states including tribal areas of Maharashtra. Traditionally the tribal population in Maharashtra grows coarse cereals like nagali, varai, bhagar etc. along with jowar and legumes. These crops were used as their staple food along with food collected and hunted from the forest areas. During our filed work we noticed decline in the cultivation of legumes and increase in the cultivation of cash crops like soyabean and ground nuts. Also the local varieties of jowar are replaced by hybrid and high yielding varieties. A positive co-relationship between shift in the cropping pattern and malnutrition could be established in Nandurbar district of Maharashtra having dominant population of tribals.

Keywords: *Food Security, Cropping pattern, tribal, Nandurbar, Maharashtra.*

Climatic Variability Affects Food Security

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Now a days, variation in climatic conditions such as change in rainfall pattern, water availability, increase in temperature, increase in carbon-di-oxide concentration etc. have been considered to be the most burning issues of the environment. Since, environment provides us clean air, water, shelter, security and food, therefore, any variation in it directly or indirectly affect different social and economic aspects of life. Due to these climatic variations agricultural practices are greatly affected which can negatively affect the availability of good quality and sufficient quantity of food, hence, arise the problem of food security. Health related problems also originate due to these climatic variations. Food security, in general terms, is defined as availability of good quality and sufficient quantity of food to each and every individual at reasonable and affordable price. It seems that due to climatic variability food security would become the biggest challenge in coming few years. Therefore, such agricultural practices are required which maintain emergency stocks of food grains to overcome the problem of food security and also to fulfill the requirement of food due to unpredictable climatic conditions.

Effect of One Time Land Application of Treated Spentwash on soil health and crops yield

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Treated spent wash from M/s. Ravindra distillery and Co, Bidar was soil applied one time before the onset of the Monsoon in the selected farmer's field of Kadwad village, Bidar District during 2017-18. Treated spent was applied on the basis of nitrogen requirements of the crops.Soil samples were collected at two depths, 0-30cm and 30-60cmbefore the application of spent wash and after the harvest of the crops. Observation on pH, EC(dSm^{-1}), Available nitrogen, organic carbon and potassium levels remain well within the prescribed optimum limit indicating eco-friendly utilization of one time application of treated spent wash. Analysis of soil samples before and after harvest of the crops recorded pH values at 0-30 cm depth from 6.12 to 7.87 and at 30-60cm depth it was 6.00 to 7.72. Conductivity varied from 0.18dS/m to 0.42 dS/mat 0-30 cm and at 30-60cm depth it was 0.10 dS/m to 0.35dS/m.Organic carbon recorded at 0-30 cm depth varied from 0.14 to 0.84 per cent and at 30-60cm depth it was 0.12 % to 0.74%. Similar trend was also observed with available potassium and nitrogen. No deleterious effect on the yield of different crops including Maize, Soybean, Green gram, wheat, chickpea and sugarcane was observed.Based on the results, it could be concluded that one time land application of treated distillery spent wash could be used in agriculture as a source of plant nutrients. However, continuous use of the treated spentwash to the same land/field should be discouraged to keep the sustainability of soil.

Keywords: *Treated spent wash, soil health, crops, yield.*

Survey of Malnutrition Cases in pre school children Of Malkhed Circle, Ner Taluka,Yawatmal Distric, Maharashtra, India

Zarreen huma and Pushpa Shendokar

Malnutrition among under-five children is a major public health problem in India. This is reflected by the fact that the prevalence of under weight children in India is among the highest in the world & is nearly double that of sub-saharan Africa. The above study was the general survey method. The Ner Taluka Yawatmal district of Malkhed Circle was selected to study cases of Malnutrition found in rural Area's anganwadies. Weight was measured using electronic weighing balance. Objective of this study was to know the quality of meal supplying in anganwadies and checks the health issues of children. The results are concluded among the three groups of Malnutrition i. e; Acute malnourished, Medium Malnourished & Normal children. About 4.87% girl children prevalence of Malnutrition where as 5.32% of boy children were malnourished.

Keywords: *Malnutrition, children, anganwadies, health, Problem.*

Environmental Biotechnology and Microbiology, Bioremediation

Molecular Cloning and Characterization of Interferon Stimulated Genes (ISG15, Mx2 and OAS1) for early Pregnancy Diagnosis in *Bubalus bubalis*

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Introduction: An early and accurate diagnosis of pregnancy in animals is crucial to better reproductive management in livestock. This plays an important role in shortening the calving interval through early identification of open animals and their timely treatment and rebreeding so as to maintain a postpartum barren interval close to 60 days. A buffalo (*Bubalus bubalis*) is the most important dairy animal and well known for problems related to high calving interval, late puberty, and high incidence of anestrus. Lack of pen side early pregnancy diagnostic methods further aggravates this situation. Therefore, the present study was conducted to characterize interferon stimulated genes for development of ELISA which can detect pregnancy at 18-20 days after artificial insemination.

Objective: 1. Molecular cloning and expression of interferon stimulated genes in appropriate host system, 2. Development of monoclonal antibody against expressed recombinant protein.

Material and Method: In the present study, conceptus derived proteins such as ISGs (ISG15, Mx2 and OAS1) released during 18-21 days after insemination in response to implantation of embryo were targeted. Their expression was checked during 18-21 day after artificial insemination by real time PCR and amplification of mRNA was done by gene specific primers using semi quantitative RT-PCR. Three proteins (ISG15, Mx2 and OAS1) were cloned, expressed in *E.coli* and characterized in order to decipher their role in early pregnancy diagnosis in buffalo. *In silico* analysis of proteins were done in order to find the

suitability of proteins as a candidate molecule for early pregnancy diagnostic kits. The functional characterization identifies various motifs present in proteins which were responsible for its interaction with other proteins. Physiochemical properties predicted the proteins nature during *in vitro* conditions which are required for any of the assays development. Also *in silico* and *in vivo* study was conducted for immunogenic studies which revealed their antigenic nature. Using immortal hybridoma (fused myeloma and B cells) cells, highly specific and sensitive antibodies, anti-ISG monoclonal antibody for detecting ISGs (protein) in the serum of pregnant buffaloes were obtained for development of ELISA which can detect pregnancy at 18-21 day after artificial insemination.

Results and Conclusion: The ISGs genes were found to be upregulated ($P< 0.05$) in pregnant buffalo at 18 to 21 days of pregnancy. A blocking ELISA was developed using the anti-ISG15 monoclonal antibody to detect pregnancy in buffalo within 18 to 21 days after artificial insemination. In conclusion, *in vitro* expression and characterization of interferon stimulated proteins from *Bubalus bubalis* (buffalo) is a good indicative of conceptus implantation and has suitable properties for being used as biomarker to develop early pregnancy diagnostic kits.

Keywords: *Buffalo, Interferon stimulated genes, Pregnancy, Expression, ELISA*

Potential Gut Adherent *Bacillus tequilensis* LR3F3P as Probiotics for Rohu, *Labeo rohita* (Hamilton, 1822) Fingerlings: An Appraisal on Dose, Mode of Application, Growth and Immune Response

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The study aimed at determination of dose and mode of application of autochthonous *Bacillus tequilensis* LR3F3P (KF623287) as probiotics for *Labeo rohita* fingerlings. The probiotic bacterium was offered either through feed or as water additive. Three sets of experimental diets (D1-D3) were prepared with *B. tequilensis* @ 10^7, 10^9 and 10^{11} cfu g^{-1} of diet, respectively. Similarly, the water additive groups consisted of three treatment sets (WA1-WA3) where *B. tequilensis* was added to the rearing tanks so as to reach final concentrations of 10^7, 10^9 and 10^{11} cfu mL^{-1} of water, respectively. A group without probiotic treatment was considered as control. The trial was conducted for 60 days in triplicate treatments. Fish fed diet D2 containing *B. tequilensis* at 10^9 cfu g^{-1} had the maximum weight gain (115%), which was followed by the group WA3 with *B. tequilensis* at 10^{11} cfu mL^{-1} of culture water (109% weight gain). The highest values for protein efficiency ratio, apparent net protein utilization, and carcass protein, lipid and ash contents were also recorded with the group D2. Nevertheless, moisture content was least in the carcass of fish fed diet D2. Most of the blood parameters were noticed to increase significantly ($P< 0.05$) from the initial values, except SGOT, SGPT, ESR and Lactate dehydrogenase. Among immune parameters, the maximum serum lysozyme and serum ACH_{50} activities were recorded with the fish fed diet D2. However, peroxidase level (day 60) didn't differ significantly between the fish fed diet D2 and D3, and fish reared as WA3. Serum IgM levels in ?sh fed probiotic-supplemented diets were signi?cantly higher than the control group, and the highest IgM level was noticed in ?sh fed diet D2. The highest superoxide production and phagocytic activity were noticed in the fish reared as WA3. Respiratory burst activity of the head kidney macrophages was somewhat less affected in consequence of probiotics application. In conclusion, this study demonstrated that dietary administration of probiotics was superior to water additive, and *B. tequilensis* LR3F3P at a dose of 10^9 cfu g^{-1} diets was efficient in improving growth, non-specific immunity and disease resistance in *L. rohita* fingerlings.

Keywords: *Probiotics, Rohu, Growth performance, non-specific immunity, Bacillus, water additive*

Book of Abstracts: 5th ICEE 2019 ***ISBN:*** 978-93-5346-886-6

Assessment Of Seaweeds In Biomonitoring And Biosorption Of Heavy Metals

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The brown seaweeds *Sargassum sp.* and the green seaweed *Ulva sp.* were harvested from the coastal areas of Rameshwaram, Tamil Nadu, India. Copper (Cu), Zinc (Zn), Cadmium (Cd), Iron (Fe) and Lead (Pb) content of selected seaweeds were determined using Atomic absorption Spectrophotometer. In both seaweeds, metal content sequence was observe to follow the trend Fe>Zn>Cu>Cd and Pb was not detected. Biosorption found that absorption of Cadmium from dilute aqueous solution by the native biomass resulted in the adsorption of hydrogen ions as well and the release of other non-toxic light metal ions. The brown seaweed *Sargassum Sp.* showed a higher potential for adsorption of Cadmium compared to the green seaweeds *Ulva sp.*, with a maximum uptake capacity of 191.1µg/g of dried weight of *Sargassum sp.* This study clearly shows that local seaweeds such as *Sargassum sp.*may be used as a potential biomonitor as well as cadmium absorbent from Industrial effluent.

Keywords: *Biosorption, Biomonitoring, Seaweeds, Atomic Absorption Spectrophotometer, Heavy metal.*

Synergistic Effect Of Vancomycin And Honey Supplemented With Mulberry Leaves For The Growth And Expression Of Economic Traits Of The Mulberry Silkworm

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Silkworm, *Bombyx mori* has been domesticated for rawsilk production and the maintenance of pure silkworm genetic resources has become very important for manifestation of desired objectives of the breeder. Antibiotics are the active biomolecules that can kills or stop the growth of microorganism including both bacteria and fungi. various antibiotics are used as growth stimulating factors are extensively used to enrich the nutrition of farm and other animals for their increases productivity .Antibiotics are known to improve growth of the larvae and to certain extent enhance the silk production. The antibiotics administration with different concentration significantly improved the economic parameters. The better performances were recorded with the increase of antibiotics enhance due to feed consumption and growth by stimulating metabolic processes within the silkworm as well as reduce the occurrence of the disease which can cause immense loss to the sericulture industry.

When antibiotics namely Vancomycin is administered to the silkworm, there is shift in the nitrogen metabolism in favour of increasing the body weight and increased output of silk. It is an evidence that these antibiotics exerted a beneficial influence in food assimilation rate, assimilation efficiency, food converted, conversion efficiencies were significantly higher in the antibiotic treated batches. The antibiotic feed supplementation not only showed prophylactic measures to prevent bacterial infections but also enhanced the nutrition and economic parameters of the

silkworm .Antibiotics are among the most frequently advocated medications in modern medicine which show promising results in controlling bacterial and viral diseases in animals. In sericulture, the productivity and quality largely depends on the healthiness, growth of the silkworm larvae and the suitable environmental conditions. Growth and development of larvae depends on the intrication of physiological processes of mulberry silkworm which are advocated based on different concentration of vancomycin and honey supplemented during fifth instar robust FC1XFC2 silkworm hybrid and evaluated the economic traits were analyzed statistically and recorded in the present approach .

Keywords: *Syngerstic effect, Vancomycin, Honey, economic traits and silkworm*

Efficient *Azotobacter* consortium for *Cicer aerietinum*

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The three soil samples were collected locally and analysed for their physiochemical properties. The *Azotobacter spp.* were obtained from these soil samples and identified using cultural and biochemical characteristics**.** The consortium of three isolates was prepared after studying their compatibility. The effect of *Azotobacter* consortium was studied in the pot culture experiment with *Cicer aerietinum*. In this investigation, the plants were studied their growth parameters viz. number of leaves root length shoot length and their dry weight per plant. The dried plant material was analysed for its nitrogen content as compared to control sets. It was found that 40% growth and nitrogen content was increased as compared to control.

Keywords: *Soil, Consortium, Azotobacter spp.**,** Cicer aerietinum*

Use of *Moringa oleifera* and *Manilkorazapota* seeds for the Purification of Drinkingwater and Study of their Antimicrobial Activity

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In many parts of India, river water has been used for drinking purposes. The turbidity of this water is normally removed by treating the water with different chemicals such as aluminium sulphate, which are dangerous to people and the environment and are expensive. *Moringa olefifera*(Drumstick) seeds contain water soluble, positively charged proteins whichmay act as effective coagulant for water.*Manilkorazapota* (Chikoo) seeds even have antimicrobial property against different Gram- positive and Gram-negative bacteria. Crushed *Moringa* and *Manilkora*seeds have been used in the present investigationto check their activity to purify water to suit domestic use and lower the bacterial contamination by 90% in the water, thereby making it safe for drinking. This simple method of filtering by using *Moringa*and *Manilkora*seed powder could be used as a quick and simple method for cleaning dirty river water.The water quality of Mula-Mutha river was examined before and after the treatment of water with seeds and their antimicrobial activity was checked against different Gram positive and Gram-Negative organisms.Water was collected from two different sites of the river. Dissolved oxygen (DO), chemical oxygen demand (COD),biological oxygen demand (BOD), p^H, conductivity, salinity and total dissolved solid wereestimated.Removal of Heavy metals such as Fe, Cu and Cd by *Moringa* and *Manilkora* seed powder was studied.Such studies will lead to eco-friendly measures for water purification.

Keywords: *Moringa oleifera, Manilkorazapota, River water, Coagulant activity, Antimicrobial activity.*

Biodiversity Dynamics and Crisis

Morphological Identification of a Calliphorid fly *C. rufifacies* (Macquart 1843) using Molecular Taxonomy and Scanning Electron Microscopy

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In forensic entomology insect evidences and the developmental stages of the insects used to determine the post-mortem interval (PMI). A PMI estimation is based either on insect developmental rates or on insect colonization and succession patterns of carrion. Calliphoridae are first among all dipteran flies to visit a carrion. Correct identification is very important step in forensic entomology to determine correct PMI. Inaccurate identification may lead to inaccurate PMI. *C. rufifacies* (Macquart 1843) is one of the Calliphorid flies with forensic and medical importance has been studied for developing standard identification key. For identification firstly morphological identification was done followed by scanning electron microscopy. Molecular study was performed to confirm the identification performed by using taxonomy. This study affords an excellent opportunity to make a significant contribution to the baseline database used in forensic entomology.

Keywords: *C. rufifacies, Molecular taxonomy, succession, entomology, developmental, colonization.*

Mch Values In Blood Of Male And Female Megachiropteran Bat Rousettus Leschnaultii (Desmerest) Duringm Reproductive Cycle

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The Indian fruit bat, Rousettusleschenaultishows a peculiar breeding cycle. Adult males show double peaks in their testicular weight corresponding to the two pregnancy cycles of the female. The first peak occurs during October–November and the second during February–March. Females show I-pregnancy cycle from December to April and IInd – Cycle from April to July.

The blood profile is affected by various factors such as age, gender and reproductive state, by endogenic rhythms of various metabolites as well as by external factors such as season, time of the day, food availability and quality In blood energy is generated almost exclusively through the breakdown of glucose. In Rousettusleschenaultithe Mean Corpuscular Hemoglobin values varied from month to month or in other words according to reproductive status of both the sex in the same direction but with a significant difference. The MCH range in femalewas found to be 13.8 to 36 mmg. The significantly higher values recorded for MCH were in this sequence (November – Oestrous female), (January – mid pregnancy), (March – late pregnancy). An insignificant drop in the higher values were recorded during (December-ovulation + early pregnant), (February-advance pregnancy) and (June-advanced pregnancy/abortion). The significantly lower values were observed during July, October, April and May, August but variable values were recorded during September. An insignificant sex difference in the MCH values has been observed.

Keywords: *Rousettus leschenaultia, MCH, blood, reproductive cycle.*

The Biological Techniques Involved In Conservation Of Potential Ecoraces Of Eri Silkworm *Samia Ricini* (Donovan) In Tamil Nadu.

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Eri P2 Basic Seed Farm,CSGRC Campus, Thally Road, Hosur, T.N.

Insects are one of the major components of biodiversity and the systematic survey, gather Knowledge about them. The most diverse orders of insects on the basis of number of species are Coleoptera (3,00,000) Lepidoptera (2,00,000) Hymenoptera (1,30,000) Diptera (1,00,000) and Hemiptera (60,000) and to explore the insects diversity there is a great need to strengthen the insect systematic. Biodiversity is the complete variability in all living organisms and the ecological complexes that they inhabit and has three levels in diversity namely ecosystem diversity, species diversity, and genetic diversity. The Central Silk Board has established, Central Sericulture Germplasm Resources Centre, Hosur for conserving the diversity in the mulberry germplasm and silkworm germplasms. At present this center is conserving 1190 numbers of mulberry genetic resources and 473 numbers of silkworm genetic resources, which includes 73 MV, 380 BV and 20 Mutants. Further with a view to conserve the biodiversity in Eri Silkworm *Samia ricini,* Central Silk Board has also established an Eri P2 Basic Seed Farm in South India *i.e.* in Hosur Tamil Nadu. At present the center is producing more than 3 lakhs Eri DFLs and distributing to other centres in North and North Eastern states. The above said center is the main source of Genetic resources of Eri Silkworm for catering the need in research, host for biological control, academic studies about Eri silkworm in South India.

Keywords: *Exploration, Germplasm, Samiaricini, Manihotutilissima, Conservation, Diversity, Systematic, Ecosystem, Borduar, Khanapara, Titiabar, Sadhiya, Danubhanga.*

Studies on Biological effect in grainage performance of Eri Silkworm (*Samia ricini)* on two different host plants Castor *(Ricinus communis)* and Kesseru (*Heteropanax fragrans)* in Tamil Nadu condition

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Ericulture means rearing of Eri Silkworm, ***Samia ricini*** for the production of Eri Silk which commonly known as Ahimsa silk. Though eri silkworm is a polyphgous and feeds on more than 30 host plants but preference food selection goes to castor (*Ricinus communis*). In North Eastern states, the pupae of the eri silkworm is being used as an ideal food for the people. Since its pupa is edible, the north eastern people especially the tribal people of Assam practices ericulture for the edible pupae besides eri silk being the bi-product for them. To introduce ericulture in South India, Central Silk Board had established one Eri silkworm Seed Production Center (ESSPC) in Hosur, Krisnagiri district, where the Eri silkworm eggs (DFLs) are produced to cater the requirement of P1 DFLs in North, and North Eastern States. A comparative study has been undertaken to investigate the biological effect of eri silkworm on two different host plants *viz.,* Castor (***Ricinus communis***) and Kesseru (***Heteropnax fragrans***) by feeding their leaves to eri silkworm in four seasons during the year 2017-18. The rearing and grainage performance of eri silkworm found better with the food plant of caster than the Kesseru.

Keywords: *Polyphagous, Euphorbiaceae, Samia ricini, Heteropanax fragrans, Ericulture, commercial, Biological effect, Grainage*

Status of GOLDEN MAHSEER *Tor Putitora* (Hamilton 1822) in River Kosi, Uttarakhand, India

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Introduction : Golden mahseer is known to be as the majestic Himalayan mahseer or tiger of Himalayan freshwater river systems but it is experiencing decline in its population due to several reasons such as habitat fragmentation, habitat destruction, diversion in water flow, dynamiting and poaching. Habitat destruction through the construction of dams and barrages causes restriction in migration of mahseer to move upstream to breed and spawn. Destructive fishing methods are also adding to the rapid population decline. Due to these factors, golden mahseer (*Tor putitora*) is enlisted as an endangered species in the IUCN Red List (IUCN, 2017)

Aim of the study : Our study aims to assess the current population status of golden mahseer with respect to the temporal change in the surrounding environment (river quality). This study also enlists the other co-existing fish species along with golden mahseer in the pool habitats.

Study area : The present study was conducted in the upper stretch of Kosi stream of Ramganga in Uttarakhand to assess the population structure of the fish species and to conduct study onenvironmental variables during post-winter and post-monsoon seasons. Seasonal change in the river stretch has been observed and quantified.

Methodology : A total of 23 pool habitats were surveyed in a 32 km river stretch for two seasons. At each pool habitat, river cross-

sectional study was performed; at every 5m interval, variables like pool depth, flow and habitat substratum were recorded at every 1m interval. Water quality assessment was done by estimation of DO, pH, temp, EC and TDS. Fish sampling was performed using cast net in shallow run and riffle habitat and underwater observation was done in pool habitat.Habitat Utilization Co-efficient (HUC) was evaluated for the presence and use of habitat by golden mahseer in Kosi River.

Results : Mean depth, flow and volume of pool habitats were measured, average measures of water quality parameters were reported for DO, conductivity, pH and temperature. Dissolved oxygen and temp were found to be important factors for mahseer occurrence. Small sized boulders and cobbles were reported as dominant substratum. Fifteen different species of fishes belonging to nine genera were recorded. Fishes were found to be spatially segregated in pools. Being carnivore in nature and big in size,the habitat utilization by adult golden mahseer was found in deep pools. Small individuals were found in shallow riffle and run habitats.

Way Forward : This species is being decimated due to indiscriminate fishing by netting, dynamiting and poaching. Also, flow diversion and habitat fragmentation impacts its breeding and spawning.Knowing about the nature of water which is very dynamic, it is difficult to feature things which are changing so frequently and affecting the population status of golden mahseer. Therefore, a study has been initiated by Wildlife Institute of India, Dehradun and WWF-India in collaboration with Uttarakhand Forest Department to understand the abundance, movement, migratory routes and spawning grounds of golden mahseerin rivers of Uttarakhand using the "**Radio Telemetry Technology**".This study will be carried forward for the next two years.

Keywords: *Dams; environmental variables; habitat; migration;population decline;Radio-telemetry*

Biodiversity Of Thane Creek And Its Importance

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Thane creek (Long. 72°.55' to 73°.00' E and Lat. 19°.00' to 19°.15' N) is a 26 km long water body with Mumbai on the east bank and Navi Mumbai on the west bank and joins the Arabian Sea to the south, with a minor connection with the Ulhas river estuary to the north. It supports a good diversity of mangroves and birds (both local and migratory) and is a popular fishing ground for the fishermen of Thane, Mumbai and Navi Mumbai areas. Thane creek is designated as an IBA (Important Bird and Biodiversity Area) and in September 2015 the Government of Maharashtra declared Thane creek as a Flamingo sanctuary.

To assess the present status of Thane creek, a baseline study was carried out over a period of six months. Literature review, physico-chemical parameters of the sediment and water, benthic diversity, biodiversity of the creek and stakeholder analysis was carried out as a part of the study in the Flamingo sanctuary area. Water and sediment samples including plankton samples were collected from 19 locations and analysed as per standard methods (APHA, 2012). Mangrove sampling was done using quadrant method whereas line and point count method was used for bird diversity. Fish catch was procured from the local fishermen during their fishing activity in the creek. Stakeholder analyses were carried out using survey questionnaire, personal interviews, meetings and e-mails.

The literature survey until December 2016 resulted in 692 documents on studies of different aspects on Thane creek the earliest study being reported in the year 1857. During our study, 15 true mangrove species and 34 mangrove associate species, 44 phytoplankton species, 24 zooplankton species, 23 species of macro benthos, 72 insect species, 7 Arachnids, 15 species of fish, 4 reptiles, 154 birds and 7 mammals were reported.

The major and most common concern of the fishermen were the restrictions being imposed by the forest department, the need to have a sanctuary and its impact on their livelihood. Thus the Thane creek is of significant importance not just historically but also socially and environmentally. A lot of work has been carried out on and along the Thane creek in the last few decades. It is a major attraction for birds and now that it is a designated Sanctuary, it needs to be well protected and conserved.

Keywords: *Thane creek, Flamingo Sanctuary, Literature review Physico-chemcial parameters, Biodiversity, Stakeholders.*

Melia Dubia: A Promising Agroforestry Tree Under Changing Climate

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India, today, stands at the forefront of global efforts in promoting research and education in agroforestry. Agroforestry systems, in addition to the economic and other benefits, also provide environmental services leading to resilience of agriculture through adaptation to, and mitigation of, climate change. Being perennials, the trees provide an element of long-term economic stability to the farmer in the event of a crop failure. This is truer for Indian agriculture where more than 60% of the net sown area is rainfed. One of the main problems that farmers face today is decreasing income from an acre per year against sudden increase in the value of agricultural lands. Planting certain tree varieties such *Melia dubia* which fetch a handsome price in the market, assured buyback, and require low maintenance expenditure may help in this regard. In addition, the trees also aid the planet by preventing temperature rise and checking gas emission into the atmosphere. *Melia dubia* is a fast growing, indigenous and economically important multipurpose tree species that grows naturally in certain parts of the Western Ghats of South India. It is a moderate light demander in the young stage and grows vigorously in the moist deciduous forest. *Melia* is a money spinning tree of short duration. Since there is a total mismatch between demand and supply for wood, block planting of 750 to 1000 trees per ha can ensure a minimum profit of rupees two to three lakhs per year from a hectare. With this background a suitability studies on performance of *Melia dubia* under agroforestry system in North Karnataka was conducted in farmer's field during 2014-15 in Lingsugur taluka of Raichur district in Karnataka state. Observations on influence of *Melia dubia* on field (cotton) and horticulture (Papaya, Pomegranate and Sweet lime) crops were recorded. *Melia dubia* positively

influence the yield of horticulture crops rather than that of field crops. Cotton crop did not affected by *Melia dubia* crop, but due to accommodation of *Melia dubia* plants, number of cotton plants were reduced so there was less yield of cotton (1.75 t/ha) was recorded compared to sole cotton (2.1 t/ha) . *Melia dubia* showed positive effect on quality of pomegranate fruits by reducing scorching by sunlight which saves farmers up to Rs one lakh per ha. In general, farmers protect their pomegranate fruits from sunlight by spreading clothes, which cost around Rs one lakh per ha. Incidence of bacterial blight was not noticed in new plantations but anthracnose (2 to 7%) was noticed in few gardens. *Melia dubia* did not have any negative effect on growth and yield of crops grown in agro-forestry system, this multipurpose crop can be grown in agro-forestry system in North Karnataka.

Keywords: *Melia dubia, Agroforestry, Tree, Farmer, Income, Positive effect, Negative effect*

Species Richness, Density and Aboveground Biomass in 10 ha Plot Pachaimalai Hills of Southern Eastern Ghats, Tamil Nadu, India

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This study was reported in Pachaimalai, a part of southern Eastern Ghats in Tamil Nadu to density, species richness and aboveground biomass of trees. In10ha plot was established and each plot was sub-divided into two hundred and fifty (20m × 20m) workable sub plots, from ground level to above 1.3m. All trees ? 10 cm girth at breast height (GBH at 1.3 m) were measured. Basal area of trees also varied considerably among species. For multi-stemmed trees, sampled trees were tagged with aluminium tags to facilitate further survey and monitoring. The aboveground biomass of trees in semi evergreen forests was estimated by using the allometric formula was developed through destructive sampling methods. A total 61 tree species (? 10 cm GBH) that belong to 45 genera and 30 families were recorded In a total of 5644 woody stem trees density of species varied considerably among species. *Memecylon umbellatum* recorded the highest number of density (3113) individuals followed by Buchanania lanceolata (605 trees), *Memecylon edule* (520 trees), *Buchanania lanzan* (350) and *Psydrax dicoccos* (203 trees) from Pachamalai Hills of Southern Eastern Ghats Tamil Nadu.

Keywords: *Species Richness, Aboveground Biomass, Tropical Forest, Pachaimalai Hills, Southern Eastern Ghats.*

Distribution Pattern of Woody Vegetation in a Mountainous Riparian Corridor along Neeru Stream, Bhaderwah, Jammu and Kashmir

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Riparian corridors are related to longitudinal and lateral patterns of plant species distribution as well as to species flows and exchanges across ecotonal and ecoclinal boundaries. The spatial distribution depends on a number of factors like physiography, hydrology, geo-morphology, climatic regime, substratum, light and temperature, etc. The present communication describes the distribution pattern of riparian vegetation along an elevational gradient of 1302 m along Neeru stream, a major left bank tributary of river Chenab. The abundance to frequency ratio (A/F) of different species was computed using the Whitford's index. This ratio indicates regular (< 0.025), random (0.025 to 0.05) and contagious (> 0.05) distribution.The results reveal that a large stretch of the riparian forest exhibits random followed by contagious and (negligible) regular pattern validating the better chances of species survival with adequate resource availability. When analyzed for occupancy frequency distribution, the vegetation showed homogenous distribution in the riparian and heterogeneous distribution along the upland forests. The whole corridor as a single linear unit was observed to be homogenous with high frequency of occurrence observed for class C (41-60%) and class D (61-80%) at the mid elevation. The hierarchical clustering defines the extent of similarity among the plant associations in the riparian and upland buffers with more information on patterns of distribution. The riparian forests mainly comprised of Alder while the upland buffers are represented by conifers *Pinusroxburghii*, *Pinuswallichiana*, *Cedrusdeodara, Abiespindrow* and *Piceasmithiana* along the rising elevation in the study corridor. The results revealed that most of the vegetation is random or contagious in distribution with a small section showing regular distribution. *Alnusnitida* the dominant tree in the

riparian zone showed more of a contagious distribution with the evidence of random distribution at the lower and moderately higher elevations.The percentage of species encountered in all the five Raunkaier's frequency classes for riparian and for upland forests along the left and right banks as well as for the whole study corridor has been calculated. The frequency classes at 20% interval are represented as A=1-20%, B=21-40%, C=41-60%, D=61-80%, and E=81-100%. The statistical analysis was performed in Microsoft excel and PAST 3.0 software.

Keywords: *Abundance, Frequency, Heterogeneous, Homogeneous, Plant associations, Riparian, Upland.*

Population Decline and Cytogenetic Analysis of Krez frog, *Chrysopoasternosignata* from Jammu and Kashmir

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Over the past few years, decline in population of Karez frog, *Chrysopaasternosignata*(Anura: Dicroglossidae) from Jammu and Kashmir state, India is quite alarming. The species inhabits the cold streams of Bhaderwah tehsil, district Doda (altitude 1500m-3000m) and has witnessed a great reduction in population size over the last three-four years. Anthropogenic activities, Climate change, habitat loss and toxicants are the possible causes for the reduction in population size. It is suggested that if the same factors are not strongly mended or conservation strategies not designed, we are soon going to find the species losing it 'Least Concerned' status also.

Cytogenetic analysis of the Krez frog, *Chrysopoa sternosignata* from Jammu and Kashmir, was conducted for the first time. The frogs were collected from Bhaderwah town of Jammu& Kashmir. Chromosomal observations showed diploid number of 26and the chromosomes were divided into two groups – first group of 5 pairs of larger chromosomes and 2nd group of 8 pairs of smaller chromosomes. Chromosome no. 2,3,4,9 and 10 were sub-metacentric and all other chromosomes were metacentric. No sex chromosomes were distinguishable. C-banding analysis showed presence of centromeric heterochromatin in all the chromosomes. Whereas NOR banding showed a pair of secondary constrictions on chromosome no. 10 on long arm, i.e. 10q. A slight difference was seen in the size of NORs on the chromosome of 10th homologous pair.

Keywords: *Krez Frog, Chrysopoasternosignata, C-Banding, NOR Banding, Climate change.*

Conservation Of Plant Biodiversity In India With Reference To Socio-Religious Practices Andrituals

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Biodiversity is the variation of life forms. It is an important gift of nature that provides all the basic requirements for human existence. Due to modern developments of human civilization nature is under great threat. Since time immemorial plants have played an important role in human civilization. Hindu religion is one of the largest and oldest religion of the world and is dominant religion in India.Great diversity is found in cultural practices, in religious beliefs and in rituals in different regions in India. It has been observed that a large number of plants are being used in these socio-religious functions and rituals which serve as a useful tool for the conservation of plants. In the present paper use of various plant species in different cultural practices,religious functions, rituals and also in celebration of festivals have been reviewed. A total number of 38 plant species belonging to 35 genera and 28 families have been enumerated and discussed.

Keywords: *Biodiversity, Hindu religion, socio-religious, rituals, conservation.*

Species Diversity of Macrobenthic Invertebrates in Relation to Water Quality Status of Jhajjar Stream, Jammu, India

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Macrobenthic invertebrates are used in the assessment of water quality of freshwater bodies because of their abundance, high birth rate and short generation time. Monthly sampling for water quality analysis and macrobenthic-invertebrate enumeration was carried out at the upstream and downstream sites of Jhajjar stream, Jammu, for a period of one year (March, 2016 – February, 2017). The macrobenthic-invertebrate fauna of the stream was represented by fourteen species belonging to Three phyla (Arthropoda, Annelida and Mollusca) and seven orders (Coleoptera, Hemiptera, Ephemeroptera, Odonata, Diptera, Oligochaeta, Arhynchobdellida Basommatophora and Aranea). Water quality of the stream in terms of the various physicochemical parameters viz. pH, electrical conductivity, TDS, turbidity, dissolved oxygen, BOD, free CO_2, calcium, magnesium, total hardness, sodium, potassium, chloride, sulphate, nitrate and phosphate showed well marked variations between the upstream and the downstream sites indicating more polluted conditions at the downstream site. The downstream site being the famous tourist spot of Jammu showed increased pollution load due to increased recreational and tourist activities, agricultural runoff from the vicinity, discharge of waste from nearby shops and hotels; and run off from the National highway. This pollution increase at the downstream site was confirmed by the presence of some pollution tolerant species. Interpreting the phenomenon of variations in the macroinvertebrate diversity patterns with respect to the changing water quality of the stream will be helpful in devising an effective management plan for the area.

Keywords: *Jhajjar stream, bioindicators, macrobenthic-invertebrates, physicochemical parameters, water quality.*

Data Assessment of Avifauna in Pir Panchal Range of Middle Himalayan Chain of Doda, J&K

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Birds are one of the significant fauna which are directly or indirectly related with the human beings. Therefore avian diversity and its conservation is regarded as one of the major issue to enable sustainable use of natural resources. It is necessary and need of the hour to conserve the avian diversity in their natural habitat. The present paper deals with the survey carried out in temperate and sub tropical forest in Pir Panchal range of Middle Himalayan chain of North West Himalayas of erstwhile District Doda. The study area lies between 32O- 53" and 34O-21" North Latitude and 75O-1" and 76O-47" East Longitude with an elevation ranging between 700m to 4500m and with varied climatic conditions. The present study documents 71 species of birds belonging to 9 orders, 12 sub orders and 27 families along with their resident and migratory nature. Altitudinal variation and substrate preference for feeding were also taken into consideration during the course of study.

Keywords: *Avifauna, Pir Panchal, Himalayas, Diversity and Doda.*

Sustainable Increase in the Number of Sarus Crane in and around Alwara Lake of District Kaushambi (U.P.), India

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The Sarus crane (*Grus antigone)* is the world's tallest flying bird. This is the only resident and non-migratory breeding crane of Indian subcontinent. The sarus is well known as an eternal symbol of unconditional love, devotion and good fortune with high degree of marital fidelity as they pair for lifelong. This bird is now globally threatened due to the shrinking of wetlands, reduction in safe mating sites and increased anthropogenic activities. Present study is designed to study the number of sarus crane in the year 2018 in and around the Alwara Lake of district Kaushambi (Uttar Pradesh) India and their comparison to its number recorded from 2012 to 2017 in the same study area. This systematic study reflects an increase in the number of sarus crane at sustainable level in the area studied due to better ecological and climatic conditions of the lake.

Keywords: *Alwara Lake; Sarus crane; Wetland; Threatened; Conservation; Awareness.*

Chromosomal Karyotype And Dna Banding As A Taxonomical Tool For Identification Of Two Earthworm Species

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Introduction : Earthworms play an important role in the ecosystem management under varied land use type. They constitute about 80% of soil faunal biomas. Total of 4000 species of earthworms are known to occur globally and from India 418 species are reported belonging to 67 genera and 10 families. Off these species reported all are not suitable enough to be utilized for vermicomposting, due to the fact that different species have different functional role in ecosysytem as epigeic, endogeic and anecic. Therefore it becomes imperative to taxonomically identify the species so that their potential as useful agents of ecosystem development can be determined and this is possible only if proper taxonomical identification is done. Morphological identification of earthworm species has been done from time to time but due to limitation of taxonomical tools available and also extensive time consuming dissection process involved the morphological identification of species is long cumbersome process, further taxonomical identification based on morphological feature of earthworm is largely confined to adults only as other life stages are unidentifiable. Therefore to supplement the morphological identification of earthworm species DNA banding as well as the chromosome numbers and position of centromere were considered as significant molecular and cytological based taxonomical evidences for identification of earthworm species. Keeping this view point in mind in the present study two earthworm species collected from agriculture and natural forest in Raebareli district have been first identified morphologically and then Karyotype as well as DNA band pattern done for their identification.

Methodology : 1. Earthworm Sampling was done using hand shorting method, 2. Chromosomal Karyotype by air drayed method, 3. DNA banding by kit method

Objective : To taxonomical identification of earthworm using DNA banding and chromosomal Karyotype

Result : Morphological, Chromosomal Karyotype and DNA band pattern showed that species collected from agro ecosystem and forest were two taxonomical distinct species are of that was *Eutyphoeus incommodus* and natural forest and *Eutyphoeus waltoni* from agriculture field.

Conclusion : Thus the above study shows that supplementing the morphological identification with DNA bands and chromosomal Karyotype will give more accurate and conclusive taxonomoical identification of Earthworm species such *Eutyphoeus incommodus* from natural forest And *Eutyphoeus waltoni* from agriculture field.

Keywords: *Earthworm, Taxonomy Karyotype, DNA banding, land use.*

A Colepid Species *Colepselongatus* (Ciliophora: Prorodontida) In Freshwater From Nashik, Maharashtra, India.

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Water samples were collected from different stagnant fresh water bodies in Nasik, Maharashtra, India. The study had been undertaken for the period of one year from Aug 2013 to July 2014. During the investigation a Colepid species *Colepselongatus* was observed and identified morphologically. The present species is compared with all previously described species of genus *Colepsa*nd redescribed here. Shape and size of the cell, number of rows of pellicular platelets, and number of posterior spinous projections were considered to identify the species.

Keywords: *Ciliate, Colepid, Freshwater, Morphology, Protozoa.*

New Records Of Dermaptera (Insecta) From Maharashtra, India

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The order Dermaptera is commonly known as Earwigs, which constitutes relatively a small order of insects comprising about 2000 species globally and 315 species are reported from India and 11 species from Maharashtra. The order Dermaptera commonly known as ear-wigs constitute a well-defined group of insects which are elongated and dorsoventrally flattened insects and can be easily recognized and differentiated by 3 segmented tarsi and a pair of unsegmented chitinised cerci (forceps) situated at the posterior end of the body. Many species of Dermaptera are apterous but those who possess wings are also not capable of performing long flights.The present knowledge on the Dermaptera fauna of Maharashtra is meagre as this state has never been explored extensively earlier by any researchers. The taxonomy of Dermaptera is mainly based on the structure of ? genitalia as well as its external morphology. However,?s can also be determined by comparing when collected in association with ?s during faunal explorations. The Diagnostic charactersof the species mentioned herewith are based on the specimens collected from its particular locality during the Faunistic Surveys. The photographs of each species provided in this paper have been taken with the help of Stereo type Zoom Microscope. The collections from the Western Regional Centre, Zoological survey of India, Pune and the recent collections from the authors were sorted out, set pinned, and identified based on the key characters given in the Fauna of India volumes. (Srivastava, 1988, 2003 and 2013). The identification of the species *Euborelliaannandalei* (Burr,1906), *Cranopygia raja* (Burr, 1911) and *Cranopygiasteinmanni* Srivastava, 1988 from the collections of Western Regional Centre, Zoological survey of India, Pune and the recent collections by the authors, constitutes the new record of these species not only to Pune district, but also to Maharashtra state. Further, thorough study in all the ecosystems of Maharashtra may reveal few more new records and we can't deny the new species also.

Keywords: *Earwigs, Taxonomy, Apterous, Euborellia, Cranopygia.*

Study Of The Genus *Omphra* Dejean,1825 (Coleoptera: Carabidae: Helluonini) From Maharashtra, With New Records

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The*Omphra*Dejean is a flightless genus under the tribe Helluonini. In addition to its endemism to the Indian subcontinent, *Omphra*is unique for its geophilous habit and winglessness (Sloane 1914; Andrewes 1920, 1930; Reichardt 1974). The genus *Omphra*Dejeanof India was studied by Kushawaha and Hegde (2014). The genus *Omphra*Dejean can be differentiated from rest of the Helluonins by strong, stout mentum tooth and legs. Members of this genus inhabit under leaf litter, under stones, and under logs etc. Due to their apterous and geophilic nature, geographical barriers play an important role in their range extension and endemism within Indian region. The genus is mainly concentrated within Penninsular India except *O. Pilosa* and *O. complanata* with report from Uttarakhand and Himachal Pradesh respectively. (Kushawaha,and Hegde, 2014) The genus is not reported from North-eastern states and part of Western India (Rajasthan and Gujarat). The present knowledge on the genus *Omphra*from Maharashtra is meagre as this state has never been explored extensively earlier by any researchers. Hence, the genus *Omphra*Dejean (Coleoptera: Carabidae: Helluonini) of Maharashtra is studied from the collections of Western Regional Centre, Zoological Survey of India, Pune. The collected specimens were sorted out, set-pinned, labelled and identified based on the literatures (Shiju*et al* 2012). 04 species of the genus *Omphra* were identified from the collections with the help of the key characters given in Shiju*et al* (2012). Out of 04 species, the species *Omphrahirta*(Fabricius, 1801) and *Omphrarufipes*(Klug, 1834) were newly recorded not only from Pune but also from Maharashtra state. The species viz; *Omphrapilosa*(Klug, 1834) and *Omphracomplanata*Reiche,

1843occurred in Pune district now were earlier reported from Mumbai and Sangli district of Maharashtra state respectively. Since, this is the most available genus in Maharashtra, further, thorough study in all the ecosystems of Maharashtra may reveal few more new records and we can't deny the new species also.

Keywords: *Taxonomy, Flightless, Geophilous, Ground beetles.*

Multiple Correlation coefficient of the length of leaf, length of the petiole, number of leaflets and length of the apical leaflet of *Tagetes erecta* L. collected from Ranchi (23°21'36"N, 85°20'24"E msl 629 m)

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Tagetes erecta L. commonly called as Marigold or Genda is an annual herb with linear-lanceolate leaves with a characteristic smell. It is also known to have numerous medicinal properties. The aim of the paper is to observe the correlation (if any) between the length of leaf, length of the petiole, number of leaflets and length of the apical leaflet of *Tagetes erecta*, with the help of PSPP software.

All variables show positive correlations with each other. The highest positive correlation is found to be between the length of the leaf and the apical leaf length(0.78), followed by length of the leaf and the number leaflets(0.66) and length of the leaf and petiole length (0.60).

Moderate positive correlation is found between apical leaf length and length of petiole (0.44), followed by correlation between apical leaf length and no of leaflets (0.34).

The lowest correlation was found between the petiole length and the number of leaflets(0.22).

Keywords: *Tagetes erecta, correlation, leaf, blade, petiole, leaflets, PSPP*

Collection, Isolation And Identification Of Certain Zooplanktons As Bioindicators Of Freshwater Bodies Using Foldscope As A Research Tool

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In present studies, the focus is to identify micro zooplankton and algae found in various freshwater bodies within the vicinity of Osmania University, Hyderabad using foldscope. The foldscope is a portable optical microscope made mostly out of paper and a small spherical glass lens replacing conventional microscopes. Once assembled, it provides magnification from 140X to 2000X. The freshwater samples were collected with the help of plastic bottles and transferred to laboratory immediately. As this sample consists of a mixed number of organisms, the cells are picked up with the help of a micropipette and transformed into cavity block. Hay infusion was used as culturing medium for rearing ciliates. So far we have identified several micro organisms such as *Paramecium caudatum, P. bursaria, Oxytricha fallax, Euplotes patella, Vorticella Stentor, a gigantic Frontonia, Spirostomum, Colpoda, Tetrahymena, Coleps, Bacteria, Daphnia, Cyclopes, Naupleus, Insect Eggs, Pollen grains, Spirogyra, Oedigonium, Hydrilla, Euglina and Tardigrada* along with several others. The binary fission and conjugation in ciliates was recorded. Phagocytosis and contractile vacuole activity under cypermethrin induced stress was also observed. In conclusion we propose that Foldscope can be a useful research tool to identify various zooplanktons as well as phytoplankton in water quality assessment.

Keywords: *Foldscope, Ciliate Protozoa, Bioindicators, scientific temper, Toxicity evaluation*

Analysis Of Protein, Fat, Carbohydrates From Wild Vegetables Used By The Tribes K.H. Wild Life Sanctury

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The present communication deals with the ethnobotanical exploration, identification, concerns and future potentialities of the unconventional wild vegetables consumed by the tribal communities inhabiting in the Kalsubai-Harishchandragarh Wildlife Sanctuary located at the Northern Western Ghats of Maharashtra state, India. A total of 21 plant species used as a vegetable were reported from the study area. The Western Ghats of Maharashtra covers an area of 52,000 km^2 [Ahmednagar district is one of the ten district of Western Ghats region. This district covers an area of 17,035km2 and lies between 73º9' to 75º5' E and 18º2' to 19º9' N. The area is occupied by large numbers of tribe's viz. Mahadev-koli, Thakars, Bhils and Ramoshies. Their major occupation is agriculture. Rice, black sesame and Finger millet are some of the crops they cultivate. The forest resource plays an important role in the livelihood of these communities. Different field visits will be undertaken in different seasons along with tribal people for collection wild vegetables. These plants were identified and classified with expert using floras; moreover photographs of the plant will be taken Out of these one wild vegetable were analyzed . The proximate analyses of the sample were determined. Proximate analysis showed that *Celosia argentea* is rich in the amount of protein with composition of 22.3% and mean value for carbohydrates (54.26%) in *Celosia argentea.*

Keywords: *Kalsubai-Harishchandragarh wildlife sanctuary, vegetable, community*

Studies on Planktonic Diversity of Bindusara Dam Reservoir, Beed District, Maharashtra, India

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Water is the most vital resource of all kinds of life as it forms a medium in which physical,chemical transformation specially those of biological significance takes place. Water covers more than 70% of the earth's surface. The high specific heat of fusion, latent heat of fusion, latent heat of evaporation, high surface tension, high density and powerful solvent nature of water plays a significantrole in regulation of different activities in organism. It also makes the existence of plankton possible. Being a good solvent water has many chemicals dissolved in it in nature. By utilizing these substances intheir various metabolic activities aquatic plants and animals bring about changes in the chemical composition of water. Though fresh water habitats occupy a relatively small portion of the earth surface when compared with other habitats they are extremely important to man as disposal system.

Plankton act both as predators and consumers play an important role in transformation of energy from one tropic level to the next highest ultimately leading to fish production which is final product of the aquatic environment. The zooplankton populations in a small water bodies are subjected to extreme fluctuation, the cause of which is not adequately understood even though exhaustive literature on Plankton studies are available. The Indian notable contributions to the knowledge of zooplankton are of Arora (1931) Sewell (1934) who studied on planktonic rotifers. Gouder and Joseph (1961) documented detailed information on copepods. George (1961) has worked on the distribution of zooplankton in pond and lake. Govind (1963) investigated on the relation between copepods and physico-chemical parameters in Tungabhadra reservoir. Hospet, Karnataka. Michael (1968) worked on several aspects such as distribution and abundance of zooplankton in different water bodies near Chennai.Applied

limnology has great scope in healthy existence of natural and manmade water bodies and to harvest the natural resources at sustainable level, Goldman and Horn (1983). In order of utilize a fresh water body successfully for fish productions its very important to study a abiotic and biotic factors influencing the biological productivity of the said water body. In biological investigation study of micro and macro flora and fauna always provides the clear picture of the ecological relationship existing in the water body.

Hence the present work is an attempt to accumulate information pertaining to various aspect of hydrobiology of standing water bodies from this part of peninsular India. The present investigation has been carried out on Bindusara Dam located on river Bindusara (Godavari Basin) near 12 Kms. From Beed city near pali village of Beed district in Maharashtra State. This falls 16° 168 N latitude and longitude 73° 26 E. It is multipurpose type like irrigation and potable water project. As a representative of these Bindusara Dam' was selected for the limnology studies. The present study is aimed to investigate some of the important physical and chemical parameters along with the flora and fauna of the reservoir. Similarly by studying the phytoplankton and zooplankton quantitatively to find out what type of exotic fishes can be introduced in the reservoir in future so as to utilize the water body successfully for fish production.

Keywords: *Limnology, Phytoplanktons, Bindusaradam reservoir, plankton.*

Feeding strategies with formulated diets for culture and brooder production of Giant snakehead, *Channamarulius*(Hamilton, 1822)

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Giant murrel, *Channamarulius* is an important food, ornamental and sport fish of India, China, Pakistan, Bangladesh, Srilanka, Thailand, Malaysia andCambodia. It is known for good taste, better protein quality and medicinal importance that fetcheshigh market demand. It is air breathing in nature and tolerate higher levels of ammonia and thus suitable for marshy and poor quality waters. The population of this species has declined tremendously in last 3-4 decades and there is urgent need to develop aquaculture techniques for seed production, larval rearing and its culture. The fish is highly predatory and cannibalistic in nature and hence past attempts were unsuccessful for its culture. In order to reduce predation and cannibalism, an experiment was conducted to rear the fry to table size exclusively on formulated diet. Based on our earlier work, a diet comprising of approximately 50-55% CP was formulated using prawn meal 25%, soybean meal (extruded) 25%, whole egg 25%, wheat flour 10%, rice polish 11%, vitamin Mineral mixture 2.0% and cod liver oil 2% and was provided in semi-moist condition. The feeding trial was conducted in a cement tank (size 5mx3mx1.2m) which was filled with tube well water having temperature 23.20$\pm$5.26 ?C, pH 8.20$\pm$0.60, EC 450$\pm$40 µmhos/sec, TDS 220$\pm$25 mg L ?[1].

Keywords: *Channamarulius, Protein diet, Fish meal.*

Air, Water, Soil and Noise Pollution and Control Strategies

Rare Gas In Rocks Of Vindhyan Super Group Around Sagar, South Ganga Basin, Bundelkhand Region M.P. India

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Studies on the exploration of the Helium gas in the rocks of the Vindhyan Super Group around Sagar, South Ganga Basin, Bundel khand region, M.P. is carried out in the detail with joint collaboration of Deptt. of Applied Geology and ONGC Energy Centre, Ahmadabad. As Author has already reported the Discovery og Helium has leakages through more than 50 tube wells/e wells excavated in agriculture fields various Villages in Sagar Distt. The geochemical analysis of the soil , gas and water indicates remarkable amount of Helium gas in these tube wells, containing about 0.45 to 0.735 and methane varying from 72 % to 99%. These investigations were done in the long research work (more then 25 years)dedication carried out in this area and research finding published in the Journal of National and International repute, which has attracted the officers/ Scientists of ONGC, Dehradun, CGWB, Faridbad, Atomic Mineral Directorate Hyderabad and Bhabha Atomic Research Centre Mumbai.

The Result of the stable isotopic analysis of Ethane gas in these samples ä C^{13} value are ranging from -24.9 per mill w.r.t. PDB and -26.9 per mill w.r.t. PDB and the Methane gas are ranging from Isotopic Values -54.0-per mill w.r.t. PDB to -61.5 per mill w.r.t. PDB are indicative that this gas is of thermogenic origin, which must have been formed at very high temperature & pressure condition in the deeper horizon of the great Vindhyan sedimentary basin of late Proterozoic (>500m.y.) period. A reporting of leakages of above mentioned gas from 50 tubewells

in the inliers of Vindhyan rocks and even in the Deccan trap rocks ensures that this area must be having a big gas reservoir within Vindhayn rocks around Sagar- Distt. in M.P.

The ONGC energy Centre Ahmadabad has started the detail collaborative geophysical work on the drilling exploration upto the depth of 600 m has been carried out and to be carried out in various location from where the leakages of has been earlier reported earlier. In these 600 m deep drill holes detail geophysical logging including the gama ray logging and Neutron logging, lithological an d structural logging will be carried out to know the probable gas reserve and at what depth the, we can get the gas for the exploration and utilization of these ases for industrial purpose and other uses etc.

The detail geophysical studies will be very much helpful in the gas reserve calculation and the depth of the gas pockes in the South Ganga Basin in Bundelkhand region in M.P.

Keywords: *Vindhyan rocks, petroleum gas, helium, proterozoic, stable isotopic, geochemically, leakages, Thermogenic, p[roterozoic.*

A Case Study Of Physico-Chemical & Biological Parameters Of Adilabad District Town Lake, Telangana State, India

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The present investigation study about the Physico-chemical and biological charectarestics of Adilabad district town lake, Telangana, India. A peice of research work done during the period from June 2014 to May 2015. It is situated 1 ½ distance from bus stand. In this research ten Physico-chemical parameters were analysed by standed methods, plankton, fish species also identified. In Research period Physico-chemical parameters ranges between above moderated polluted water levels that's why in summer season deoxygenated problem in this lake, it is cause to fish species died in summer season, floating on the surface of water body. In this lake low number of plankton species identified. To avoid sewage consult, drainage water consult, washing of clothes, buffallow cleaning and domestic activities surrounding the lake. Establish waste water recycling plants to protection of lake environment. Finally i am concluded lake water quality above moderated pollution level. For future generations some precaution should be taken to the sarrounding lake environment. Adilabad district town people it is a very good water resource for sustainable development of future generations.

Keywords: *Physico-chemical parameters, lake bunddle, above moderated polluted levels, plankton species, Fish species.*

Pm_{10} Bound Pahs In The Ambient Air Of Angul-Talcher Industrial Area In Odisha, India

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A work was undertaken to assess the PAHs (polycyclic aromatic hydrocarbons) concentrations in the ambient air of Angul- Talcher industrial area in the state of Odisha, India at four locations (stations), namely, National Aluminium Corporation(NALCO) township, Hakimpada, Talcher Super Thermal Power Station (TTPS) township and Mahanadi Coalfields Limited(MCL) mine area bimonthly during the period 2017-2018.

The sampling of PM_{10} and $PM_{2.5}$ was carried out for 24hrs by Respirable Dust Sampler and $PM_{2.5}$ Sampler, respectively and 16 priority PAHs compounds were analyzed by using a gas chromatograph/FID (GC/FID). These are Naphthalene, Acenapthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenzo(a,h) anthracene, Benzo(ghi) perylene.

The results revealed that the total concentration of PM_{10} and PAHs associated with PM_{10} was respectively in the range of 48 to 227 ng/m^3 and 5.6 to 307 ng/m^3in the ambient air of Angul- Talcher industrial area during the study period. The PM_{10} bound PAHs at different locations during the study period varied from 44.2 to 307.2 ng/m^3 in NALCO Township, 21.5 to 119.9 ng/m^3 in Hakimpada, 14.45 to 230 ng/m^3 in TTPS township and 5.65 to 24 ng/m^3 in Mahanadi coalfield mines area. Further, Benzo[a]pyrene (BaP), the carcinogenic marker of PM_{10} bound PAHs, was found to be high (53.4 ng/m^3) at TTPS followed by

Nalco Township (46.7 ng/m^3), MCL (39.6 ng/m^3) and Hakimpada (27 ng/m^3).

During, summer, monsoon and winter the concentration ranges of PM_{10} bound PAHs irrespective of sampling stations were 60-107.8ng/m^3, 5.65-44.25 ng/m^3 and 119.94-307.24 ng/m3, respectively whilst the average concentrations were 74.5 ng/m^3, 21.5 ng/m^3 and 224.8 ng/m^3 respectively. So the highest concentration of ?16 PAHs (224. 8 ng/m^3) was in the winter while the lowest (21.5 ng/m^3) was in the monsoon with the ratio being almost ten. The concentration in summer was also in between 3-4 times higher than that of monsoon. The correlations between meteorological variables and PM_{10} bound PAHs concentrations indicated that average temperature and solar radiation were signi?cantly in?uencing the PAHs concentrations of the ambient air. Diagnostic ratio and Principal component analysis (PCA) tool was applied to diagnose the source apportionment of particle-bound PAHs and this indicated that diesel, gasoline and coal combustion contributes most to PAHs pollution. Diagnostic ratio using specific markers were used in cross plot to determine the specific source type for PAHs in the study. Analysis of Variance showed there is significant difference in three seasons and at different sites. In summer, monsoon and winter the concentrations ratios of CANPAHs/?PAHs were in the ranges 49.4-68 %.15.4-67.4 % and 36-49% with average of 61.3%,45.8% and 42.8% respectively. Toxic Equivalency factors (TEFs) of the individual PAHs have been used to calculate their carcinogenic potential or “BEQ”(Benzo[a]pyrene Equivalence).

Keywards: *PM_{10}, PAHs, Angul - Talcher Industrial Area, Seasonal Variation, Source Identification*

Book of Abstracts: 5th ICEE 2019 ***ISBN:*** 978-93-5346-886-6

Grounwater Arsenic Pollution In West Bengal: An Overview

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According to World Health Organization arsenic is regarded as one of the ten chemicals of major public concern. Long-term consumption of drinking water contaminated with naturally occurring soluble inorganic arsenic leads to chronic arsenic poisoning, which is called arsenicosis. Many states of India, particularly, a considerable part of west Bengal are severely affected by high-level arsenic contamination of drinking water. The occurrence of arsenic in ground water and its consequential health hazards to the people of Ganga-Brahmaputra plains in India has been indicated as one of the biggest natural groundwater disasters to the mankind. Presence and concentration of arsenic in ground water depends on several hydrogeochemical characteristics of the local sediment strata. For this reason, geochemical analysis of ground water, pore water and aquifer sediments are necessary to understand the origin and release mechanisms of dissolved arsenic in the aquifers. The arsenic contamination in ground water was first reported from West Bengal in late eighties, and since then a number of counteractive, preventive measures, and research and development activities have been put in practice. The two major approaches in arsenic management involve provision of alternative, arsenic-free water supply, which is, definitely, a large-scale, permanent solution; and secondly, provision of arsenic removal technology, which include short or medium-term measures. However, despite of best efforts, the spread of arsenic contamination in ground water has continued to enhance, and more new areas have been added to list of contaminated areas. Thus, the existing solutions seem to be partial and inadequate, which are needed to be revisited. A whole-hearted and coordinated effort of scientific communities, political initiatives and active participation of the NGOs can only bring the desired, fruitful results.

Keywords: *Arsenic, Arsenicosis, Contamination, Goundwater, Aquifer*

Water Quality Assessment of River Godavari, Paithan (Maharastra), India

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The physico-chemical parameters of Godavari river near Nath temple in Paithan was analysed. The Samples were collected on the monthly basis since January to December, 2017 from three different sites such as upstream temple, near temple and downstream of temple. The samples were analysed and a correlation matrices among parameters was determined. The physico-chemical parameters like pH, alkalinity and chloride were found to be under the acceptable limit of BIS (2009),the turbidity and hardness were exceeding the limits at all sites but total dissolved solid only in near temple and downstream river sites were observed. Water samples from the confluence zone near the temple showed slightly higher concentration of all the parameters than other sites. The present study reveals the slight effects of various religious activities on confluence site of Godavari river water near the temple which were found to be under the prescribed permissible limits of BIS (2009). The results shows that for the conservation of water quality of river and additional measures measure should be taken into consideration. During study it found that major stressor is sewage pollution is observed. Pollution of river water can be reduced by providing proper sanitation facility to pilgrims and by providing proper methods for dumping of sewage and wastes.

Keywords: *Upstream, Nath temple, Downstream , Godavari River.*

Correlation Between Various Physico-Chemical Parameters And Zooplankton Density In Garga River Of Bokaro District In The Year 2012-2014

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Garga is a small river flowing along the south eastern outskirts of Bokaro Steel City which is located in the eastern part of India at 23.29? NL and 86.09 ? EL in Jharkhand state. It is the lifeline of the city but is facing all kinds of stress due to overuse of its water. Studies were done to find out various physico-chemical parameters *viz.*Temperature,pHNitrate($NO_{3)}$ and Phosphate(PO_4) and Zooplankton density over a period of two years starting from September 2012 to August 2014.Each year was divided into four seasons namely Post monsoon,winter,summer and monsoon. Four sampling sites were selected along the entire stretch of the river. They were conveniently named as G1, G2, G3 and G4.Sampling was done monthly from all the four sites in all the four seasons. The sampling schedule and sampling frequency was the same for water quality analysis and zooplankton analysis as well. Samplings were done as per the standard norms of APHA (1998).Water samples were collected in pre-cleaned 2L PVC bottles. Plankton net of bolting silk cloth no.-25 was used. The pHand Temperature were measured *in situ*with the help of Micro Processor Cond-TDS-SN Meter (LABARD) automatic kit. Nitrate (NO_3) was estimated by Phenol disulphonic acid (PDA) method. The concentration of Phosphate (PO_4) was estimated by measuring the amount of absorption of light by a blue colored complex-molybdophosphoric acid. For the quantitative enumeration of planktons Sedgwick Rafter Counting slide was used. The results were analyzed and correlation coefficient (r) of the physico-chemical parameters and zooplankton density was calculated. At G1,in the first year of study, zooplankton density was negatively correlated with temperature and Nitrate(NO_3) whereas it had weak positive correlation with pHand

Phosphate(PO_4).In the second year the zooplanktonic density was slightly positive with temperature and moderately correlated with pHand PO_4(0.48).The correlation between Nitrate($NO_{3)}$ and zooplankton density was moderately negative. At G2 also similar trend was observed. In the first year Temperature and Nitate (NO_3) showed negative correlation with zooplankton density whereas the correlation of pHand PO_4) was weak positive and strong negative respectively. In the second year of study pHwas strongly negative with density whereas NO_3 and Phosphate (PO_4) were moderately positive and negative respectively. Temperature had a very weak positive correlation with zooplankton density. At G3 the correlation of temperature and PO_4 with zooplankton density was very weak and positive in the first year of study.pHand NO_3 showed moderate positive and negative linear relationship respectively. In the second year Temperature, pHand Phosphate (PO_4) showed a weak and moderate positive, linear relationship with zooplankton density whereas Nitrate ($NO_{3)}$ showed a moderate negative relationship. At the fourth sampling site G4, Nitrate ($NO_{3)}$,pHand Phosphate(PO_4) showed a positive correlation with the zooplankton density whereas temperature had a strong negative linear relationship with the density. In the second year of study temperature showed a moderate negative linear relationship with the zooplankton density while pH Nitrate (NO_3) andPhosphate (PO_4) showed a similar trend as in the first year i.e. 2012-13.

Keywords: *Garga river, Correlationcoefficient, Zooplankton density, Temperature, NO3, PO_4pH*

Review On Hazardous Effects Of Noise Pollution

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Any undesirable change in the physical, biological and chemical parameters of the environment which makes it harmful for human as well as other living organisms is known as pollution. In case of noise pollution, sound is the main means of communication in many animals including human beings. A low intensity of sound is pleasant and harmless while a loud and unpleasant or unwanted sound of any kind is called as noise and it is harmful. A disturbing, often excessive and persistent level of noise is harmful in a given environment is called as noise pollution. Sound is expressed in decibels. WHO recommended a noise less than 75 decibels. A sudden loud noise such as an explosion may damage the eardrum.

Now a day the noise pollution is a critical problem in most of the countries of the world. It is going seriously in rapidly growing population countries because metropolitan cities have more means of transports (on roads, air) causing high frequency level of noise pollution. Due to more vehicles, intensity of noise is increasing day by day. The present study reviews the data on intensity of noise pollution and effect on health. The study on noise pollution reveals increasing population, industrial activities, in traffic and rapidly changing life style are the major factors.

The major health implications are annoyance, disturbance in sleep, interference with communication, unhappiness and rarely hypertension effects. With the help of observations, the cause and effect relationship between the intensity of pollution and occurrence of diseases, we conclude that decrease in population and vehicles will also decrease the intensity of noise pollution because everyone knows very well that number of sound producing vehicles depend upon the number of users of those cities.

Due to prolonged noise pollution, damage to heart, brain and liver in animals has been reported. A continuous noise level over 80 dB gradually leads to permanent loss of hearing ability. Reduction in rapidly growing population and Green Muffler are main steps to controlling the noise pollution.

Keywords: *Decibels (dB)- After A.G.Bell, Eardrum- Tympanic membrane, Annoyance- Impatient, Hazardous- Dangerous to people health, Green Muffler – Plantation along the road side.*

Low Cost Development of Air quality Monitoring Devices Using Urban Environments

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Air pollution is both an environmental and a social problem, as it leads to a multitude of adverse effects on human health, ecosystems and the climate.Air pollution is one of the largest environmental health risks in Europe today. Quality of the air in city and urban areas is the most important factor that directly influences the incidence of diseases and decreases the quality of life. Taking appropriate decisions in a timely period depends on the measurement and analysis of the parameters of the air, which creates the need for the development of real time air quality monitoring. The use of multi-parameter air quality monitoring systems makes it possible to do a detailed level analysis of major pollutants and their sources. These monitoring systems are important components in many smart city projects for monitoring air quality and for controlling the main pollutant concentrations in urban areas. In this paper, we present an approach for cost-effective measurement of relevant environmental parameters, based on a scalable sensor array with integrated aromatic and infrared gas sensors. The device has been tested in the city and the measurement was compared with the output data of the local environmental control authority stations. The preliminary results show that this approach can be used as an economical alternative to the professional grade systems.

Solid Waste Management A Problem In Aurangabad City

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Increase in modernization industrialization particularly in urban area creates a many problems to environment among these pollution is the major problems before the community, the pollution is undesirable change in environment which is harmful to the human beings. the environment is get polluted due to change in quality of air, water and land. now a days urban areas facing a one another major problems that is the problem of solid wastes. Increase in global population creates rising in the demands of essentials which resulted to increases in wastes from houses and other sources, these wastes from house hold is not collected properly and is ultimately thrown into open spaces of city or nearby road sides or dumping sites which created a serious health problems, present study deals with to focus on a dumping sites of solid wastes situated at naregaon near aurangabad. These dumping sites creates very serious problems of health air, water and soil pollution as well as social and economical problems also.

Defluoridation Of Water By Using Natural Low Cost Adsorbents : A Case Study

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The present study focuses the ability of the natural low cost adsorbent for the defluoridation.and the final fluoride ion conc is measured by SPANDS method.The samples were collected from the selective locations in an Amalner Tehsil Dist- Jalgaon. After defluoridation study SEM is used to verify the general morphological characteristics of the respective Adsorbent. FTIR study has demonstrates the presence of different functional groups present in the adsorbent used for the defluoridation purpose.

Sanitary Waste Disposal: An Increasing Problem in India

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Sanitary waste disposal has become an increasing problem in India as the plastic used in disposable sanitary napkins are not bio-degradable and lead to health and environmental hazards. The impact is more pronounced because of the unorganized ways of municipal solid waste management and poor community collection, disposal and transportation networks in the cities and villages. The lack of concern for sanitary waste management in our country is reflected in the fact that there is no reliable statistics on the subject. Due to the lack of segregation of waste, there is hardly any documentation in this area, so through instructions for handling and management of sanitary waste are essential. Every month, around 353 million women and adolescent girls across India use sanitary products and generate menstrual waste, and this number is growing with each passing day. Studies have shown that one sanitary pad could take from 500 to 800 years to decompose as the plastic used is not bio-degradable, and can lead to health and environmental hazards. With awareness and health campaigns all across India being active in popularizing the idea of sustainable menstruation, there are healthy ways to utilize menstrual care products without any impact on the environment. There are brilliant innovations with safe health benefits and cost-effective utilization.

Keywords: *Sanitary, Bio-degradable, Segregation, Environment Hazards, Sustainable.*

Hydrological Study of Gauripada Pond using Physico- Chemical Parameters and Water Quality Index, Kalyan, Maharashtra, India

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The present paper deals with the seasonal study of physico-chemical parameters of Gauripada pond, Kalyan, Maharashtra and to calculate water quality index (WQI) which will helps to understand quality of water. Water Quality Index, represents water quality in terms of index number, which is useful representation of overall quality of water for public as well as government authority to understand status of water body for their management. In the this study water quality index was calculated on the basis of season wise data of some selective physico-chemical parameters such as pH, electrical conductivity, total dissolved solids, suspended solids, alkalinity, hardness, chloride, nitrate, dissolved oxygen and biological oxygen demand. However from the calculated seasonal value of WQI in the present study indicates that water quality of this pond is very poor and unsuitable for drinking purpose.

Keywords: *Gauripada pond, physico-chemical parameters, Water quality. WQI, hydrology*

Hydrological Analysis of Hebbur Micro Watershed in Tarikere Taluk, Chickmagalur District

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The study was conducted to analyse the hydrological parameters in Hebbur micro watershed which is under Ajjampur sub-watershed in Tarikere taluk of Chikkamagaluru district, Karnataka state. The study area comes under semi-arid region with average annual rainfall of 874 mm. Hebburu Micro-Watershed is located between 13º 46? 14.81? N to 13º 44? 23.95? N Latitude and 75º 58? 24.38? E to 76º 0? 41.14? E Longitude, covering an area of 1037.59 ha. Area covered mostly of black soil however it also contains small portion of red and sandy textured soil. The rainfall data of Ajjampura hobli station (KSNMDC) is considered for analysis as it is nearer to micro-watershed. The long term average annual rainfall (1980-2017) was found 874 mm. Maximum rainfall is observed during 2014 whereas minimum rainfall during 2012. High temporal variation found between yearly annual rainfall.

Years of 2011 (7.68% deficit with respect to average annual), 2012 (41.31 %), 2016 (38 %) and 2017 (24.16 %) were found deficient years between 2010-2017. Year 2014 received 42 % excess rainfall. The *Kharif* rainfall (May-August) is about 60% of the average annual rainfall and it is typically follows the annual rainfall patterns. High variability was found between annual *Kharif* rainfall. Years of 2011 (21 %), 2012 (62 %), 2016 (19%) and 2017 (44 %) received deficient rainfall. The average *Rabi* rainfall (Sep-Dec) is about 33 % of the average annual rainfall. Years 2012 (43%), 2013 (16%), 2013 (39%) and 2016 (64%) received deficient rainfall. Years 2010 and 2014 received highest Rabi rainfall. The rainfall distribution, On an average the number of rainy events likely to produce runoff (>20 mm/hr) are about 4 to 6 per year with moderate variation across years. During lower

rainfall years (2011, 2012 and 2017) it was found that the there were atleast 4 events per year except in 2016 (extremely lower rainfall year), which produced just one event.

The water table was measured from the 150 representative bore wells, monthly from January 2016 to November 2018 by using manual water level indicator. Data indicated increasing trend of depth to water table. The mean depth of ground water observed from ground level during the different months (since Jan 2016) was found 28.89 m with highest and lowest level of 45.54 (June 2017 m) and 11.18 (Jan 2016 m) respectively.

The Discharge from borewells were measured in the micro-watersheds using volumetric method during different cropping seasons. The variation in discharge rate observed during Post and Pre monsoon period from selected bore wells. Maximum discharge of bore wells was observed during post monsoon due to recharge, whereas 30 to 40 per cent of the discharge was decreased during pre monsoon period due to over exploitation of ground water, as the majority of the farmers dependent on ground water for irrigation. The discharge has got reduced in January, May and August of 2017 due to late monsoon

Infiltration Test at different soil management unit was observed by Double Ring Infiltrometer. The Infiltration rate observed at hebbur microwatershed varied from 7 -16 mm/ hr. The Lower infiltration rate observed at places due to heavy claey (deep black soil) and the higher infiltration rate were observed at places where the sandy clay loam (Red soil) is present.

During 2009 to 2014, the average annual actual evapotranspiration, AET (825 mm) was lower than the average annual rainfall (874 mm). During months of July to November rainfall is higher than AET so there is excess water budget in this period. During Kharif average rainfall and AET were 525 mm and 411 mm respectively, whereas in Rabi it was about 297 mm and 264 mm. In comparison to the 2001-2009, the annual AET increased by 9 % during 2010-2014. The evapotranspiration index revealed that the average AET/P ratio between 2009-2014 was about 90%, which is higher than the sustainable limit of about 80%. In 2012, even though there was deficit rainfall of 41%, the

AET was unaffected and above normal of 900 mm. This suggests the presence of water storage and utilization from other sources (such as groundwater), which buffered the lower rainfall.

The water balance revealed that, during April-October months, Precipitation is higher than Evapotranspiration, hence Runoff can occur in the watershed. The runoff under existing conditions was 102 mm and runoff available after effective interventions (e.g. bunding) 60.0 mm, Runoff excess for harvesting by construction of structures 42.0 mm.

The ground water yield in cubic meter per day was measured in more than 100 bore wells in the micro-watershed. Corresponding ground water depth was also recorded. This data provides relationship between bore well yield and depth to groundwater. The bore well yield decreased modestly with increase in depth to groundwater. The ground water samples were collected seasonally to analyze different chemical parameters to assess the quality of ground water.

The study revealed that the water quality parameters of the study area were found within the acceptable limits for using irrigation purpose as per FAO standards.

The groundwater level trends are strongly correlated with annual rainfall. The mean annual rainfall recharge factor is approximately 16%, which results in good mean annual recharge of about 140mm and are sustaining groundwater irrigation. The drought year of 2012 had a lower recharge factor of 13% (annual recharge of 75 mm). The coefficient of variation of annual rainfall, recharge and discharge are 31%, 35% and 19% respectively.

Keywords: *Hydrological analysis, Evapotranspiration, Groundwater fluctuation, Rainfall analysis*

The Sources, Effects, and Suggestions for Controlling the Noise Pollution

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Noise means wrong sound in the wrong place at the wrong time. Noise pollution is the unwanted sound which gets damped into the atmosphere without regarding to the adverse effect it may have. Different people have not affected equally by the same noise. The effect of sound on human depends upon its frequency. Human ear are known to be sensitive to an extremely wide range of intensity varied from 0 to 180dB and an extremely wide range of frequencies varied from 20Hz to 20 KHz. The noise is generated by the human though various ways. Most of our day-to-day activities, by knowingly or unknowingly every one of us contribute to generate noise pollution. Often neglected, noise pollution adversely affects the human being leading to irritation, loss of concentration, loss of hearing. Efforts shall be made to identify the sources of noise pollution and the reasons for increase of noise levels. Efforts shall be made to reduce the undesired noise levels from noise generating sources. Noise must be controlled and prevented by using various effective techniques at the source itself. The statutory regulations have prescribed the noise level exposure limits. The educated peoples may complain to the statutory board for violation of noise level limits by any noise generator. The suitable action will be taken to attenuate the noise levels and controlling pollution. In future, public education, government and NGOs can play significant role in controlling the noise pollution. The present paper explores the sources, effects, and suggestions for controlling the excessive noise.

Keywords: *Noise pollution, sources, effects, prevention, suggestions*

Quality Analysis of Physico-Chemical Characteristics and Microbiological Assessment to the study of the Water Quality of different regions of Indian Sundarban

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Riverine and tide-influenced mangrove ecosystem of Indian Sundarban is dynamic in nature. In one word the biodiversity of Sundarban is unique. Sundarban has extremely rich diversity of aquatic flora and fauna. But this world's largest aquatic mangrove ecosystem has been threatened with serious environmental pollution and man-made hazards.

So, the main aim of this paper is to study the physico-chemical characteristics and Microbiological assessment of the water quality of Sundarbans. In this context water samples were collected from different places like, Buridhabri (junction point of Jhila River and Buridhabri Khal), Jhingakhali (junction point of Rai Mangal River and Bhangarkhali River), Mollakhali (junction point of Amtoli and Gomar River), Sajnekhali (Hogul River), Sudhanyakhali (Sudhanyakhali Khal), and Dobanki (Dobanki Khal) on November 2013. Every substance that dissolves in water can be called a physico-chemical characteristic of the water quality. Physico-chemical analysis of the water such as Colour, Odour, pH, Total Dissolve Solids (TDS), Total Alkalinity, Total Hardness, Aluminium, Barium, Boron, Calcium, Chloride, Copper, Fluoride, Iron, Magnesium, Magnesium, Manganese, Nitrate, Selenium, Silver, Sulphate, Zinc, Cadmium, Cyanide, Lead, Mercury, Nickel, Total Arsenic, Total Chromium were estimated. In addition to this, Microbiological Assessment of water sample was also done using APHA method. Microbiological parameters of the water sample such as Total Coliform Bacteria, E. Coli or Thermotolerant coliform bacteria were estimated. The identification of the mathematical values of the various water quality parameters and after physico-chemical and Microbiological analysis, it was identified that the present water quality is unsuitable for irrigation, drinking and aquatic ecosystem of Sundarban.

Keywords: *Indian Sundarban, TDS, Alkalinity, APHA*

The Effect Of Air Pollution On Pollen Allergens

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Since the beginning of industrialisation, pollution has become an increasing environmental problem. The amount of pollutants and the number of people suffering from allergies has also been on the rise. The types of pollution can range from chemical air pollutants such as particle matter, nitrogen dioxide, carbon monoxide and ozone, to natural outdoor pollutants such as pollen. Pollen is an allergen largely responsible for respiratory diseases such as hayfever. These pollen allergens would stick to pollution particles in the air. This suggests that as exhaust pollution in the air increases, they become carriers for allergens like pollens. Air pollution 'fuels' a pollen allergy. In present study the data of allergenically significant people was collected from polluted and non-polluted area. The study showed that the number of pollen sensitive people and allergenicity of pollen extracts was greater from polluted than from unpolluted sites. Air pollutants might damage the pollen cell wall, facilitating allergen release into the environment and penetration into the lower respiratory tract. These pollutants can interact with allergen-carrying small particles, which pass through the airway and cause asthma symptoms in predisposed subjects. Also, the allergenic potential of allergens could be enhanced through contact with chemicals. Chemical pollutants can act as adjuvants to stimulate IgE-mediated responses, modify allergenic potential, and enhance the expression of some allergens in pollen grains. A number of publications appearing in recent years considered air pollution as a stressor that increases the expression of some allergens in pollen grains. The present study showed that pollen from polluted area has more allergenic potential as compared to unpolluted area.

Keywords: *Allergens, chemical air pollutants, respiratory allergy, polluted area, pollen.*

Studies on Discharge Water from Koradi Thermal Power Station

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Discharged water, a thermal pollutant from thermal power station is the main cause of thermal pollution. Safe operation of a coal-fired power plant is related to freshwater resources. Environmental problems related to water sources and wastewater discharge is one of the big challenges for power station operation. This case study is done on Koradi Thermal Power Station. This plant receives freshwater from Pench River of Madhya Pradesh for the production of electricity. Waste water during this operation is discharged in nearby lake. Also the wastewater from nearby colonies also collects in the same lake. The evaluation of wastewater from thermal power station was done and its environmental impact of residual water, during the operation of thermoelectric units. Assessment of the discharged water temperature, total alkalinity, total hardness, total dissolved solids, dissolved oxygen, percentage saturation, BOD, COD Fe SO_4 etc was done. Thinking of zero liquid discharge, water audit should be done. A percentage of water should be conserved, purified and supplied for agriculture, textile or small scale industries.

Keywords: *power plant; environmental impact; thermal pollution; wastewater, water audit, conserve, agriculture, industries*

Environmental Toxicology and Human Health Issues

Ecotoxicity of Eucalyptus *globulus* Plant extract on Soil Living system of *Eisenia fetida (Earthworm)*

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This study was conducted to determine the earthworm acute toxicity of 'Eucalyptus Globulus Plant extract' by using artificial soil. Earthworm is good friends of farmers and soil nature, its beneficial for agriculture soil. 'Eucalyptus *globulus* Plant extract/ oil' is using in industrial purpose as a medicines and pesticides and also plantation on the lands, it's directly and indirectly interact with soil natural system. This study was conducted for eco-toxicological effects on the natural system. A preliminary dose range finding study was conducted with 'Eucalyptus Globulus Plant extract' on earthworms prior to conducting the main test. Doses of test substance used for range finding study were 100, 200, 400, 800, and 1000 mg/kg of dry weight of artificial soil, respectively. Since the percent mortality during the range finding test was found up to 10%, the limit test was conducted at the concentration of 1000 mg/kg of dry weight of artificial soil. No noticeable toxic effects of test substance were observed on the test organisms i.e. earthworms at the limit concentration of 'Eucalyptus Globulus Plant extract'. As per study no toxic and health effects on the soil organism and further long term study will be required.

Therefore, it can be concluded that the LC_{50} of the test substance i.e. 'Eucalyptus Globulus Plant extract' is >1000mg/kg of dry weight of artificial soil.

Keywords: *Eucalyptus Globulus Plant extract, Eisenia fetida, Soil pollution, Toxicity, LC50*

Dissipation Study Of Novaluron And Lambda Cyhalothrin On Cabbage And Soil

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Cabbage is one of the most commonly grown annual vegetable crop throughout the world.It is affected by insect pests such ascabbage worm, aphids, diamondback moth. The diamondback moth(*Plutellaxylostella*L.) causes considerable yield losses tothecabbage crop. The combination product of novaluron and lambda cyhalothrin can be used for the control of the insect pests of cabbage.

The residue study of novaluron and lambda cyhalothrinwas carried out on cabbage by carrying out the supervised field trials at the Indian Institute of Horticultural Research, Bangalore during September 2017-January 2018. The cabbage variety Unnati was treated with the combination productnovaluron 9.45% + lambda cyhalothrin 1.9% at the standard and double doses of 750 mL/ ha and1500 mL/ha, respectively. The first application was given at the head formation stage and the second application was given at 10 days interval. The samples were collected on0 (within 2 hours), 1, 3, 5, 7, 10, 15, 20, 25and 30 days after the 2nd spray. The soil samples were collected on 20th day after the second spray. QuEChERS analytical method was used for thesample preparation of cabbage and soil samples. The recovery studies were carried out fornovaluron and lambda cyhalothrin in the concentration range of 0.01-0.05 mg/kg. Gas chromatogram with electron capture detector (ECD)was used for the analysis of novaluron and lambda cyhalothrin.

The recoveries of novaluron and lambda cyhalothrinwere found to be within the acceptable range of 70-120%. The LOQ were

found to be 0.01 mg/kg for novaluron and 0.05 mg/kg for lambda cyhalothrin. Initial residues of novaluron on cabbage were 1.354 and 1.897 mg/kg at the standard and double dose treatments. Novaluron residues on cabbage persisted for 15 days at standard dose and at 20 days at double dose. It dissipated with the half-life of 3.1 and 4.0 days from the standard and double dose, respectively. The residues in the field soil at 20th day were found to be 0.049mg/kg and 0.163 mg/kg at the standard and double dose. Lambda cyhalothrin residues on cabbage initially (0-day) were 1.354 mg/kg and 1.897 mg/kg at the standard and double doses, respectively. The residues persisted for 5 and 7 days and dissipated with the half-life of 2.1 and 2.6 days from standard dose and double dose treatments.The pre-harvest interval (PHI), the time required for the residues to reduce to the maximum residue limits (MRLs) was 3 days. The field soil at 20th day novaluron and lambda cyhalothrinresidueswere <LOQ from both treatments.

Keywords: *dissipation; half-life; lambda cyhalothrin; novaluron; QuEChERS*

Effect Of Different Temperature And Moisture Regimes On The Dissipation Of Spiromesifen In Soil

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Spiromesifen [3-(2, 4, 6-trimethylphenyl)-4-(3,3-dimethylbutyl-carbonyloxy)-5-spirocyclo-pentyl-3-dihydrofuranon-2] is a novel insecticide/miticide belonging to the spirocyclic phenyl substituted tetronic acid class. The persistence of spiromesifen in soil can be affected, temperature, air movement, light, rainfall/humidity, microbial activity and soil characteristics. This study was conducted, to study the effect of different moisture regimes and temperature on the degradation of spiromesifen in two different types of soil, such as: sandy loam and clay soil. The moisture regimes that were maintained for the experiment were field capacity and flooded conditions. The effect of temperature was studied by keeping the treated soils at room temperature (25±2^{0}C), 4^{0}C and 40^{0}C. The sample preparation was carried out as per QuEChERS analytical method and analysis by gas chromatography with electron capture detector (GC-ECD) and confirmation by LC-MS/MS analysis.

Spiromesifen degradation was faster in clay soil compared to the sandy loam soil. In addition to that the degradation of spiromesifen was faster under flooded conditions compared to the field capacity moisture conditions in both soils. The degradation was further accelerated when the soil temperature was increased. In sandy loam soil under flooded condition, the residues of spiromesifen persisted for 60 days at 4^{0}C, 40 days at room temperature and 12 days at 40^{0}C. In clay soil under flooded condition, the residues persisted for 50 days at 4^{0}C, 30 days at room temperature and 10 days at 40^{0}C. The half-life of degradation (DT_{50}) of spiromesifen in sandy loam soil at 4^{0}C was 38 and 30 days, at room temperature, 20 and 14 days; at 40^{0}C, 7 and 4

days, under field capacity moisture and flooded conditions, respectively. In clay soil, the DT_{50} values at 4^0C were 26 and 20 days; at room temperature, 14 and 10 days; at 40^0C, 4 and 3 days under field capacity moisture and flooded conditions, respectively. Spiromesifen-enol, the major metabolite of spiromesifen was not detected in soil and the same was confirmed by LC-MS/MS analysis.

Keywords: *Spiromesifen, Degradation, Half-life, Field capacity moisture*

Evaluation of DNA Damage Induced by Bisphenol A using Single Cell Gel Electrophoresis

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Bisphenol A (BPA) is a rapidly emerging pollutant in the ambient environment. It is a major industrial chemical has been broadly used as a raw material for the preparation of epoxy and polycarbonate resins (e.g., coatings of water containers, infant bottles, and medical devices). It is one of the highest production volume chemicals worldwide. Because of its environmental persistence, ability to cause endocrine disturbance, and potential toxicity in animals and humans, BPA contamination has become a matter of great concern. The present study was undertaken to investigate genotoxic potential of BPA on fish *Channa punctatus* using comet assay. For this purpose LC50 was determined and fish were exposed to 1/2th of LC50 value for 96 hrs. Blood was taken from control and treated groups after 24, 48, 72 and 96 hrs of exposure. The results of the study showed a significant increase in DNA damage as compared to control groups. Thus, we conclude that BPA is a prospective hazard to fish and therefore proper measures need to be taken to minimize the wide exposure to this compound so as to reduce the associated adverse health problems.

Keywords: *Bisphenol A, Pollutant, Channa punctatus, genotoxicity,*

Residue Study Of Tebuconazole On Tomato

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Tomato (*Solanumlycopersicum*) originated in western South America and later in 16th century it was brought to India. Tomato is one of the important commercial crops in India which ranks second in world production. It is rich in antioxidants,Vitamin Candconsumedinraw, cooked and processed form.The tomato crop is infested by many pathogenic fungiduringits cultivation.Toprotect the tomato plant from fungal pathogens,a lot offungicides areapplied.Tebuconazole (1-(4-chlorophenyl)-4,4-dimethyl-3-(1,2,4-triazol-1-ylmethyl)pentan-3-ol) is a systemic fungicide of the triazole chemical group.Itactsasa demethylationinhibitorin the fungal membrane.Tebuconazole controls a broad range of fungal diseases such as anthracnose, rusts, mildews and blights.

The residue study of tebuconazole on tomato was carried out at the experimental field of ICAR-Indian Institute of Horticultural Research, Bangalore during February-April, 2018. The fungicide spray was given at two concentrations, i.e. standard dose, 268.75 g a.i./ha and double dose 537.5 g a.i./ha with 3 applications at 7-day intervals. Residue analysis of tebuconazole on tomato was carried after the last application on 0(within 2 hours),1,3,5,7,10,15,20,25 and 30 days. The sample preparation was carried out by QuEChERSanalyticalmethod andtebuconazole residues on tomatowasanalysed by gas chromatography mass spectrometry (GC-MS). The recovery study was carried out at different spiking concentrations such as, 0.05, 0.25, 0.5 mg/kgintomatoes and soil.

The recovery levels obtained were between 86.40-98.32% in tomato samples and 79.36-94.55% in soil, which were withinthe acceptable range 70-120%. The limit of quantification (LOQ) of the method was 0.05 mg/kg.Initial residue levels of tebuconazole on tomato were 4.822 mg/kg and 10.733 mg/kgfrom treatments at the standard and double dose, respectively. The residues persisted up to 15 days from standard dose and 20 days from double dose treatments. Tebuconazole residuesdissipatedat the half-life of 2.2 days from standard dose and 2.9 days from double dose treatments.In the field soil,the tebuconazoleresidueswere 0.193 mg/kg and 0.466 mg/kg at standard and double dose treatments after 20 days. The maximum residue limit (MRL) of tebuconazolegiven by European Union (EU) is 0.9 mg kg^{-1}.The pre-harvest intervals (PHI), the time required for tebuconazole residues to reduce to the MRL,was 6 days from standard dose and 11 days from double dose treatment.

Keywords:*Tebuconazole, GC-MS, dissipation, half-life*

Essentiality Of Nanotoxicology In Safeguarding The Human Health: An Overview

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In recent years, nanoparticle based technologies are benefitting us in several ways. Among different facets of nanotechnological applications, nanomedicine and nanobiology are perhaps the most significant ones. Nanoparticles are being used for developing different delivery systems of several biocompatible materials within the human body, such as chemotherapeutic and other drugs, vaccines, genes, food supplements etc. It is well known that nanostructured materials or nanoscale particles possess many novel properties such as self-assembly, size effects, large surface area, ultrahigh reactivity and quantum effects because of their very small size and unique structures. But as we know that any new development must have its own pros and cons, the rapid development of nanotechnology is likely to become new sources of human or environmental hazards through inhalation, ingestion, skin uptake, or injection of engineered nanomaterials in different consumer products. So far, research results suggest that nanoparticles may cause adverse effects on human health at their portal of entry, which show difference from the bulk materials of the same chemical composition. It also deals with the quantitative assessment of the severity and frequency of nanotoxic effects in relation to the exposure of the organisms. We should remember that the large alteration in physicochemical properties of nanomaterials as compared to the bulk material of the same chemical form will undoubtedly lead to different biological effects in vivo. So the existing database of safety evaluation for the bulk materials, including the effects on health and the environment is probably no longer valid while dealing with nanoparticles. These nanoparticles easily enter the environment via various routes, and ultimately enter human body through direct routes such as dermal and oral exposures, nanodrugs, or through indirect routes such as the food chain, etc. For nanoparticles, except the very

strong size-effects, other unique properties such as the tremendous surface, anomalous interface, complicated reactivity, quantum effects, etc. can also lead to changes in physicochemical properties which naturally alter the biological activities *in vivo*. As different tissues and organs have different compositions, structures and functions, toxic responses are mostly different once nanoparticles enter different organs. Human skin, intestinal tract and respiratory tract are always in direct contact with the environmental nanoparticles. For instance, skin, as a structural barrier between the environment and the body, plays an important role to protect against break-in of exogenous particles. Respiratory tract, generally divided into three segments, upper respiratory tract, respiratory airways and lung, most of which exists merely as a piping system for air to travel in the lungs. Gastrointestinal tract, also known as the digestive tract, can uptake, transport, digest and adsorb various substances such as nutrients, water and vitamins from food. On the other hand, the gastrointestinal tract is also designed as a barrier to restrain the entry of pathogens, toxins and undigested macromolecules. As such, these potential exposure routes are likely to be the first portal of entry for nanoparticles invading into the human body. In addition, other physiological systems such as cardiovascular system and central nervous system may have chances to interact with exogenous nanoparticles circulated or transported from the above exposure routes. Nanotoxicology is the study of the nature and mechanism of toxic effects of nanoscale materials/particles on living organisms and other biological systems. This particular branch of toxicology must be developed further, for providing us standard assay and evaluation methods for nanomedicinal or nanobiological applications, so that we can get an ultimate safeguard and assurance while consuming something with nanoproducts.

Keywords: *Nanoparticles, Novel properties, Delivery systems, Human health hazards, nanotoxicology*

Effects of Deltamethrin on Haemocytes Morphology on Muga Silkworm Larvae, Antheraea Assamensis

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In view of the significance of the haemolymph and haemocytes in the various life process and protection mechanism from foreign bodies, the present study was carried out to investigate the effect of Deltamethrin on the morphology of haemocytes of 5th instar muga silkworm larvae. Five main types of circulating hemocytes, *viz*., Prohemocytes (PRs), Plasmatocytes (PLs), Granulocytes (GRs), Spherulocytes (SPs) and Oenocytoides (OEs), had been identified in the haemolymph of 5th instar muga silk worm larvae. The effects of deltamethrin on the haemocytes of 5th instar muga silkworm larvae feeding on its host plant *Som* after treatment with sub lethal dose of 0.05% were studied at an interval of 24 hours, 48 hours, 72 hours and 96 hours of treatment. Deltamethrin caused the morphological deformaties in the circulating haemocytes. Haemocytes undergo changes in their shape and size observed under light microscope. The most common morphological deformities are characterised by the extrude cytoplasm, darkly stained, rupture in cell membrane. Deltamethrin cause a significant aeration in the morphology of haemocytes indicating that muga silk worm is highly sensitive to deltamethrin.

Keywords: *Deltamethrin, muga silkworm, haemolymph, haemocytes.*

A Study Of The Dissipation Pattern Of Fluopyram And Tebuconazole In Tomato And Soil Under Field And Poly-House Conditions

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Fluopyram N-(2-[3-chloro-5-(trifluoromethyl)-2-pyridinyl]ethyl)-2-trifluoromethyl)benzamide and tebuconazole1-(4-chlorophenyl)-4,4-dimethyl-3-(1,2,4-triazol-1-ylmethyl)pentan-3-ol are systemic fungicides with distinct mode of action against fungal pathogens. Fluopyram is pyridyl-ethyl amide class which acts on succinate dehydrogenase enzyme in the fungal mitochondrial respiratory chain. Tebuconazole is a triazole fungicide which inhibits ergosterol biosynthesis which is a major component in fungal plasma membrane growth.

Tomato (*Lycopersicumesculentum*) belongs to the *Solanaceae* family. India is the second largest producer in world total production of tomatoes. Tomatoes are rich nutritional components like vitamin C, vitamin A and antioxidants. Tomatoes are consumed as fresh vegetables and also processed in to several products. The tomato crop is prone to fungal infestations and the major fungal diseases are early blight, septoria leaf spot, late blight, grey mould, and anthracnose. Numerous fungal strains have developed resistance to fungicides and to overcome this problem combination fungicides are introduced in the agrochemicals market. The combination formulation of fluopyram and tebuconazole is used for control of a broad spectrum of fungal diseases of tomato. Their use may leave residues in tomatoes beyond the permissible limits (maximum residue limits). Moreover, behaviour of pesticides may vary in the open field and under controlled environmental conditions. This study was therefore

conducted at the experimental field of IIHR, Bangalore by applying fluopyram200 + tebuconazole200 (400SC) at standard dose, 112.5+112.5 g a.i./ha and double dose, 225+225 g a.i./ha on tomato crop. The study was carried out in the open field and as well as under poly-house conditions simultaneously. The foliar application was given twice i.e, first application at fruit initiation stage followed by second application after 10 days interval. The tomato fruit and leaf samples were collected and analysed on 0, 1,3,5,7,10,15,20,25 and30 days. The soil samples were collected and analysed 0, 5, 10, 15, 20, 25 and 30 days after last application. Tomato crop without application of the fungicides was kept for comparison. Extraction of fluopyram, its metabolite fluopyrambenzamide and tebuconazole from tomato fruits, leaves and soil matrices was carried out by the QuEChERS analytical method, followed by dispersive solid phase extraction (d-SPE) clean-up. Analysis of the fungicides was carried out by high-performance liquid chromatography with mass spectrometry (LC-MS/MS). Selectivity, linearity, accuracy, precision, limit of detection (LOD) and limit of quantification (LOQ) parameters were studied for method validation (SANTE 2017).

The method used for analysis of fluopyram, fluopyrambenzamide and tebuconazole gave satisfactory recovery for all matrices which was within acceptable range of 70-120%. The LOD and LOQ of the method were 0.001 µg mL^{-1} and 0.005 mg kg^{-1}, respectively. In the open field from treatment at the standard dose the residue levels of both fluopyram, and tebuconazole was close to the maximum residue limit (MRL) of 0.9 mg kg^{-1} (European Union). In the poly-house, for the same treatment, the required pre-harvest interval (PHI) and the time required for the residues to reduce to the MRL levels was 2 days. When the treatment was doubled, the PHI required in the open field was 7 days and in the poly-house it was 9 days. In leaves the residue concentration was high in both field and poly-house. But, dissipation of both fungicides in the leaves in the open field was much faster compared to the poly-house. The degradation half-life (DT_{50}) in the field was about 7 days, where as in the poly-house it was in the range of 16-18 days. In the field soil the

fungicides were detected upto 30 days, but faster dissipation was observed in the open field compared to the poly-house. Fluopyram benzamide, the metabolite of fluopyram was detected in tomato fruits and leaves, but not in field soil. In fruits the growth dilution effect seemed to be the major factor for fungicide dissipation. In the tomato leaves photo-degradation appeared to be major factor for fungicide dissipation. The results of the study indicated that both fluopyram and tebuconazole are likely to remain for a longer period of time under poly-house ecosystem compared to the open field.

Keywords: *QuEChERS method, LC-MS/MS, Half-life, PHI*

Effect of Plant Phenolic Compound On The Larvae of *Spodoptera Litura (*Fabricius) And Its Parasitoid *Bracon Hebetor*

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Introduction : The last few decades have witnessed a major advance in the field of crop protection, achieved largely through synthetic pesticides and fertilizers. The large scale and unscrupulous use of synthetic pesticides in intensive agriculture has no doubt have made great contribution in increasing the crop yield but has also led to health hazards, pollution of environment, adverse effect on non-target organisms including human and resistance in insects. Also the buildup of pesticide residues has made it mandatory to search for alternate ecofriendly control strategies. Phenolic compounds are widely gaining attention due to an increased interest in their interaction with other organisms and their role in imparting resistance to biotic and abiotic stress. These are safe and ecofriendly as they are biodegradable to non toxic products. Therefore the present study was aimed at investigating the potential of the plant compound gallic acid in suppressing the population of tobacco caterpillar, *Spodoptera litura* (Fabricius) and its indirect effect on it*s* natural predator *B. hebetor.*

Methodology : The cultures of the polyphagous insect pest *S. litura*, and *B. hebetor* was maintained in the laboratory at 25 °C temperature, 65 ± 5 % relative humidity (RH) and 12:12 dark : light (D: L) photoperiod. The mass rearing of *B. hebetor* was carried out on 5th instar larvae of *Corcyra cephalonica* and the culture of *C. cephalonica* was maintained on partially crushed sorghum grains at 25 ± 2 °C and 65 ± 5 % RH. The antibiosis influence of gallic acid was ascertained by feeding second instar larvae on artificial diet incorporated with different concentrations (5ppm, 25ppm, 125ppm, 625ppm, 3125ppm) of the compound.

The experimental larvae were kept in the Bio-chemical Oxygen Demand (B.O.D) incubator and observed daily for the various developmental parameters such as larval mortality, pupal mortality, total development period and adult emergence. The effect of the phenolic compound on the parasitoid was evaluated by providing the *S. litura* larvae fed on the LC50 concentration of the phenolic compound for parasitization. The developmental parameters viz. larval mortality, percent pupation and the total development period were also recorded for the parasitoid.

Results and Conclusion : We found that there was higher larval mortality, reduced pupation and lower adult emergence of the larvae of *S. litura* and *B. hebetor* under the influence of gallic acid. Thus in conclusion, our results illustrated that gallic acid effected the survival of both pest and its parasitoid .Thus our compound has great potential to be used as a biopesticide against insect pest but its impact on the natural predator cannot be neglected .

Keywords: *bioassay, gallic acid, pesticide, ecofriendly, parasitoid*

Cadmium Toxicity And Its Amelioration By Sulfate In Maize Seedlings

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Plants, being sessile are highly vulnerable to various adverse environmental conditions including heavy metal stress. Cadmium (Cd), one of the highly toxic non-essential heavy metals, when present in the environment in excessive amount can cause substantial reduction in plant growth and productivity. Within cells, Cd can displace essential metals with similar properties; interact with functional groups of catalytic or transport proteins, thereby modifying protein structures; and disturb the cellular redox status by excess production of reactive oxygen species (ROS). To cope with Cd stress and protect cells from adverse affects, plants have adopted various strategies, among which nutrient management is one of the possible way to mitigate Cd toxicity. Sulfur (S) uptake and assimilation are crucial for determining crop yield and resistance to Cd stress. Cd affects S assimilation pathway which leads to the activation of pathway responsible for the synthesis of cysteine, a precursor of glutathione (GSH) biosynthesis. The GSH, a non-protein thiol acts as an important antioxidant in mitigating Cd-induced oxidative stress. It also plays an important role in phytochelatins (PCs) synthesis, which has a proven role in Cd detoxification. Therefore, S assimilation is considered a crucial step for plant survival under Cd stress. In the present study, an attempt was made to create a better understanding of the role of added sulfate (SO_4^{2-}) in modulating S-metabolism conferring tolerance against Cd stress in maize. Expression patterns of antioxidant genes, transporters involved in SO_4^{2-} and Cd accumulation, membrane damage, in vivo reactive oxygen species (ROS) detection and hydrogen peroxide (H_2O_2) accumulation under Cd stress in presence or absence of excess SO_4^{2-} were studied to get an overview of cellular maneuvering in conquering Cd induced oxidative stress damages.

Supplementation of the ¼ Murashige and Skoog (MS) media with excess sulfate [600 µM $(NH_4)_2SO_4$] markedly restored the shoot biomass under Cd stress (100 µM $CdCl_2$). Greater availability of excess sulfate at the transport site significantly reduced Cd uptake as well as tissue Cd accumulation in both roots and shoots of SO_4^{2-} supplemented plants under Cd stress. Histochemical staining and ROS imaging revealed that SO_4^{2-} supplemented plants have experienced less oxidative stress as also evident from non-significant increase in O_2^- and low H_2O_2 content as compared to Cd challenged plants. Elevated GR, APX-1 mRNA and protein expression levels were found to be insufficient to prevent Cd stressed plants from ROS induced oxidative damage to membrane lipids, as indicated by high MDA levels. Fine adjustment of transcriptional regulation of sulfate uptake and assimilation was also found to be beneficial for SO_4^{2-} supplemented plants to counter Cd stress effects at cellular level. Enhanced GSH level with concomitant increase in total PC both in root and shoot might play a substantial role in conferring Cd stress tolerance. Moreover, precise role of miRNAs involved in oxidative stress (miR398a), glutathione biosynthesis (miR408a) and sulfur assimilation (miR395d) was also unveiled to understand SO_4^{2-} mediated Cd stress mitigation at the post transcriptional level. Taken together, our findings indicate that fine adaptation of sulfate uptake and assimilation in sulfate supplemented maize plants might satisfy two contrasting needs: (a) maintaining high GSH pool essential for sustaining balanced redox status under stress condition; (b) alleviating Cd stress effects by means of GSH mediated detoxification pathways. Over all, this investigation provides a deeper understanding of molecular mechanism of Cd stress alleviation by added SO_4^{2-} in maize.

Keywords: *Antioxidant, Cadmium, GSH, Maize, Phytochelatins, ROS, Sulfate*

Influence of Cadmium Chloride on Physicochemical and Biochemical Properties of *Zea mays*

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The natural environment is clean, but due to diverse activities of human beings, it is polluted resulting in what is called environmental pollution. In the present study the investigationwas done on the physico-chemical analysis of sixteen parameters as well as four metals (Cd, Cr, Zn and Ni)of theselected soilsample on Atomic Absorption Spectroscopy (AAS). The seeds of *Zea mays*were sown in earthen pots with soil sample and cadmium chloride treatment was given by incorporating increasing concentrationsof cadmium chloride i.e., 20, 40, 60, 80 and 100 ppm in the soil. The aim of this work was to determine the toxic effects of cadmium chloride on the photosynthetic pigments, proline, polyphenol and antioxidative response in *Zea mays*.

Keywords: *Zea mays, Cadmium chloride, AAS, Physico-chemical and biochemical properties.*

Biocomputational Analysis and Insecticidal Toxicity of a Lectinfrom *Vigna aconitifolia* for *Lipaphis erysimi*

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In 1888, Stillmark reported first lectins from castor bean which was later found as widely distributed in nature and present in every living organism. Lectins are distinctively carbohydrate binding proteins with non-immune origin and possess one non-catalytic domain with reversible and specific suger specificity. Legume lectins are exclusively present in members of *Legumeinoseae* and composed of either two or four subunit of nearly 30 kDa and showed toxicity against hemipteran. This study explains the insecticidal potential of *Vignaaconitifolia* lectins through molecular modeling and docking with receptor Aminopeptidase N from *Acyrthosiphon pisum*(Pea aphid) membrane and *H. armigera*. The functional domain analysis of this test lectin revealed metal binding and N-linked glycosylation site. The ExpasyProtParamtool revealed different physico-chemical parameter like pI of 5.85, instability index is 30.24 and aliphatic index with 85.07 which explain different attributes of this protein. Molecular Doking study revealed that ASP, SER, VAL, GLU, ASN, LYS, THRand ARG amino acid residues of this lectin are involved in interaction with TYR, SER, ASP, ARG, VAL, GLY, GLN and ASN residues of alanyl aminopeptidase N (APN) receptor of *Acyrthosiphon pisum* (pea aphid) and aminopeptidase N receptor of *H. armigera,* which showed binding affinity of this lectin towards these receptors. The expression studies of this test lectin was accomplished using *E. Coli* BL21 pLys cells and further, purified test lectins proteins was analysed using SDS PAGE and western blotting, ensure the molecular mass of about 30 kDa. Probit analysis estimated the LC_{50} for this lectin as supplemented in artificial dietwas 0.015 and 1.33 µg/g of diet

based on mortality data against *L. erysimi*and *H. armigera*respectively.

The present study using various molecular and bio-computational tools will enhance our understanding about *Vignaaconitifolia* lectin structure and could be used as a potential candidate gene for generating transgenic of crop plants for increased insect resistance.

Keywords: *Lectins, Heterologous expression, pI, instability index and Molecular docking*

Anatase (TiO_2) Nanoparticles Induced Cytotoxicity in Lentils

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Nanotechnology has gained public interest due to its wide spread applications in many areas of human interest. Understanding nanoparticles behavior in the soil and plants is essential to check its potentially toxic effects, since plants are the mode of entry of nanopaticles in the food chain. In the present study we have investigated the effect of TiO_2 nanoparticles at four different concentrations (50,100,150,200 200mg mL-1) following seed dressing. The different cytological effects including the chromosomal aberrations were studied in detail for the treated cells as well as control, using root tip meristems of lentil as a model organism. Genotoxicity as a biotic response to NP exposure increases with increasing concentration and exposure duration, which leads to an inhibitory effect on cell cycle. The common anomalies observed during the study were laggards, bridges, fragments, Micronucleus etc. It is inferred from the present study that TiO_2 nanoparticles could penetrate the plant system and may impair stages of cell division and can be a clastogenic/genotoxic and cytotoxic agent.

Keywords: *Nanotechnology, Nanoparticles, Cytotoxicity, lentils.*

Simple And Rapid Bioassay Test For Screening Cytogenotoxicity Effects Of Pendimethalin Using Ciliate Protozoa *Euplotes Patella* And *Oxytricha Fallax*

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In the present work an attempt has been made to evaluate the in vitro cytoxicity effects in freshwater ciliated protozoans, *Euplotes patella* and *Oxytricha fallax* exposed to different sub-lethal concentrations of commercial grade Pendimethalin pesticide. Cytotoxicity was determined based on LC_{50} value of acute toxicity tests and the calculated LC_{50} value for *Euplotes patella* and *Oxytricha fallax* was found to be 56ppm and 77.62ppm respectively. It was found that *Oxytricha fallax* has more tolerance towards Pendimethalin than *Euplotes patella*. Significant reduction in contractile vacuole activity was observed in time and concentration dependent manner and food vacuoles formation was diminished in dose dependent manner in both the experimental organisms (P ? 0.05). Macronuclear changes such as vacuolated, fragmented, unevenly divided, karyolysis, and rod shaped were observed in both test organisms at various sub-lethal concentrations. In brief our findings confirmed that ciliate protozoa serve as potential model organisms for water quality assessment in aquatic ecosystem bio-assays. It is further concluded that Pendimethalin is genotoxic to ciliates in the present studies.

Keywords: *Karyolysis, Pendimethalin, Phagocytosis, Swimming behaviour, Threshold value*

Effect of Insecticide Chlorantraniliprole on Hematological Profile of Fingerlings of Freshwater Fish *Cirrhinus mrigala*

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In recent times, numerous pesticides are being used for the controlling the agricultural crop pests. Most of the pesticides,now available in the market, are synthetic which is the major causes of environmental pollution in general and aquatic pollution in particular. Fishes are highly sensitive and hence act as macro indicators of aquatic environment. The first reported anthranilicdiamide pesticide is Chlorantraniliprole, which is mostly used for the control of agricultural pests in the insect's order Lepidoptera, Coleopterans, Dipterans and Hemipterum. The main target of Chlorantraniliprole is the ryanodine receptorwhich releases the calcium from the sarcoplasmic reticulum of muscle cells and endoplasmic reticulum of other cells. This leads to impaired muscle activity, paralysis and ultimately death of exposed species. The present study was designed to evaluate the toxicity of Chlorantraniliprole on hematological profiles viz. total erythrocyte count (RBC), total leucocyte counts (WBC), hemoglobin concentration (Hb), packed cellvolume (PCV), mean corpuscular volume (MCV), mean corpuscular hemoglobin (MCH) and mean corpuscular hemoglobin concentration (MCHC) in fingerlings of freshwater fish *Cirrhinus mrigala*.Before the experimental protocol, fingerlings were acclimatized in glass aquarium for seven days. After acclimatization, fingerlings were exposed to predetermined LC0 and LC50 concentration of Chlorantraniliprole in twenty-liter test container for 96 hrs (static bioassay method).In the present study, it was observed that RBC, Hband PCV; were significantly decreased in LC0 and LC50 concentration group as compared to the control group (P<0.0001). However, the WBC, MCV, MCHand MCHC was significantly increased in LC0 and LC50 concentration group as compared to the control group (P<0.0001).On the basis of hematologicalprofile studies, one can conclude that 'insecticide Chlorantraniliprole stimulatesthe immune system, an anemic condition that leads to change the physiological state of fish'.

Keywords: *Cirrhinus mrigala, Toxicity,Chlorantraniliprole, Hematological Profile.*

Ecotoxicology: An Overview

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Organisms can be exposed to various kinds of toxicants at any life cycle stage, some of which are more sensitive than others. Toxicity can also vary with the organism's placement within its food web. Bioaccumulation occurs when an organism stores toxicants in fatty tissues, which may eventually establish a trophic cascade and the biomagnifications of specific toxicants. Biodegradation releases carbon dioxide and water as by-products into the environment. This process is typically limited in areas affected by environmental toxicants and known as environmental toxicity. Harmful effects of such type of chemicals and biological agents as toxicants from pollutants, insecticides, pesticides, and fertilizers can affect an organism and its community by reducing its specific diversity and abundance. Such changes in population dynamics affect the ecosystem by reducing its productivity and stability. When toxicity and ecology come together a specific branch of environmental toxicology will made termed ecotoxicology.

Ecotoxicology is the study of the effects of toxic chemicals on biological organisms, especially at the population, community, ecosystem, and biosphere levels. Ecotoxicology is a burning issue of today because it is related with plants as well. Plants are what make up the most vital trophic level of the biomass pyramids, every other organism in an ecosystem relies on the health and abundance of the primary producers in order to survive. If plants are battling problems with diseases relating to exposure to chemicals, other organisms will either die because of starvation or obtain the disease by eating the plants or animals already infected. So ecotoxicology is an ongoing battle that stems from many sources and can affect everything and everyone in an ecosystem. There are so many toxicants are present in our surroundings e.g. PCBs, Pesticides, Mycotoxins, Plastic, VOCs,

Dioxins, Heavy metals, and Chloroform etc. Through the contamination of these chemicals, it is very easy to wipe off any species from ecosystem. We use many tests to find out the concentration of toxicity in any tissue. Ecotoxicological studies are generally performed in compliance with international guidelines, including EPA, OECD, EPPO, OPPTTS, SETAC, IOBC, and JMAFF. There are many federal and state laws protecting birds, animals, and rare plants. But the first order of protection comes from us taking steps to avoid harm since we are the main source of all the toxins.

Keywords: *Toxicology, ecology, environment, organisms, plants, contamination.*

Toxicity Stress on Internal Organsof *Heteropneustes fossilis* to Nuvan

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Organophosphates are used in agriculture as pesticides and insecticides due to their rapid biodegradability nature to control pest but their broad spectrum of harmful effects extends far beyond the pest. Main objective of the paper is to carryout an emperial study to investigate the effect of sub lethal Nuvan on intestine, liver, etc. of *Heteropneustes fossilis.* LC_{50} value of nuvan was calculated and for 96 hours it was found 0.98ppm. For this study, the experimental group was treated with sub lethal nuvan concentration of 1.43ppm. Histopathological tissues were collected from both control and experimental group following 30 days exposure of nuvan.

Keywords: *Organophosphates, Nuvan, Intestine, liver,H. fossilis, Histopathology.*

Toxicity Studies Of Heavy Maetals On Physiology Of Fresh Water Fish: *Rasbora Daniconius*

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Heavy metals pose a great threat to aquatic organism not only because they are highly toxic in low quantity but also because of their potential characteristic of combining with biological moleculs. Metals like mercury, cadmium and lead all show a great affinity for sulfhydryl (-SH) groups and exert toxic effects largely by combining with such groups on proteins. One of the most significant effect of metallic pollution is that aquatic organisms can absorb and accumulate concentrations in their tissues. For example, there may be up to 15 times as much mercury present in fish. The LC10 and LC50 values for heavy metals were summarized in (Table No 03).The LC10 of lead acetate for 24, 48, 72, and 96 hours were 3.34,3.80, 1.99 and 1.90 ppm respectively. The LC10 of zinc sulphate for 24, 48, 72 and 96 hours were 6.64, 5.71, 2.99 and 1.99 ppm respectively. The LC10 of nickel chloride for 24, 48, 72 and 96 hours were61.07, 18.63, 23.09 and 9.29 ppm respectively. The LC50 of zinc sulphate for 24, 48, 72 and 96 hrs were 14.6, 12.65, 9.38 and 6.26 ppm respectively and LC50 of nickel chloride for 24, 48, 72 and 96 hrs were 82.78, 69.15, 44.86 and 29.22 ppm respectively. Where as in preset study no such behavioral changes were noticed in the control fish, which remained active and healthy throughout the experimental period.

Keywords: *Heavy metals, Rasbora daniconius, Toxicity.*

Biochemical Alterations due to Chlorpyrifos among Spray Farmers Selected Area from Jammu and Kashmir

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Pesticides are those substances which are used to control pests, for example insects, aquatic weeds, plant diseases, and aquatic snails that carry the cause of schistosomiasis an acute and chronic parasite disease that can effect liver, urinary bladder and other organs**.** Chlorpyrifos is one among the pesticide which plays vital role in the field of agriculture and is registered for the control of corn rootworms, flea beetles, grubs, cutworms, flies, termites, fire ants, mosquitoes, lice and cockroaches. It is also registered for direct use on sheep, horse site treatment, domestic dwellings, dog kennels, farm buildings, storage bins. Mostly chlorpyrifos is used apple orchid in Jammu and Kashmir valley.

Present work shows the impact of biochemical parameters due to the effect of chlorpyrifos on spray formers. Chlorpyrifos, exposure causes many biochemical alterations. Eight occupationally exposed spray farmers and Eight of unexposed same were selected from district Bandipora Hajin area, Jammu and Kashmir using stratified balanced chance sampling procedure and tested for different biochemical parameters. It was found that protein, Fasting blood sugar level were significantly decreased in those who were involved in Chlorpyrifos spraying for about one complete year, that is, march to march, while as urea and creatinine were found to increase significantly as compared to control. So it has been observed the difference between C and E. where C is control and E is experiment.

Keywords: *District Bandipora Hajin area, Biochemical; Chlorpyrifos; Spray farmers.*

Environmental Impact Assessment, Environmental Auditing and Life Cycle Assessment

Flood in Kerala in August, 2018 and Anthropogenic Inputs – Some inconvenient facts and lessons for the future

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Kerala is situated between Arabian Sea and Western Ghats. Climatically, the region includes tropical coastal plains, mountainous terrain and plain midlands. The state experiences two monsoon spells, southeast and the northwest, 120–140 rainy days. The state receives about 3100mm of rain, while mountainous highlands of Idukki district receive above 5,000 mm of orographic precipitation. Rains were comparatively less during 2016 and 2017. Sufficient rain was there in June and July, 2018. Between August 1 and 19, the state received 758.6 mm of rain, compared to August-average of 287.6 mm – 164% more in 19 day and 42% more for entire monsoon season, enabled by spells of low pressure systems formed over Bay of Bengal and Odisha. Monsoon wind-system, which pulled in huge amount of moisture to hit Western Ghats, caused concentrated rain at some localized areas of Kerala. The land-areas were already saturated by incessant rains since June and dams were full to the brim. This torrential downpour led to more surface run-off causing landslides and widespread flooding. Dam authorities waited till water-level in Idamalayar reservoir reached its capacity of 169 feet and released the gates that led to sudden flash floods. Ernakulum in Kochi along the Periyar river, was most severely affected into which excess water from the Idamalayar dam was drained. **35** gates **of the 39 dams** were opened at a time, knowing well what was to come. The intensity of the rains meant that two dozen more dams in states nearby had to follow. A torrent of hell let loose on **God's own country**. Residents fled to high roads that gradually engulfed in floodwater and landslides. At least **357 people** died, and floods destroyed crops in **906,400 hectares**. Loss to the state and people stood at **Rs 19,512 crore**.

Now we come to anthropogenic inputs for this disaster. Climate **study** on sea-surface temperature of Western Indian Ocean for 1950-2015 predicted extreme rainfall events with intensified westerly winds moving into increasingly-warmer Arabian Sea with surges in moisture to the subcontinent during monsoons. Researches added, such events could be predicted two-to-three weeks ahead. But IMD failed to study the situation, while the state failed to take proper preparations to face impending disasters. According to **UN report**, the main reasons for floods was high-intensity rainfall in short duration, poor or inadequate drainage capacity, unplanned reservoir regulation and failure of flood control structures, as **report**ed by the Ministry of Water Resources in the Rajya Sabha.

Report of World Bank Group brings out rise in average temperatures and more erratic rainfall in India and predicts, these weather changes would continue to shadow over coming decades. Madhav Gadgil Committee appointed by Government, submitted way back in 2011 the vulnerabilities and ecological fragility of the Western Ghats highlighting highest number of vulnerable zones in Kerala and challenges posed by their position amidst the Ghats. Imprudent activities viz. quarrying, mining, repurposing of forests, and high-rise constructions continued unabated, which the state ignored**.** Only after the massive flood, illegal stone quarries, deforestation for real-estate development or unauthorized constructions on river beds were officially recognized.

The study establishes the extent of disaster due to human intervention, to which intense rainfall added an impetus.

Keywords: *Anthropogenic inputs, Sea-surface temperature, Ecological fragility, Vulnerable zones*

Impacts And Adaptation Strategies Of Climate Change In Kashmir Himalaya

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Climate change effect all sort of people around the world but the main group of people that will be affected the most is the poor population of the world. This is based on the facts that they rely mostly on their natural resource base viz., agriculture, fisheries, livestock, biodiversity, hydropower generation , tourism activities and also quality of human health. Kashmir valley of J&K state has also shown strong signs of climatic variability both in terms of extreme weather events as well as losses in crop yields. From 1980- 2017 different districts of Kashmir valley have suffered meteorological droughts of moderate severity (26-50% less than normal) in the years 1981, 1985,1998, 1999, 2000-2004, 2006,2007,2011,2013,2016. In the last 37 years (1981-2015) maximum spring temperature has shown an increase of 10.16 % (18.3^{0}C in 1980-1997 to 20.16 ^{0}C in 1998 to 2017) while as the winter maximum temp has increased to 17.3%. Similarly, minimum temperature particularly in winter has exhibited an increase of 9.32 % from 1981-2017. Overall the average temperature has shown an elevation of 0.49°C (12.87°C from 1980-97 to 13.36°C from 1998-2017). Similarly, the average rainfall has shown a declining trend in the past 37 years (902.25 mm from 1980-97 to 747.85 mm from 1998-2017) (Source: agrometerological Division, SKUAST-K, Shalimar campus SKUAST K. Climate change has resulted in abnormal weather events viz., extreme rainfall, drought like situations, floods, strong winds, etc. Untimely snowfall has also badly affected the yield of

apple, almond and cherry. Saffron, a very important cash crop has also exhibited huge losses due to extreme weather conditions in the past few years. Infestation of pests and fungal attacks on agriculture crops has been a common occurrence. Due to climate change land use and land cover pattern in Kashmir has shown alarming variations as major land under agriculture has been converted in to urbanisation. Adaptation strategies like development of climate resilient varieties of fruit and agriculture crops, water management, greening / rehabilitation of waste lands is a major thrust area of research.

Keywords: *Climate Change, Extreme weather Events, climate resilient varieties*

Assessment of Impact of Climate Change on Water Balance in Jamni and Dashan Sub-basins of Betwa River Basin, Central India

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The impact of climate change and adaptation measures is observed as a major contemporary global concern. The hydrological system is vulnerable to climatic variations, especially precipitation and temperature. Soil and Water Assessment Tool (SWAT) is the semi distributed hydrological model widely used for analyzing and predicting the water balance components like precipitation, potential evapotranspiration, surface runoff, ground water, and stream flow etc. Jamni and Dashan rivers are the major tributaries of Betwa River basin which are contributing maximum water yield.In the present study,SWAT was used for a future projection of changes in the hydrological parameters based on Representative Concentration Pathways Scenarios (RCP 4.5 and RCP 8.5) of ensemble downscaled Coupled Model Intercomparison Project's (CMIP5) General Circulation Model (GCM) outputs. The water balance parameters have been measured and compared in different time scale (historical 1971-2015, predicted 2016-2040). Different parameters such as, DEM, land use land cover, soil, temperature and precipitation, solar radiation, relative humidity and windare used as a input parameters for this model to calculate the runoff at watershed outlet. Hence the values obtained by GCM are to be reduced by multiplying factor which is estimated by linear scale bias correction method to estimate water availability. The study demonstrates that the important water balance components of evapotranspiration and water yield in Jamni and Dashan sub-basins. However, modeling results showsthe significant changes in the sub-basins water balance and hydrological regime. Hence with the increasing temperatures and precipitation will certainly effect in the upper and middle sub-basins of the Jamni and Dashan.

Keywords: *SWAT, GCM, CMPI5, Water balance, Jamni River and Dashan River.*

Environmental Impact Of Water Pollution From Plastic And Non Biodegradable In Present Scenario In Punpun River At Chotanagpur To Fatuha,Patna(Bihar State) India

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Punpun River Is"Adi Gange PunePune"(Garur puran Article 84)The Punpun River Is Auxilary River Of The Ganga.Other Name Of Punpun Is Kikat River Or Bamagadhi River.Present Time This River is very dirty suffer from water pollution .The study of this river nabinagar to fatuha in bihar.So very very dirty river from plastic and non biodegradable things.

So,now bihar government closed polythin bag but no any plantation at river side in rainy season flood position in this river and soil erosion.

Keywords: *punpun river,adi gange,Garur puran,plastic,soil erosion.*

Environment And Climate Change And Its Effects On The Organisms

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Climate change as: “a broad range of global phenomena created predominantly by burning fossil fuels, which add heat-trapping gases to Earth’s atmosphere. These phenomena include the increased temperature trends and also encompass changes such as sea level rise. Most plants and animals live in areas with very specific climate conditions, such as temperature and rainfall patterns, that enable them to thrive. Any change in the climate of an area can affect the plants and animals living there, as well as the makeup of the entire ecosystem. Some species are already responding to a warmer climate by moving to cooler locations. The impact of climate change on a particular species can ripple through a food web and affect a wide range of other organisms.

Climate change, along with habitat destruction and pollution, is one of the important stressors that can contribute to species extinction. The IPCC estimates that 20-30% of the plant and animal species evaluated so far in climate change studies are at risk of extinction if temperatures reach the levels projected to occur by the end of this century.

A diversity of species increases the ability of ecosystems to do things like hold soils together, maintain soil fertility, deliver clean water to streams and rivers, cycle nutrients, pollinate plants (including crops), and buffer against pests and diseases—these are sometimes called ‘ecosystem functions’ or ‘ecosystem services’. A loss of species could reduce this ability, particularly if environmental conditions are changing rapidly at the same time. Increasing our understanding of the effects of climate change on organisms and developing practical ways of mitigating such effects, are critical to limit the damage. Unless greenhouse gas emissions are severely reduced, climate change could cause a quarter of land animals, birdlife and plants to become extinct.

Keywords: *environment, climate change, destruction , species, extinct*

Green Chemistry and Technology

Utilization of temple waste flowers of marigold and hibiscus for colouration of cotton and cotton/viscose blend

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India is a home for festivals and celebrations. Marigold is grown abundantly in various parts of India and used for making garlands and decoration at religious occasions and many other ceremonies. Hibiscus is a small shrub grown in tropical regions, an evergreen flowering plant and is abundantly available throughout the Middle East and eastern Asia. It is also popularly known as China rose. In India Hibiscus is grown in all the regions, cultivated in home gardens too and mainly red coloured hibiscus flowers are offered to Lord Ganesha. Apart from the other varieties of the flowers that are offered in temples, marigold and hibiscus are most common and as a result, a substantial amount of waste is generated after fulfilling their purpose. Such flower waste can be used in different manners to produce valuable products and thereby may also contribute towards saving the environment from pollution caused by inadequate disposal of flowers offered to the deities. There is common practice in India of throwing the temple flowers once used in Idol worship into river, which contributes to the water pollution.

The waste disposal of such flowers is itself an issue and hence exploring the potential of using this flower waste from temples for dyeing of textile has been undertaken. However, during the last few decades, the use of synthetic dyes is gradually receding due to their harmful effects, toxic nature and some are even found to be carcinogenic. Therefore in this era of green minded consumers and increased awareness about environmental regulations; natural dyes are recovering their lost importance apart from giving safe coloration property. Although natural colors cannot substitute use of synthetic dyes completely, there is definitely increasing market for such complete eco-friendly dyed

or printed materials. Therefore in the present study, the temple waste flowers of marigold and hibiscus were collected from local area and the attempt has been made to standardize procedure of extraction and dyeing. The dye extract was prepared using water as extracting medium and then applied on 100% cotton and cotton/viscose fabrics to achieve single as well as compound shades. As natural dyes need to be applied on textile material with the help of mordant, earlier this mordanting was done with the help of chemical or metallic substances such as ferrous, copper, tin etc. But such metallic mordants themselves are pollutant and harmful. Due to the environmental hazard caused by metallic mordant while dyeing of textile fabric, in this study, natural mordants such as amla, harda and pomegranate rind were used by Premordanting technique.

The dyed samples were evaluated for their colour strength in terms of their K/S values, tonal variations in case compound shades and also assessed for their performance properties in terms of wash fastness, rub fastness, light fastness and perspiration fastness. The results were very encouraging as the shades of yellow, yellowish beige, light beige, beige were obtained. Also the fastness properties found to be in the acceptable range. Thus the dyeing of self and compound shades of marigold and hibiscus collected from temple waste was successfully carried out on cotton and cotton/viscose blend fabrics using natural mordants by premordanting technique. Results were encouraging wide range of shade gamut was obtained by combination of marigold and hibiscus with each other. As the uses of metallic mordants give bright colour to natural dyes, the shades obtained in this study were all soothing and subtle because of use of natural mordants.

Thus the study is very promising as the natural dyes obtained from natural waste are contributing greatly to keep our environment green and clean. The findings of the study also provide a new possibility for designers to enhance their upcoming creations. Also it is valuable for the designers and craftsmen looking out for sustainable solutions for their textile creations.

Keywords: *temple wastes, marigold, hibiscus, compound shades, natural mordants*

Indirect Oxidation of Cytarabine Drug via Electro-Fenton Process: Optimization and Degradation Study

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Cytarabine (CTN),the antineoplastic drug is an emerging persistent pollutant responsible for exerting genotoxic and mutagenic effect on the aquatic environment. Electrochemical advanced oxidation processes(EAOPs) are effectively usedfor such recalcitrant compounds whose degradation is not possible through conventional treatment technologies. In EAOPs, hydroxyl free radicals ($^{?}$OH) are electrochemically generated, which is a strong oxidant with a redox potential of 2.80 V/SHE. The Electro-Fenton process is anEAOP based on Fenton chemistry where the mixture of hydrogen peroxide (H_2O_2) and ferrous ions (Fe^{+2}) are either electrogenerated or added externally for the formation of $^{?}$OH radicals.This study aims to investigate the oxidative degradation of cytarabine through in-situ generated H_2O_2 and Fe^{+2}at graphite and iron electrodes system respectively, in an undivided electrochemical cell. For the attainment of highest removal efficiency,the operating variables like pH, current densityand initial CTN concentrationwas optimized.The maximum removal efficiency of CTN was obtained at lower pH with current intensity20mA/cm^2. Hydroxyl free radicals were mainly responsible for the degradation of CTN.

Keywords: *Cytarabine,Electrochemical advanced oxidation process, Hydroxyl free radicals,andgreen technology.*

Aquatic Resource Management

Phytoplankton as Bioindicators of Environmental Conditions of Lake Mansar, Jammu, Jammu & Kashmir, India

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Phytoplankton serve as an important biomarker for assessing the quality of water and are basically the first bio-indicators of pollution of an aquatic ecosystem. Phytoplankton assemblageis always influenced by environmental factors and respond rapidly to changes taking place in the aquatic environment. Therefore, these environmental changes and threats must be understood for efficient management of any aquatic ecosystem. In the present study, limnological investigations were carried out in a sub-tropical Lake Mansar, Jammu by analyzing water quality parameters (temperature, depth, transparency, EC, TDS, salinity, pH, carbonates, bicarbonates, total alkalinity, chloride, free carbon dioxide, DO, BOD, COD, calcium, magnesium, total hardness, sodium, potassium, nitrate, phosphate, sulphate and silicate) and qualitative and quantitative analysis of phytoplankton for a period of two years (2014-2015). Phytoplanktonic investigation has revealed presence of 92 species belonging to Chlorophyceae (57 spp.), Bacillariophyceae (20 spp.), Cyanophyceae (11 spp.), Dinophyceae (2spp.) and Euglenophyceae (2 spp.). Chlorophyceae has been recorded as the most dominant group throughout the study period. Present observations haverevealed that the lake is a highly productive water body, facing pollution problems and is approaching towards eutrophication. Nygaard's trophic status indices have supported the above observation and confirmed high organic pollution in Lake Mansar due to the presence of high number of pollution indicator species belonging to classes Chlorophyceae, Bacillariophyceae and Cyanophyceae. Based on the findings, conservation strategies have been proposed for Lake Mansar.

Keywords: *Microphytic, productive, Chlorophyceae, Cyanophyceae, BOD, Organic pollution.*

Use Of Nanoscale Zinc Particles For Photocatalytic Remediation Of Aquatic Pollutants

Prasenjit Hazra

Aquatic pollutions from chemicals such as industrial wastes, dyes, solvents, pesticides and microbes pose serious threat to water quality. The currently available methods to treat water do not actually destroy the pollutants.We have developed a model for remediation of aquatic pollutants using nanotechnology which will safeguard the aquatic animals and public health by treating the pollutants. Zinc oxide (ZnO) nanoparticles with a high surface reactivity owing to large number of active sites, has emerged to be an efficient photocatalyst as compared to other metal nanoparticles. Due to thenanosized structure of ZnO, more surface area available for the adsorption of the target molecules (chemical and biological pollutants) and hence higher will be the efficiency of the photocatalytic reactions.Here, in this model, we explored the use ZnOnanoparticles for photocatalytic degradation of aquatic pollutants. ZnO serves as an attractive way of treating water as it can remove both chemical and biological contaminants by producing reactive oxygen species such as hydroxyl radicals (?OH), superoxide radical ($?O_2^{-}$) etc. The photocatalytic process is based on the adsorption of photons with wavelengths ~388 nmusing UV light. This will activate ZnO nanoparticles for initiating the charge separation. It results in the promotion of an electron in the conductive band (e_{CB}^-) and formation of a positive hole in the valence band (h_{VB}^+). The following reactions will take place during the process:

$ZnO + h? (388\ nm) \rightarrow ZnO (e_{CB}^- + h_{VB}^+)$

$h_{VB}^+ + R \rightarrow$? intermediates ? $CO_2 + H_2O$

$H_2O + h_{VB}^+ \rightarrow ?OH + H^+$

$?OH + R \rightarrow$? intermediates ? $CO2 + H_2O$

$ZnO (e_{CB}^-) + O_2 \rightarrow ZnO + ?O_2^-$

$ZnO\ (e_{CB}^-) + {}^?O_2^- + {}^2\ H^+ \ ?ZnO + H_2O_2$

$ZnO\ (e_{CB}^-) + H_2O_2 \ ?ZnO + {}^?OH + H^-$

$^?O_2^- + H_2O_2 ?^?OH + H^- + O_2$

$^?O_2^- + H^+ ?^?OH_2$

$ZnO\ (e_{CB}^-) + {}^?OH_2 ?\ ZnO + HO_2^-$

$HO_2^- + H^+ \ ?\ H_2O_2$

$2^?OH_2 \ ?\ O_2 + H_2O_2$

$ZnO\ (h_{VB}^+) + H_2O \ ?\ ZnO + {}^?OH + H^+$

$ZnO\ (h_{VB}^+) + OH^- \ ?ZnO + {}^?OH$

Final reaction is:

$^?OH + H^+ + 2e^- \ ?\ H_2O$

$½\ O_2 + 2\ H^+ + 2e^- \ ?\ H_2O$

For even distribution and better circulation of ZnO nanoparticles in the water, a stirrer is used. This model also uses the nanofiltration system to separate the used ZnOnanoparticles from the purified waters using 0.2- 5 nm sieve. With the help of vacuum filtration, the purified water will be recovered for further use in various purposes such as, industrial use, for fish cultivation or even for drinking purpose with additional water treatment methods.

Application of Multicomponent Biosorption for the removal of Pb(II) and Fe(II) ions by Flyash

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The treatment of heavy metals is of special concern due to their recalcitrance and persistence in the environment. The flyash was used in this work as low cost sorbent material for removal of Pb(II) and Fe(II) ions from aqueous solutions. The samples of adsorbent were sorted according to the particles diameter by standard sieves 250-500 µm. Batch experiments were carried out to study the sorption process and several parameters such as Initial pH of adsorbent, effect of contact time, effect of adsorbent amount and effect of metal concentration were conducted in these experiments. It was found that the obtained maximum sorption capacities of flyash for the removal of selected heavy metals were very high. This provide us to use flyash as a low cost material to clean up the water from toxic heavy metals studied.

Keywords: *Adsorption, Adsorbent, Environment, Flyash, Heavy metal.*

Potentiality of Aquatic Fern of Accumulating Heavy Metals and Reversal of Metal Induced Stress by Polyamine

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Our Environment is being polluted days after days by different anthropogenic factors. It is becoming ever increasing threat which makes the plants and human being unsuitable to grow and develop properly. The metal toxicity is one of the threatening issues among environment polluting factors. The toxic metals cause the most serious damages of major crop plants as well as natural flora. Among heavy metals, lead (Pb), cadmium (Cd), aluminium (Al) and mercury (Hg) are the notable ones which may perturb natural physiological phenomena of plants. Though ample reports are available regarding metal accumulation potential of aquatic angiosperms and terrestrial ferns but scanty works have been done on metal accumulation aquatic ferns. Both the aquatic fern *Marsilea* and *Salvinia* showed significant content of metal accumulation from polluted water bodies. The aquatic fern *Salvinia natans* is able to accumulate 1400 ppm Al maximum from industrial wastes collected from different sources. On the other hand, the aquatic fern *Marsilea minuta* accumulates 791.6 µg/g Cd of DW maximum from varied industrial effluents. The Atomic absorption spectrophotometric (AAS) studies of both the ferns were performed. From this study, interestingly it was observed that both *Salvinia* and *Marsilea* exhibited intake capacity of 3000 ppm of Al and 262.1 µg/g of Cd maximum respectively. In the plant metabolic system, polyamines play as effective stress relievers in different metal induced stresses. The polyamine putrescine (Put) minimized the metal accumulation capacity of *Salvinia* by 30%. In case of *Marsilea* the reduction of stress induced effect was 17.89% by polyamine spermidine (Spd). Significant metal accumulation capacity of these aquatic ferns and different positive experiments supporting this phenomenon enlighten about phytoremediation potentiality of *Marsilea* and *Salvinia* which is yet to be explored a lot.

Keywords: *Marsilea; Aluminium; AAS; Putrescine; Cadmium*

Effects of Various Categories of Pollutants on the Rate of Photosynthesis in an Aquatic Plant

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The use of different chemicals in our daily lives has shown some surprising and alarming results affecting the plants. In our experiment, we worked with different parameters and it was sought to find out whether they had any bearing on the rate of photosynthesis of an aquatic plant, *Hydrilla*, using a Wilmott's Bubbler and by counting the number of oxygen bubbles evolved. Five organic solvents viz., aniline, benzene, 1-butanol, benzaldehyde, and acetic anhydride were used for our study. While aniline, 1-butanol and benzaldehyde showed some rises in rate of photosynthesis by 20.51%, 21.42% and 9.8% respectively, benzene and acetic anhydride dropped the rate by30%and 27.5% respectively.

Hydrilla was treated with samples of Indian brands of soaps and detergents viz., Tide, Dove, Clean and Clear face wash, Lifebuoy and Surf Excel bar. Dove shampoo plummeted the rate by 80.6%, followed by Lifebuoy at 80.0%. Clean and Clear face-wash, Surf Excel bar and Tide led to a drop by 62.9%, 55% and 48% respectively. Then, five industrial pollutants viz., strontium chloride, barium chloride, lead nitrate, chromium trioxide and mercurous sulphide were used to find out their effects on the rate of photosynthesis. Only barium chloride showed a rise by 48.8%. Strontium chloride showed a moderate drop by17.8%. Mercurous sulphide, lead nitrate and chromium trioxide dropped the rate of photosynthesis by 90.1%, 28.9% and 54.2% respectively.

Lastly, five leading brands of automobile lubricants viz., Servo, 4T, Castro, Max and HP were taken for consideration. Servo

showed a nominal increase in the rate of photosynthesis by 27.2%. Max had the highest impact by 458%. In between, 4T, Castrol and HP showed some rises by 70%, 80% and 275% respectively.

Although a lot more work is needed to come to the final conclusion, it has become quite clear that the unchecked use of all the above chemical substances has created a serious imbalance in nature. Plants form the basis of nature and are the torch bearers of a clean environment. Neither a major increase, nor a decrease in the rate of photosynthesis is good because it creates havoc in the plant system. So there is an urgent need to implement the judicious use of these substances so that a minimal interference to the environment is allowed in course of our development planning and execution.

Keywords: *detergents, lubricants, heavy metal, photosynthesis, solvents.*

Conservation Status And Management Of Freshwater Fishes Of The Nilgiri Biosphere Reserve, Southern India

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The present study provides information on the current conservation status of freshwater fishes and measures for their conservation in the Nilgiri Biosphere Reserve (NBR), southernIndia. A total of 75 sites were sampled in five river basins of the eastwards flowing (Bhavani, Kabini and Moyar rivers and their tributaries) and westwards flowing (Chaliyar, Bharathapuzha rivers and their tributaries) river systems in NBR. A total of 117 fish species were collected from these 75 sites covering the five river systems. Earlier reported species were included based on the available published literature. Status was assessed based on method described by Coad (2000). Canonical Discriminant Analysis used for categorization of different conservation status. Out of the 117 species found, 12 species (11%) were assessed as being Critically Endangered, 22 species (20%) as Endangered, 33 species (30%) as Vulnerable, 27 species (24%) as Low risk near threatened and 17 species (15%) as Low risk least concern. *In situ* conservation measures, captive breeding, habitat protection and restoration, declaration of some of the area as fish sanctuary, protecting and developing riparian vegetation which provides food and protection for fishes, banning of sand collection from the river and river banks, completely banning fish capture during the breeding season, and increasing awareness among the local people about the importance and sustainable uses of these fishes are suggested as appropriate conservation measures.

Keywords: *Vulnerable, Endangered, In situ conservation, Western Ghats, River Moyar.*

Habitat Preference And Utilization Of Threatened Fishes In The Nilgiri Biosphere Reserve, South India

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Fishes are challenging subjects to study assemblage pattern and partitioning as they are temporally structured using a given habitat for only part of the year or period of life cycle. Uses of the terminology of assemblage and community are highly variable and still there is no consensus on the concept of community. Importance of habitats and the relationship between fish and habitat are of major concern to fishery biologists and ecologist. A common use of fish habitat indicates the physical and chemical characteristics of the environment, excluding biological attributes.Community – habitat relationships have been investigated in a variety of terrestrial assemblages, notably birds, desert lizards and rodents. In aquatic communities substrate diversity is a reliable predictor of species richness in freshwater molluscs, marine crustaceans and benthic insects. Very less work was carriedout on fish ecology and habitat preference especially on threatened fishes. So this study was conducted in the Nilgiri Biosphere Reserve (NBR) South India between $10^0$45' - $12^0$15'N and 76^0-$77^0$15'E to understand the habitat preference and ecology of threatened fishes on NBR. Detailed study was carried out at 20 sites on 31 the critically endangered / endangered fishes. Macro and microhabitat preference such as habitat type, substrate type, vertical position of fishes, flow, depth, fish cover, food and feeding habits of critically endangered and endangered fishes were studied.

Keywords: *Freshwater fishes, micro habitat, Ecology, Food and feeding, Endangered*

Evaluation of Traditional Fishing Crafts and Gears in Bihar

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Fishing is an old practice carried out since long-long time.In India, crafts and gears being used in different parts are mostly primitive, low-cost and non-mechanized. A wide range of fishing crafts and gears to catch fish has been evolved by the fishers of Bihar. The information on fishing crafts and gear was collected during 2017-18 from the Bihar, is an attempt to record the traditional indigenous knowledge. The identified crafts and gear are classified into different groups. Gill net, cast net, drag net, scoop net, hand bag net for jumping fish , bag net for community fishing, hook and line and traps are used as gears as seen during survey.

As the literature advocates that the knowledge about fishing crafts in Bihar is scattered, scanty and incomplete, so the present survey report has been undertaken to focus on the traditional knowledge of fishing practice tools and techniques.

Keywords: *Crafts, Gear, Fishing practice, Traditional knowledge.*

Periphyton Based Different Approaches In Fisheries Modules: Implication Of Sustainable Livelihood Security Of The Farmers In Rural Sunderban Of India

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The study was conducted to assess the alternative livelihood conditions through periphyton technology in different aquaculture practices in vast area in Sundarban by using semi-structured and pre-tested interview schedule in order to assess the alternative livelihood for rural youth men and women empowerment. Periphyton is the complex of sessile aquatic biota with associated detritus, attached to submerged substrates. It includes phytoplankton, zooplankton and other bottom organisms in combination with microbial bio-films.

About 49% of farmers of South 24 Parganas are small and marginal. A possibility of regular income generation through traditional farming is limited due to small land holding, soil salinity, frequent attacks of cyclones like '*Aila*', floods, sea water intrusion, agricultural practices without scientific knowledge and crop failures due to pests and diseases. The district is exposed harsh agro-climatic situations leading to frustration, abandoning farming, migration of farming communities seeking better livelihood opportunities, shift to alternate income earning opportunities etc. Most of the farm-families in the district have one or more than one pond in and around their dwelling areas. These ponds and its surrounding areas may be a major source of income to sustain their livelihood if utilized efficiently in a scientific manner. But the reality is that in most of the cases these important resources remain unutilized without any considerable income due to lack of awareness, technologies and examples before them. In this backdrop, 'different approaches in fisheries modules approach is envisaged as an effective tool to create examples before the farmers so that they become able to tap

their own resources for sustainable income generation and to enhance their livelihood security. The units may be of different types depending on the resources and capacity of the farmers. Considering superior periphyton growth on bamboo posts, most production trials were carried out with bamboo as substrate. This material is too expensive in South-Asia for resource poor farmers. Therefore, cheap alternatives for the bamboo substrate are sought. The minimum components of different approaches in fisheries modules will be- i) mono culture (23%), ii) poly culture (52%) and iii) brackishwater farming (25%).

Mono culture: Scampi culture with periphyton technology, monosex tilapia farming, mud crab culture and fattening, bhetki farming.

Poly Culture: Fish culture with IMC- Rohu: Catla:Mrigel:, magur farming with bhangor fish, *Anabus* with scampi.

Air-breathing fish culture- Culture of Magur, Koi or Singhi either single species or in combination Increasing and popularizing of indigenous species farming

Keywords: *Periphyton, Mono culture, Poly culture, Air-breathing fish culture, Indigenous species.*

Indirect Oxidation of Cytarabine Drug via Electro-Fenton Process: Optimization and Degradation Study

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Cytarabine (CTN),the antineoplastic drug is an emerging persistent pollutant responsible for exerting genotoxic and mutagenic effect on the aquatic environment. Electrochemical advanced oxidation processes(EAOPs) are effectively usedfor such recalcitrant compounds whose degradation is not possible through conventional treatment technologies. In EAOPs, hydroxyl free radicals ($^{?}$OH) are electrochemically generated, which is a strong oxidant with a redox potential of 2.80 V/SHE. The Electro-Fenton process is anEAOP based on Fenton chemistry where the mixture of hydrogen peroxide (H_2O_2) and ferrous ions (Fe^{+2}) are either electrogenerated or added externally for the formation of $^{?}$OH radicals.This study aims to investigate the oxidative degradation of cytarabine through in-situ generated H_2O_2 and Fe^{+2}at graphite and iron electrodes system respectively, in an undivided electrochemical cell. For the attainment of highest removal efficiency,the operating variables like pH, current densityand initial CTN concentrationwas optimized.The maximum removal efficiency of CTN was obtained at lower pH with current intensity20mA/cm^2. Hydroxyl free radicals were mainly responsible for the degradation of CTN.

Keywords: *Cytarabine,Electrochemical advanced oxidation process, Hydroxyl free radicals,andgreen technology.*

Environmental Geography, Remote sensing and GIS in environmental management

Dimensions of Environmental Degradation in Patna: A Study in Environmental Geography

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Patna, the capital of Bihar is one of the fast expanding metropolitan cities of India. The ever swelling population (1.7 million: 2011census), rapid urbanization and development oriented anthropogenic activities has greatly deteriorated environmental quality in and around Patna. Since 1980, Patna has witnessed multiple transformations in terms of ecological, morphological, socio-demographic, cultural, economic and functional setup and has resulted into enormous environmental stress, which needs to be addressed immediately. At present the city is coping with loss of green cover and biodiversity, lowering of underground water table, air, water and noise pollution, drainage issues, urban flood, pocket rain, solid waste management and many more environmental problems. In recent years the rise in construction activity has greatly dwindled green cover, and has resulted into decline in rodents, birds and insects population and verities both. The excess withdrawal of underground water for various anthropogenic needs has resulted into marked decline in underground water table. The discharge of city drainage water in the river Ganga, without any significant treatment has badly polluted the river water. The rise in emission of green house gases has degraded the air quality and triggered health hazard. The level of air pollution is so high that Patna has been ranked as one of the most polluted city in India. The ever rising noise level has resulted into noise pollution. The local climatic anomalies are further deteriorating the landscape. The solid waste management is another issue, yet to be addressed.

The present research paper is a study of Patna, under 'Environmental Geography'. The study seeks to identify the nature, extent and intensity of environmental degradation in Patna and also focus on possible solution and paradigms restore and protect the environmental quality. It is an empirical study based

on field work and active research. The primary and secondary data and satellite imagery has been used supplement the study. The primary data has been generated through random sample survey of 200 respondents.

Keywords: *Anthropogenic activities, Quality of environment, Climatic anomalies, Health hazard, Environmental stress.*

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A Geo-Environmental Discussion on Sustainable Physical Infrastructural Framework Available to the Urbanites of Berhampore in Murshidabad District, West Bengal

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The present research-venture will throw adequate spotlight on the current layout of physical facility utility services encompassing water supply, sanitation and sewerage along with housing and electrification in different micro urban units of the oldest urban local body of historically significant Murshidabad District, West Bengal. Municipal arenas are the residential units for urban population and in order to facilitate a standard livelihood for all its urban communities, different physical as well as non-physical governances are extended generally by the Local Self Governments. Sustainable Urban livelihood expands basically on the concept of urban services through inclusion of manifold sustainability components with the expectation of improved and more developed urban prospects. In such construction, physico-organizational blue-prints enable urban entities to function holistically and there is a significant aim implied over here for meeting the needs of the present generation without compromising the capabilities of the future cohorts. For implementation of these worthwhile features w.r.t. urban glorification, fruitful urban planning strategies are required first of all and thus it can be inferred that urban planning is actually a technical as well as political process concerned with the scientific designing of the urban environs. The water supply system of Berhampore Municipality was constructed in the year of 1894. Hence it's a century old system and definitely a wonderful parcel of mechanical engineering. Persons from the Royal Families in the study area donated 2 lakh rupees for the re-construction of this Water work system in the post-independence phase. This system is still working but requires proper renovation for much upgraded and wider water contribution according to the growing population pressure on the township. Dilapidated dwellings and other administrative constructions also do desire restoration in Berhampore ULB. Urban electrification is here under round the clock surveillance of the State Electricity Board and they make necessary modifications in the same as per the situation arises. In order to get a comprehensive report on the most recent scenario of aforementioned items related to urban municipal system, a thorough questionnaire survey was run by the researcher in selected wards of Berhampore and *Purposive Stratified Sampling* technique was adopted for selecting the target population. In the pre-field phase, a few reports, records, journals, gazetteers, leaflets and brochures were gone through with rapt attention from the achieve/library of the Berhampore Nodal Agency and a formal interview was also taken to the Chairman for acquiring sufficient official information about recently executed government policies to escalate the urban status and stature of the municipality. At the time of field visit and perception survey, a good number of snapshots were collected to substantiate the feedbacks from the interviewees. Lastly, with the help of statistical and RS-GIS Softwares, the requisite datasets had been handled or processed to reach to geographically viable conclusions.

Keywords: *Urban Infrastructure, Nodal Agency, Domain of Water Supply, Urban Renovation, Cost-Benefit Ratio.*

Book of Abstracts: 5th ICEE 2019 ***ISBN:*** 978-93-5346-886-6

Resource Mapping Of District Kulgam Kashmir Valley By Using Rs And Gis Technology

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A study was conducted to ascertain the landuse/landcover dynamics of district Kulgam-Kashmir valley during 2015-16 by using high resolution LISS-IV satellite data of Nov-Dec 2013", with a spatial resolution of 5.8m and at a mapping scale of 1:20,000. Various thematic layers pertaining to various resources of the district were generated, including water resources, land, forest and agricultural resources etc. Apart from mapping of the natural resources various supplementary thematic layers viz., watershed maps, drainage map, slope map etc were generated to understand the present status of the available natural resources by using ASTER DEM (30m). By using on screen digitization method, it is revealed from the study that snow and glacial cover shows the highest percentage of 29.9 % covering an area of 35981 ha, followed by forest resources 33883 ha (28.2 %), agriculture land 14805 ha (12.3 %), orchard/horticulture (mainly apple dominated) 14568 ha (12.1 %), barren land 7469 ha (6.2 %), mixed plantation 4175 ha (3.5 %), grassland / meadows 3573 ha (3.0 %), built up 2951 ha (2.5 %) and waterbody / wetland 2804 ha (2.3 %) respectively. The change detection studies have also shown that the builtup has shown an increase of 50.41 % since 2000. This study present essential source of information whereby planners and decision makers can make best use of available natural resources in order to sustainably plan the environment.

Keywords: *RS, GIS, Kashmir valley, ASTER DEM*

Modeling The Suitable Cultivation Regions Of *Perilla Frutescens* In Uttarakhand Using Maxent

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Introduction : Species distribution models (SDMs) that use environmental factor based on historical collections are increasingly being used to record species distribution and to predict the presence or absence of a species in an unrecorded area. These models establish relationships between species occurrence and biophysical and environmental conditions in the study area. SDMs have been effectively used these days to predict suitable cultivation regions for the conservation of endangered and rare species of plants and animals. These models have also proven to be beneficial in identifying suitable sites for reintroduction of a species in an area.

Perilla frutescens commonly known as Bhanjira is an annual herb of the Lamiaceae family and a traditional crop of Uttarakhand. The species is periodically cultivated in the Garhwal and Kumaon regions of Uttarakhand. The seeds of Perilla are used by the local people for garnishing and making sauce (chutney). The plant got importance due to its medicinal and aromatic value. The seeds of the plant are rich in omega-3 and keep importance in cure of diseases such as cancer, cold, asthma, influenza and abdominal pain.

Aim of the study : As the cropping system in the Indian Himalayan Region is getting advanced, farmers have started growing cash crops instead of traditional crops in their agricultural fields. As a result of which Perilla is losing its fate and its natural distribution isalso decreased. The present study was thus aimed to characterize habitat and niche of Perilla and identifying suitable

areas for its cultivation and conservation through model based projections.

Methodology : For modeling procedure 35 occurrence records and 14 environmental factors as well as aspect, slope, vegetation and elevation data was used. The environmental data was downloaded from worldclim portal. The source of aspect, slope and elevation was Shuttle Radar Topography Mission (SRTM) Digital Elevation Model (DEM) data, and the vegetation data was downloaded from Biodiversity Information System. MaxEnt version 3.4.1 was downloaded from the open source portal of American Museum of Natural History. To understand the spatial distribution of Perilla in Uttarakhand, the administrative boundary map of Uttarakhand in ESRI shape format was overlaid on the above-converted grid ?le in ArcGIS 9.3. Further, this grid ?le was overlaid on the SRTM-DEM to generate information on the altitudinal range of Perilla in the state.

Result : The result of the MaxEnt model predicted that the key influential factor affecting Perilla distribution is Precipitation and 5 % of the area is highly suitable for cultivation of Perilla in Uttarakhand. The highly suitable cultivation regions predicted by model for Perilla are Dehradun, Tehri Garhwal, Uttarkashi, Rudraprayag and Nainital districts of Uttarakhand, India. MaxEnt could be used to predict the potentially suitable cultivation regions of medicinal plants was reflected by the statistically significant AUC (area under curve) value (0.915) of ROC (receiver operating characteristic) curve.

Conclusion : The habitat distribution patterns of medicinal plants could be modeled through MaxEnt by using the occurrence records and environmental variables. The habitat distribution information would help in planning the land use management in and around the existing population of Perilla. It would also help in discovering new populations and identification of priority survey sites and in designing the management zone with an emphasis on species ecological boundary.

Keywords: *Digital Elevation Model; Environmental; Habitat; Himalayan; Species*

Hydrological Inferences from Watershed Analysis for Water Resource Management using Remote Sensing and GIS Techniques

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The present study highlights the importance of Digital Elevation Model (DEM) and satellite images for assessment of drainage and extraction of their relative parameters for the Rihand River Basin (RRB), M.P., India. The RRB supports production of more than 20,000MW electricity from coal based thermal power plants. In light of this the management of RRB becomes paramount to sustain the industrial needs and livelihood of more than two million people in the study area. The Rihand River Basin comprised a dendritic drainage pattern where the maximum number of stream was found in the first order and the stream order increased with decrease in stream number. The mean bifurcation ratio was 1.57 which indicates that the drainage pattern is not affected by structural disturbances. The mean value of stream frequency, drainage density and drainage texture was 0.60 km/km2, 0.06 and 0.03, respectively. These characteristics showed dominance of coarse drainage texture, low run-off, low erosional potential, permeable sub-surface material, high vegetation cover and low relief. The elongation ratio and form factor were 0.25 and 0.30, respectively, which suggest elongated shape of the basin and have a flatter peak of flow for longer duration. Flood flows of such elongated basin are easier to manage and would be helpful in determining the effect of the catchment characteristics on hydrological assessment of the study area. The dominant slopes were east facing indicating high moisture content and low evaporation in the study area. The slope map revealed gentle and moderate nature which are excellent for groundwater recharge in the RRB.

Keywords: *Drainage, GIS, Rihand River Basin, SRTM DEM and Morphometry.*

Urban Sprawl and Resource Degradation in the Jammu Region, J&K

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Urban sprawl refers to the extent of urbanization, which is a global phenomenon mainly driven by high population growth and large scale migration. In developing countries like India, where the population is over one billion, urban sprawl is causing the depletion of natural resources at an alarming pace. Urban planners require information related to the growth rate, pattern and extent of sprawl to provide basic amenities such as water, sanitation, electricity etc. In the absence of such information, most of the sprawl areas lack basic infrastructure facilities. Pattern and extent of sprawl could be detected with the help of satellite images and temporal data. In this backdrop an attempt has been made to analysing the growth, pattern and extent of urban sprawl of Jammu region. LANDSAT and MSS data were procured and used for the identification/ classification of urban sprawl of the study area. Decrease in the living standards of the people and vegetation cover as consequences of urban sprawl in the Jammu region has been discussed.

Keywords: *Urban sprawl, urbanization, infrastructure, satellite data, LANDSAT, MSS.*

Application of Remote Sensing and GIS in Shrimp Farming Areas in India

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GIS is an information system that is designed to work with referenced data by spatial or geographic coordinates .This techniques may be used for the development and management of coastal shrimp cultivation in India . The most important use of GIS is to locate suitable sites for shrimp farming and culture of fish in cage . But before operating GIS,it is best to place location criteria relative to the known demands of industry. The data can be acquired from variety of sources for location criteria . Remote Sensing may provide important information to assess site suitability , land uses and land cover. Land uses adjacent to the site will show the sources of pollution and other possible water quality problems. Because, for aquaculture use of mangroves and other wetlands is a sensitive . In the GIS database mangroves areas need to be carefully defined. To complete and update its existing mapped areas, Remote Sensing offers exceptional opportunity. This study shows the use of GIS and Remote Sensing in aquaculture planning, which can be applied in other places and results in this study can be beneficial to sustain shrimp culture.

Keywords: *GIS, Remote Sensing, Shrimp farming, Aquaculture, Mangroves*

GIS in Environmental Management

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Human activities and global warming are rapidly contributing to environmental degradation, decreasing glacier area, growth in glacial lake size, unprecedented rainfall, changes in land use and land cover, forest degradation, floods, landslides, and shortfalls in agricultural crop production are among the many problems brought on by environmental changes. These issues need timely monitoring and supervision. Effective monitoring of the environment and an improved understanding of the same requires valuable information and data that can be extracted through application of geospatial technologies such as GIS.

Geographic Information System (GIS) is a framework for gathering, managing, and analyzing data. Rooted in the science of geography, GIS integrates many types of data. It analyzes spatial location and organizes layers of information into visualizations using maps and 3D scenes. ?With this unique capability, GIS reveals deeper insights into data, such as patterns, relationships, and situations—helping users make sound decisions.

GIS can be used most effectively for environmental data analysis and planning. It allows better viewing and understanding physical features and the relationships Factors, such as steepness of slopes, vegetation cover can be viewed and overlaid to determine various environmental parameters and impact analysis.

GIS can also display and analyze aerial photographs. Digital information can be overlaid on photographs to provide environmental data analysts with more familiar views of landscapes and associated data. GIS can provide a quick, comparative view of hazards (highly prone areas) and risks (areas of high risk which may occur) and areas to be safeguarded.

On completion of data analysis, GIS can help in effective planning and managing the environmental hazards and risks. In order to plan and monitor the environmental problems, the assessment of hazards and risks becomes the foundation for planning decisions and for mitigation activities. With the help of GIS it would be easier for the environmentalists to conserve Mother Earth and prevent all kinds of degradation.

Keywords: *GIS, environment management, conserve, planning*

Agroforestry Suitability Assessment for Sustainable Agriculture in Koranahalli Subwatershed using RS & GIS Technique

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Soil is a vital natural resource and its proper use greatly determines the life supporting system and the socio-economic status of the people. Soils provide food, fodder and fuel for meeting the basic needs of human beings and animals. However, the capacity of the soil to produce is limited. The production is limited mainly by intrinsic characteristics, agro-ecological settings and its management. It is very important for developing an effective land use system for augmenting agricultural production on sustainable basis. Hence, a detailed study for characterization and evaluation land resources is needed to realize the concept of watershed approach. From the data collected at the land parcel level, the site specific problems and potentials can be identified, conservation measures required can be planned on a scientific basis. Suitability of the area for various uses can be worked out and finally viable and sustainable land use options suitable for each and every land parcel can be suggested to the farmer and other stakeholders of the area by adapting remote sensing and GIS techniques. Remote sensing and GIS techniques have emerged as effective and powerful tools for generating different spatial information on various natural resources. Therefore, the present study of land resource assessment was taken up using remote sensing and GIS in the Koranahalli subwatershed of Chikkamagaluru district, Karnataka.

The study area lies between 13°36′50.16″ and 13°43′03.92″ North latitude and between 75°52′08.50″ and 75°57′21.80″ East longitude with a geographical area 5820.71 Ha. Thestudy areacomprisesof12 microwatersheds*viz.,* A.K.colony, Chattanahalli1, Chattanahalli2, Gollarahalli, Jodi bokikere,

Koranahalli, Mundre1, Mundre2, Mundre3, Rajanahalli1, Rajanahalli2 and Rajanahalli3. The average temperature in winter months 21.6°C and duringsummer months the temperature averages around 28.1°C. The meanannualrainfall forthe last threedecadesin study area was 750-900 mm. The region receives rainfall mainly from South-West monsoon and partly from North East monsoon with an annual rainfall season spreading over a period of 4 to 5 months. The South-West monsoon occurs from June to September amounting to about 68 per cent and North East monsoon during October to November contributing about 32 per cent of the rainfall. Average relative humidity is about 65 per cent.

Visual interpretation of False Colour Composites (FCC) of Quick bird satellite data covering sub watershed area was visually interpreted using image interpretation elements and all the available collateral data with local knowledge. The delineated physiographic boundaries were transferred on to a cadastral map overlaid on satellite imagery. Physiographically, Koranahalli subwatershed area has been covered by Peninsular gneisses of Archean age. The study area is divided into ridges, mounds, uplands and lowlands based on slope. They were further subdivided into physiographic/image interpretation units based on image characteristics.The cadastral map and satellite image were used as base map for traversing the entire subwatershed area. Visual interpretation of FCC of Quick bird dataon 1:7920 scale was carried out to identify the physiographic units in the subwatershed. Traversingoftheentire subwatershed area was undertaken in order to check the physiographic units.The transects were delineated in such away that each transect should cut across at least three or more physiographic units. In each physiographic unit, profiles were studied for morphological characteristics to establish relation between physiography and soils depending on the length of slope (Soil Survey Staff 1999 [6]). Soil samples collected from the typifying pedons were analysed for physical and chemical properties as per standard procedure.

The soil mapping units of Koranahalli sub watershed were assessed for their suitability of major crops following the procedure as outlined in FAO, 1976. Fourteen soil series were identified which comprises 108 soil phases delineated and grouped them in to 25 land management units based on the similarities with respect to type of soil, depth of the soil, soil texture, gravel, slope, erosion etc., for the purpose of preparing proposed crop plan. Soil site suitability evaluation for Agroforestry revealed that, about 33.95 per cent of area is suitable for Agri- Silvopastoral, 23.72 per cent of area is suitable for Agri-Horti-Silvicultural systems including multipurpose tree species and shrubs and about 8.20 per cent area Agri-sivicultural system.

Keywords: *Agroforestry, Remote Sensing, Watershed, GIS.*

Environmental Management

Issues of Depletion of Environment and its Management in the State of Jharkhand, India

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The paper deals with some environmental issues of depletion of Jharkhand state (lies in between 21° 58' 10"N to25° 19' 15" N and 83° 20' 50" E to 88° 4' 40"E). The state once was a region of dense forest, healthy and wealthy environmental habitat (some 60-75 yrs. Ago). But after independence the forest coverage shrinks and grassy land decreases, hills and hillocks are denudated of large trees and shrubs, diversity and density of flora and wild animals become less to lesser, population increases year after year due to increase by birth and by migration from other regions and settlement, random legal and illegal mining activities beyond the carrying capacity of a specific geographical area of the state, cutting and felling of flora, killing and hunting of wild animals, capturing and trading of the animals, destroying and divesting the shelters of wild beasts, extension of cultivable land to the forest coverage caused all round deterioration of the environment of the state as well as made the forest coverage, urban, semi-urban and other areas unsuitable for healthy living of all living beings. Such degradation of the environment has also caused many parts of the state more hot, decreases the seasonal rainfall, converted the perennial water bodies to seasonal one which affect very badly the production of crops and naturally available food materials of many forest dwellers and many other wild beasts in the forest coverage, increases the pollutant contents in the air and water both on surface and in ground water and accelerate the noise pollution in all sphere, thus making the life hail for all living organisms. Such environmental issues have created unhygienic surrounding and appearance of new diseases.

The deterioration, of the environment can be, checked by rationalizing the mining activities in a specific geographical area according to its carrying capacity by developing needed green belt, transplanting of dust and noise mitigating plants scientifically, maintening of mining instruments properly, routine checkup of surface and ground water chemistry, providing safety equipments and health check up facility regularly to mine workers and to the people inhabiting surrounding the mines area. Besides, above the avoidance of mining activities in the migratory route, in the foraging and breeding ground, in the habitat and resting field of schedule fauna of wild life Act (Protection) 1972 and strictly implementing the various acts formulated by the Govt. To prevent degradation of environment arising out of mining operations which would check the environmental deterioration and shall maintain the ecological balance.

Keywords: *Mining, Population, carrying-capacity, Acts.*

Book of Abstracts: 5th ICEE 2019 ***ISBN:*** 978-93-5346-886-6

Automatic Roti Maker Using Solar Energy

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Due to the justifiable growing trend in solar energy, there is a need to tap onto that potential of nature's free and sustainable energy. In India and some other parts of the world, roti/chapatti is a delicacy and without it in a meal, the meal is deprived of its ancient long faithful friend. An automatic Roti maker has been designed in such a way that it saves two kinds of energy, i.e. Electric energy which is replaced with cheap solar energy and Human energy through automation of the process. The designed product is lightweight and thus can be easily moved from one place to another. The entire process of roti making is fully automated right from dough making till the final stage of delicious roti as the product. The complete product is made from cheaply available material that is environmentally friendly thus achieving two objectives, i.e. low cost and preservation of natural environment. The main components of the machine are motor, rotor blade, casing, conveyor system. These are easing assembled can be easily replaced.

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Integrated Solid Waste Management. An Approach to Study Municipal Solid Waste in Rajouri Town, Jammu and Kashmir

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Solid waste generation is one of the major environmental issues and a continuously growing problem at global, regional and local level. Municipal solid waste is a heterogeneous mixture of paper, plastic, cloth, glass, metal, organic matter etc. generated from household, commercial establishments and markets. Improper disposal of these wastes in open areas and landfills have adverse effects on the living conditions of human beings as well as the on the environment as a whole. Waste can be a valuable resource if addressed through policies and practices. With the implementation of proper waste management strategies there is an opportunity to reap a various benefits. In the present study an attempt has been made to study the municipal solid waste status of Rajouri town, Jammu and Kashmir. An integrated approach is proposed for the proper handling and management of the solid waste based on waste projections and its disposal.

Keywords: *Solid waste, environmental issues, disposal, resource, integrated approach*

The Seven Rs - Reinvent/Rethink, Refuse, Reduce, Reuse /Repair, Repurpose, Recycle, Replace/Rebuy The Plastic Products To Conserve The Environment And Some Earth-Friendly Alternatives To Plastic Pollution

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Plastic pollution is the accumulation of plastic products in the environment that adversely affects wildlife, wildlife habitat, or humans (Encyclopedia Britannica 2013). Plastics that act as pollutants are categorized into micro-, meso-, or macro debris, based on size (Hammer *et al.* 2012). Plastics are inexpensive and durable, and as a result levels of plastic production by humans are high (Hester and Harrison 2011). However, the chemical structure of most plastics renders them resistant to many natural processes of degradation and as a result they are slow to degrade (Lytle and Guern 2015). Together, these two factors have led to a high prominence of plastic pollution in the environment. Plastic pollution can afflict land, waterways and oceans. Living organisms, particularly marine animals, can be harmed either by mechanical effects, such as entanglement in plastic objects or problems related to ingestion of plastic waste, or through exposure to chemicals within plastics that interfere with their physiology. Humans are also affected by plastic pollution, such as through disruption of various hormonal mechanisms (Plastic pollution, Wikipedia, the free encyclopedia 2018). Due to these hazardous effects of plastic pollution on the environment as well as on human health, this paper focuses on reduce, reuse, recycle and ultimately refuse the plastic to conserve the environment, using green alternatives and proper disposal of plastic wastes should be strictly followed to make the planet free from plastic pollution.

Keywords: *Plastic pollution, plastic waste, reduce, reuse, recycle, refuse and green alternative*s

Building Of Barrages An Inevitable Option For Sustainable Livelyhood

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Increasing human population has been posing many pressures on biome, resource depletion in one of them. Water is a universal solvent where life originated and sustains life and other life forms in a way or two. Reservoir induced seismic activityis also an equally serious question. To sustain life of native plants and animals without causing much of migrations building of barrages is necessary. Present study is the clear depicted picture of the plant and animal lives supported by building of barrages at various sites in Hingoli district of Maharashtra state.Thus adding to overall ecosystem health management. And it equally promotes building of barrages over building of dams through various government schemes.

Keywords: *resource depletion, universal solvent, seismic activity.*

Vermicomposting Technology: An approach for Converting Waste to Wealth

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The farm waste, bio-degradable, material is the sustainable source for organic manure production for improving the livelihood of any farming community. Vermiculture converts farm wastes into organic fertilizer, making it an environment-friendly technology. Vermicompost is an efficient and eco friendly way to convert any biodegradable wastes into quality manure within relatively shorter period of time utilizing earthworm species. Composting through earthworm is advantageous in preventing the loss of nutrients, beneficial micro-flora and vitamins, as strong heat does not generate during the process. Vermicomposting is one of the ways to reduce this organic waste and it has been practically used all over the world. Vermiculture is basically the science of breeding and raising earthworms. It defines the thrilling potential for waste reduction, fertilizer production, as well as an assortment of possible uses for the future Vermicomposting is a process of utilizing earthworms and it is an eco biotechnological process that transforms energy rich and complex organic substances into a stabilized humus-like product. Vermicompost does not have any adverse effect on soil, plant and environment. It improves soil aeration and texture thereby reducing soil compaction. Huge quantity of crop residues and weed biomass (5-50t/ha/year) generated in and around farmland may be a potential source of organic matter and plant nutrients if, properly utilized.

Keywords: *Bio-degradable, vermicompost, earthworm, humus.*

Estimation of Carbon Sequestration Potential by *Aegle marmelos* (Bel) Tree Species of Aurangabad Urban Area, Maharashtra

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Tree species around infrastructure, whether deliberately cultivated or allowed to grow naturally, have been identified as an essential feature of settlements of the human beings. In urban regions, plant communities provide a wide range of the environmental services including the conservation of biodiversity, soil and air pollutant removal, carbon sequestration, oxygen renewal, ground water recharge and urban cooling effects. The present study was carried out in Aurangabad city to know the CO_2 sequestration by *Aegle marmelos* (Bel). Assessment of carbon sequestration of urban trees were carried out through biomass estimation and quantification. Biophysical measurements were carried out in terms of Diameter at breast height and height of tree. Theodolite instrument was used for height measurement. Wood density is used from Global wood density database. In the present research work estimation of carbon and carbon dioxide sequestration was carried out by non destructive method. It is found that *Aegle marmelos* sequestered 496.35 kg above ground biomass, 129.05 kg below ground biomass, 625.41 kg total biomass, 312.70 kg carbon, 1146.46 carbon dioxide kg. Total tree count of the city area is 69. Total CO_2 sequestered by the *Aegle marmelos* is 8.494 tonnes in the 181.56 km^2 square kilometer of the city. Cities are generally expected to keep on growing in the future. While this is true on a global scale, a process that is rarely associated with cities and even less often studied by ecologists is urban shrinkage and decline. More efforts needed to protect resources from the ever increasing population and urbanization by the sustainable management of the trees.

Keywords: *biomass, diameter, tree, measurement*

Carbon Sequestration efficiency of *Achras sapota* (Chiku) Tree Species from Aurangabad City of Maharashtra, India

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Cities are the centres responsible for disturbance in ecosystems, lowers functioning and affect life of human beings. While sufficient integration of nature into the urban scenario can pragmatically ameliorate ecological challenges in the city, particularly those related to weather change and the ecosystem degradation. The study was carried out in the Aurangabad city to know the CO_2 sequestration by *Achras sapota* (Chiku). Assessment of carbon sequestration of urban trees were carried out through the biomass estimation and quantification. Biophysical measurements were recorded using ground measurements in terms of Diameter at breast height and height of tree. Wood density is used from Global wood density database. A Theodolite instrument was used for height measurement. In the present research work estimation of carbon and carbon dioxide sequestration was carried out by ecofriendly method. It is found that *Achras sapota* sequestered 1077.01 kg above ground biomass, 280.02 kg below ground biomass, 1357.04 kg total biomass, 678.52 kg carbon, 2487.65 carbon dioxide kg. Total tree count of the city area is 1781. Total CO_2 sequestered is 483.53 tonnes in the 181.56 square kilometer of the city. The negative effects of this ongoing process on the environment need to be studied. To protect the tree resource from adverse effects of artificially generated ecological issues, the sustainable management of urban trees is the need of the century.

Keywords: *effect, biomass, height, tree.*

Eco-system and Sustainable Development for Swacch North Bihar

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An ecosystem is a community of living organisms in conjunction with the non-living components of their environment, interacting as a system. These biotic and abiotic components are linked together through nutrient cycles and energy flow.For promoting sustainable development and healthy livelihood potential in in North Bihar, there is a need of strong extension service system, dedicated cultural protections, strengthen the environmental issues, drawing appropriate programmes and supporting policies. It requires thorough review of the previous work done in this area, learning lessons from past experiences, making analysis and adjustment for welfare, equity and justice concerning and drawing appropriate programmes and supporting policies for present and future generations.

The present paper explains analysis of present status and future prospectives to save environment and eco-system and to suggestions to how maintain all things to make Swachha North Bihar.

Keywords: *Eco-system, Biotic and abiotic components, Environmental issues, Swacch North Bihar.*

Solid Waste Management Aproblem in Aurangabad City

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Increase in modernization industrialization particularly in urban area creates a many problems to environment among these pollution is the major problems before the community, the pollution is undesirable change in environment which is harmful to the human beings.the environment is get polluted due to change in qualityof air, water and land.now a days urban areas facing a one another major problems that is the problem of solid wastes. Increase in global population creates rising in the demands of essentials which resulted to increases in wastes from houses and other sources, these wastes from house hold is not collected properly and is ultimately thrown into open spaces of city or nearby road sides or dumping sites which created a serious health problems, present study dealswith to focus on a dumping sites of solid wastes situated atnaregaon near aurangabad. These dumping sites creates very serious problems of health air, water and soil pollution as well as social and economical problems also.

Introduction

Now a day's pollution is increases day by day due to manmade activities therefore air water soil get highly polluted which causes serious problems before the environment with these problem urban areas facing one another serious problems that is of solid wastes as population increases day by day which rises the amount of wastes and then wastes from house hold is not properly collected and thrown along the road side or elsewhere which creates many problems in community. now a day's naregaon facing a serious health's, social, economical problems due to these solid wastes, Naregaon is a small village situated about 10-11 km away from Aurangabad city, is the huge density a fast

growing city of marathawada region growing industrial city of Maharashtra hence the population of city increases day by day, increase in these population, increases the solid wastes these solid wastes is thrown into muncipal wastes collection centers and from thesecenters it is collected by workers of municipalties and which is finally thrown into damping sites at Naregaon, the Aurangabad municipal corporation started a dumping site at naregaon in 1987 these damping site is situated in 44 acre area at naregaon and total solid wastes of Aurangabad city is collected in these dumping site, all these wastes generated from hospitals, health care centers, medical laboratories, research centers,among these discarded syringes, needles, bandages, swabs, plasters, plastic bag, water bottles, house hold wastes, hotel wastes toxic fertilizer, pesticides, papers, cloths, woods,radioactive materials, sewage, paints, chemicals, food scraps, electronic appliances and devices etc. from all these sources plenty of wastes are thrown into land fills and dumps among these wastes some substances are biodegradable and some are non-biodegradable these non-biodegradable substances are accumulate in nature& causes bioaccumulation and the biomagnification which are harmful to human being as all these harmful wastes are collected at dumping sites of naragaon the environment of naregaon changes and becomes highly polluted the air water and soil of these area get polluted which adversely affected on health of peoples of naregoan and others many nearby villages of naregaon . In present study attempt has been made to focus on the hazardous effect of solid wastes on the peoples in and around naregaon between the periods of 12 months of April 2015 to march 2016,

Materials and Methods

The present study is related with to show harmful effects of municipal wastes among the peoples of naregaon and others nearby environment. duringten months study author visited to dumping sites of naregaon regularly and observe the dumping sites discuss with peoples,rag pickers,doctors of these area and also observe the other animal like dogs, pigs etc.

Result and discussion

Solid wastes are generally composed of non-biodegradable and non-compostable bio-degradable materials, the substances whose bio-deterioration is not completed ispreferred as solid wastes all these solid wastes come from the sources like households, Business and commercial establishments from Industries, hospitals, clinics. from all these sources solid wastes are collected, generally wastes are segregateinto two categories such as bio-degradable wastes or wet waste and the non-biodegradable waste or dry wastes, the bio-degradables wastes includes kitchen waste like food wastes of all kinds cooked and uncooked including egg shells and bones, flowers and fruits wastes, including juice peels and houses, plants wastes gardens sweeping or yard wastes like green dry leaves, greenwaste from vegetables and fruits vendors or shops wastes from food and tea stalls or shops.

The non-biodegradable wastes includes plastics of all kinds cardboards, cartons container of all kinds excluding those containing hazardous material packaging of all kinds, glass of all kinds, rags, rubbers wrappings, pouches,tetrapacks discarded electronic items from offices colonies viz. cassettes computer diskettes, printers, cartridges and electronic parts, discarded clothing, furniture and equipment's etc. all these wastes thrown into municipal waste collection centers from where it is collected by the municipalities and to be further thrown into dumping site ofnaregaon, at this stage of dumping site the management and disposal of the wastes is improperly done, which causes serious impact on health nearby peoples, and problems to the surrounding environment of naregaon also.

All these wastes lead to the spread of infectious disease, these wastes attracts flies, rats, which are also plays a role in spreading of diseases, the wet wastes that decomposes and release badodour in air which leads to unhygienic condition to rise in the health problems, among these near about 25% of population are suffering from gastro-intestinal diseases spread due to contaminated water in and around the naregaon, about200 ft. water gets polluted, PH of the water is too high and creates and

problems of kidney stones among the peoples, as the water is highly polluted the Hepatitis,diarrhea typhoid.Jaundice, chest pain are more common among 25% Of population.

Improper Incineration or combustion of solid wastes produces large smoke continuously which creates the respiratory problems among 20% of population and peoples are suffering from asthma,Bronchitis,With the smock many viruses are spread into air causes skin diseases among the 15% of population.among the peoples fever,headache, Nausea, vomiting, cholera are the major health problems found among the population. however many people's are suffering from the community disease like T.B. also.near to these dumping sites stagnant water bodies are formed which breeding sites ofmosquitoes therefore the diseases like malaria,dengue are found among the peoples, from the dumped waterleakage of water causes contamination of water bodies and ground water also.The polluted water also creates serious health problems among the population. as these leakage of water continuously takes place to near by fields therefore it creates problems on quality of soil leads to loss of fertility of soil which affects on production. as these water contains food, bones, pieces of flesh, attracts dogs, rats, birds and other animals too. and these dump sites becomes a feeding places for all these animals, particularly the stray dogs. from these sides are cause harm to peoples of these areas. rats, cat, pigs all these animals carry diseases to nearby houses, the dumping site is also breeding site for flies all there flies spread the serious disease (UN=PA) state that wastes which are not managed properly especially solid wastes from households and community are creates serious health hazard and lead to spread the infectious diseases.

The children, waste workers, and the population living close to waste dump sites have high risk of diseases (m. Aatamila et-al.)the health care wastes and other medical wastes in dumping sites mixed with domestic wastes increases the risk of infections of diseases like Hepatitis B and C. and other harmful diseases (Report world band 2005), fromthese dump sites the toxic materials, pollutants enter into human body through the

contaminated crops, animals, food products, water etc. (medina) due these dump sites irritation of skin, eyes, nose, all fingers, psychological disorders etc. are common problems among the rog pickers,childrens and peoples closer to the dump sites also facing the social problems like marriages of girls and boys, many girls refuses the proposal of marriage with boys from naregaon area and tell to their father that 'NAREGAON CHA NAVRA NAKO G.BAI', problems like decreases the prices of land, vegetables, plots, food grains etc. workers are not ready to work in these area.

Preventive measures for harmful impact on health and environment.

- Proper segregation of wastes
- Avoid throwing of wastes on open land or streets.
- Increase use of bins, bags for collection of water.
- Avoid burning of water on road sides.
- Organic wastes can be composted and then used as fertilizer.
- Material recycling and recovery should be increase.
- Promotes the used of plastic recycling.
- Municipalities must increase there level of service to the public regarding sorting of wastes.
- Education of producers, public and people work in the waste sector should be increase.
- Legislation in waste sector should be improved.
- Collection of hazardous waste at collection center shall be safe secure.

Conclusion

The focus of study was the impact of solid waste on peoples and environment due to modernization, industrialization as well as non scientific disposal and mismanegment of collection of solid waste from city area. It is found that increase in population and demands of food and other goods increases the amount of wastes from household and other places.all these wastes form city causes serious health hazard and lead to spread various infectious diseases nearby the dumping sites.

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An Overview on Parthenium as a New Menace for Indian Agro-Ecosystems and its Management

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Parthenium hysterophorus L. commonly known as Congress grass is an aggressive and noxious weed among top worst weeds in the world. Now, it is widely distributed in all the crops of almost all the states of the India threatening natural agro-ecosystems and biodiversity. It a great menace due to causing skin allergy, asthma in human being and animals too. *Parthenium* has got major weed status in India. This weed alone may lowered the average yield of cropup to 40% and forage production about 90%. Sustainable crop production of many crops, grasslands and orchard ecosystems are being greatly affected by invasion of this noxious weed in the country. Various approaches viz., physical, mechanical, agronomical, chemical and biological have been employed for *Parthenium* management but most of them are not so effective due to invading characteristics of this weed as well as other limitations. Integrated weed management practices have been found effective to minimize this noxious weed. An attempt has been made to review its impact on various crops production, human and animal health and its effective management.

Keywords: *Noxious; Agro-Ecosystem; Forage.*

Soil and Water Conservation Techniques to Mitigate Landslides

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Landslide is defined as the movement of a mass of rock, debris or earth down the slope, when the shear stress exceeds the shear strength of the material (Cruden, 1991). The Causes of landslides can be broadly classified AS intrinsic and extrinsic factor. The probability of landslide occurrence depends on both the intrinsic and extrinsic factors. Geology, slope gradient, slope aspect, elevation, soil textural properties, vegetation cover, and long-term drainage patterns are some of the intrinsic factors that contribute to landslide. The extrinsic factors such as heavy rainfall, glacier outburst, seismic activity, etc which initiate slope failures in susceptible areas. Kodagu district is located in the South-West part of Karnataka State which lies between the latitudes 11°56′00″ to 12°50′00″ N and longitudes 75°22′00″ to 76°11′00″ E. This region is mainly covered by pristine forest, interspersed with coffee plantations and paddy fields in valley region. During August 2018, Kodagu district witnessed multiple landslides due to varied reasons. Therefore the present study was undertaken to identify the casual factors and recommend the appropriate soil and water conservation techniques to mitigate landslides in susceptible areas. Reconnaissance survey and field investigations were adopted to identify the casual factors and recommend the appropriate soil and water conservation measures.

Slope plays an important role in landslide occurrence. Severe landslides were observed in areas having higher slope percentage. Structural discontinuities such as joints, faults, and foliation form the pre-existing lines of weakness in a rock body. These lines of weakness, often in a fractured zone, are likely to be areas where moisture accumulates and vegetation grows. In addition to indicating lineaments, they affect surface material structures and have a significant influence on terrain permeability and slope stability. An earthquake is the shaking of the surface of the earth, resulting from the sudden release of energy in the earth's lithosphere that creates seismic waves. It was observed that on 9th July 2018 a tremor of 3.4 intensity was recorded in Madikeri which could have contributed

to landslides. High rainfall is one of the major extrinsic factor which contributes to landslide. During the South-West monsoon period i.e., from June to September 2018 the district as a whole recorded an actual amount of 3463.7 mm of rainfall as against the normal rainfall of 2181.9 mm.

Drainage correction is the first remedial measure to be undertaken in landslide affected area. All the water courses should be prevented from entering the slide area and diverted outside the affected area. Interflow and base flow is one of the major causes of slope instability, therefore subsurface drainage is very effective in reducing pore water pressure along the lineaments. Excess subsurface flow can be reduced by installing of horizontal drains, deep trench drains and drainage tunnels. The construction of retaining walls will support and stabilize the unstable slopes. Land use is also one of the key factors responsible for the occurrence of landslides, vegetation helps in retaining the soil cover firmly. Trees with strong and long roots increase the cohesive strength and effectively hold the formations and thereby increase the tensile and cohesive strength. However, surface growths of bushy plants promote greater seepage, which may lead to increasing pore pressure. In the absence of vegetation cover rainfall initiates a set of process like rain splash erosion, sheet erosion and gully erosion, which ultimately results in soil erosion and slope failure. Practice of suitable agronomic measures such as contour cultivation, strip cropping, buffer strip cropping and mixed cropping to minimize soil loss/erosion. Use of improved engineering structures such as graded bunds and bench terraces to reduce slope gradient and facilitate safe disposal of runoff. Desilting the streams in the landslide affected areas.

High rainfall, occurrence of earthquake, blockage of drainage and manipulation of slope toe were identified as the major causes for the landslides in Kodagu district which is mainly dominated by Sandy loam type of Soil. Drainage correction, slope stabilization and practice of appropriate soil and water conservation measures can mitigate landslides in susceptible areas.

Keywords: *Afforestation, Erosion, Soil and Water Conservation, Siltation and Drainage*

Multi Utility Vehicle and Range Finder for Defense Sector of India

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Defense is the most important sector for any country. The usage of solar energy in Army can reduce the need to import conventional fuels like coal, petrol and diesel and can improve the economy of a nation. A prototype of multi utility vehicle was designed and developed with an additional feature of navigation. Here Arduino Uno was used for motion detection. A rangefinder is a device that measures the distance from the target to the observer for the purpose of surveying, determining focus in photography and accurately aiming a weapon. SONAR (Sound Navigation and Ranging) was attached as a rangefinder. For better wheel control, motor drivers were connected to the vehicle. Bluetooth module was used for wireless connectivity between base and the vehicle. Servomotor enables 180 degree detection of the object. 10 W Solar panel was connected to charge a battery of 12Volt and 1.3 amp hour. Measurement of distance and angle of the target was done with laptop. To avoid continuous monitoring of the laptop screen, a buzzer and LED (Light Emitting Diode) were also attached in the army base. The main objective of the vehicle was to protect the soldier from enemy. The vehicle is automated so physical presence of soldier is not required. LASER (Light Amplification by Stimulated Emission of Radiation) gun was attached on the top of the vehicle to attack the enemy. All functions of multi utility vehicle can be operated from base. This paper emphasizes on the usage of solar energy in the field of defense.

Investigation On Eco Friendly Chemically Synthesized Cadmium Zinc Sulphide Nanostructured Films

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Semiconductor inorganic nanostructured compound materials have gained immense interest in recent decades due to their novel properties providing the new ideas in science and technology. They are regarded as special materials due to their unique luminescence and optical properties, quantum size effect. Cadmium zinc sulphide (CdZnS) is an inorganic compound materials which has potential applications in various fields such as blue, UV diode lasers, optoelectronic devices, photoluminescent, photoconductor, electroluminescent, high density optical recording, etc. In solar cell system, the addition of Zn to CdS or the replacement of CdS with CdZnS alloys enhances the open-circuit voltage and short-circuits current in heterojunction devices as a result of the decrease in the window absorption losses. It also produces higher conversion efficiency. It shows broad green emission peaks that shift towards shorter wavelength side with increasing Zn amount.

Good quality of nanostructured CdZnS films have been synthesized in polyvinyl alcohol (PVA) matrix varying Zn molar concentration by chemical bath deposition (CBD) method. Characterization of structural, morphological and optical properties of prepared CdZnS samples using various tools have been performed.

Nanostructured CdZnS film samples were synthesized by CBD method on glass substrates for 0.25, 0.5, 0.75 zinc molar concentrations at room temperature. $CdCl_2$, $ZnCl_2$ and Na_2S were used as the source materials for Cd^{2+}, Zn^{2+} and S^{2-} ions respectively and polyvinyl alcohol (PVA) as capping agent. All the prepared CdZnS films were golden yellow, uniform and highly adherent.

Structural analysis using x-ray diffractometer (XRD) exhibits formation of cubic phase cadmium zinc sulphide films. Crystallite size is obtained by using Scherrer's formula, Williamson-Hall plot and it varies from 9.8nm to 5.4nm. Crystallite size is found to decrease with increasing zinc molar concentration. Dislocation density of the samples are found to be of the order of 10^{16} m^{-2} and the strain is of the order of 10^{-3}. Morphological analysis using scanning electron microscope (SEM) shows that the particles are agglomerated to form somewhat nanoclusters. High resolution transmission electron microscopic (HRTEM) photographs show that the particles are nearly spherical and distributed uniformly throughout the films. Selected area electron diffraction (SAED) pattern of HRTEM confirms the cubic phase formation of the samples. Optical absorption spectra of CdZnS nanostructured films recorded in UV-Visible spectrophotometers shows that the absorption peaks of the films shift towards lower wavelength side with increasing zinc molar concentration. The optical band gap is found to vary from 2.8 eV to 3.5 eV which is more than that of bulk CdS but less than that of bulk ZnS. Moreover band gap energy of the samples is found to increase with increasing zinc molar concentration. The photoluminescense spectra of the samples is found to lie in green region of visible spectrum and photoluminescence emission intensity increases with increasing zinc molar concentration.

CdZnS nanostructured films samples prepared by CBD method were uniform and had good adherence to the glass substrates. Cubic phase formation of CdZnS films has been confirmed by both XRD method and SAED pattern of HRTEM methods. The values of crystallite size deceases whereas band gap energy increases with increasing Zn molar concentration. Uniform distribution of spherical CdZnS nanoparticles is exhibited from both SEM and HRTEM photographs of the samples. Increasing the Zn molar concentration in the samples the photoluminescence intensity is enhanced. This unique characteristics of the materials is very useful for eco friendly device fabrication such as light emitting diodes and lasers.

Keywords: *CdZnS nanostructured films, crystallite size, band gap energy, photoluminescence*

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Nano-interventions for a Safe Environment in the New Era

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Nanotechnology is a relatively new frontier of science and technology that allows us to synthesize, characterize, manipulate and use nanomaterials. These materials by virtue of their any one dimension less than 100nm long, have characteristically altered properties compared to their bulk counterparts. It's no wonder therefore that scientists working in different spheres of science are joining hands to understand nature using the nanomaterials on the one hand and to utilize the immense power of the nanomaterials on the other hand to alleviate some of the problems humans are facing.

The current presentation focuses on the fundamental nature and properties of nanoparticles- the building blocks for nanotechnology. It attempts to simplify the physics of "why nanoparticles behave differently?". Different strategies are utilized for the synthesis of nanoparticles, viz. physical, chemical, biological and hybrid methods. However, the nanoparticles aggregate together to form bulk material and lose their distinct "nano" form if they are not stabilized. This is where, the biological strategies proffer distinct advantages, viz. affordability, ecofriendly materials, safe methods and monodispersity of the product. The next challenge is to characterize the tiny particles. The methods for characterization range from simple visual detection, magnetic properties and spectrophotometric methods to more sophisticated methods such as imaging with electron microscopy, probe microscopies, x-ray based methods, infrared spectroscopy, etc. Post synthesis, the nanoparticles are stabilized by surface passivation or capping with selected chemicals or polymers. The strategies used for synthesis and stabilization of iron based nanoparticles, especially FeSNPs in our own laboratory will be described followed by their characterization.

The discussion then moves on to the application of the nanoparticles in environmental remediation for removal of dyes and pesticides from aqueous solutions. Using multiprong approaches such as biphasic adsorption kinetics, UV-vis spectrophotometry and infrared spectroscopy, the mechanism of dye removal and degradation was investigated. An upflow continuous packed bed column nanoreactor was designed for the removal of dyes and wastewater treatment. The results demonstrated the applicability of the system for treatment of large volumes of the wastewaters.

The most important aspect about nanoparticles is their potential toxicity to living organisms including humans. In carefully designed experiments, it was demonstrated that the nanoparticles synthesized in the laboratory were non-toxic. Moreover, the treated dye samples also had remarkedly reduced toxicity. Strategies for the safe disposal of used nanoparticles were also formulated, for example, the use of *lin1* bacterial culture for agglomeration of used FeSNPs and granulation of FeSNPs using calcium alginate.

Keywords: *nanoparticles, synthesis, characterization, applications, FeSNPs, wastewater treatment.*

Environment Policies, Laws and Legislation

The Environment: Stockholm Conference to Present Day

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The sustainable environment is a great challenge for the Scientists and Technologists all over the world. The food we eat, the water we drink, the air we breathe in, the materials we use in our day to day life and the environment where we live are not safe. The people all over the globe are conscious about the need of sustainable environment since 1970 and are trying to keep our environment eco friendly. Keeping in view on human interaction and the environment, the World Environment Day (WED) was established by the United Nations General Assembly in 1972. The UN General Assembly designates 5th June of every year as WED, the first day of the Stockholm Conference. While discussing on *Human and Environment,* it was unanimously decided in the UN General Assembly to take action and develop nation wise awareness programme on increasing urgent issues that influence life on earth. Two years later i.e. on 5th June 1974 the World Environment Day was celebrated for the 1st time by the United States with the slogan “Only one Earth”. Since then, every year the World Environment Day is being celebrated with an urgent issue by a host country all over the world. Last year in the UN Environment Assembly, India had been chosen as the host country to observe the WED 2018 with a theme “Beat Plastic Pollution”***,*** and it is being celebrated throughout the country.

All Most all of us know that, the plastics and plastic products are light weight, durable, moldable, versatile and cheaper in comparison to any other materials. Because of these properties, for the last 3 to 4 decades plastic has been included in our life style. Nearly one third of the plastic packaging, which we use, is recycled by our collection systems which mean, that 2/3rd of such plastic items are disposed off in our surrounding that float in our city streets, chock our drainage system and pollute our environment. Plastic waste used in land filling causes soil pollution

and underground water pollution. Improper disposal of plastic carry bags may results in death of animals that normally feed on waste dumps.

Throwing of plastic carry bag with remains of food, vegetable or fruits items can be eaten by live stocks and even by birds, which may block the alimentary canal of such animals and cause death. Throwing of plastic carry bag with remains of non-veg. items can be harmful to cat, wild dogs and other carnivorous animals. The disposal or dumping of plastic waste on land creates soil pollution and underground soil pollution. Plastic waste on the surface of water causes water pollution. Burning of plastic waste initiates air pollution and threaten the flora and fauna including the human being in this universe. To overcome the impact of plastics on environment, the governments of each and every nation and state all over the globe have started formulating and implementing various laws for the plastic manufacturers and for the users. In India also some rules have been formulated. Almost all states in India have been taking action on plastic using their own mechanisms. Government cannot be able to prevent use of plastic unless the common people are aware on it. Once the common people are aware of the merits and demerits of plastic, and their impact on life and environment, Beat Plastic Pollution mission can be a success, what the entire world is looking forward to, and provide a better and healthy environment for our future generation.

Environmental Ethics

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Moral principles define the responsibility of a particular person towards the environment. These principles, the environmental ethics establish the ethical relationship between human beings and the natural environment. The resources on earth are limited and belong to all the species that exist in nature. Though humans have right to draw their requirements from the environment but certainly not to the extent that degrades the environment and harms other species and living beings. Humans have apparently more responsibility to minimize their anthropogenic activities and to save the earth. Because human beings are deriving all the benefits from nature, they should take moral practical responsibility and proper care for the maintenance of ecological balance and preservation of biodiversity in all its forms. The existing environmental ethics seem imperfect and insufficient to meet the current situation hence humans have to rethink about effective environmental ethics**.**

Keywords: *Environmental ethics, anthropogenic activities, healthy environment, sustainable development.*