1ST National Conference

Prospects and Retrospects of Life Sciences in India (PRLS 2018)

February 25-26, 2018

ABSTRACT CUM SOUVENIR

Organised by

DEPARTMENT OF BOTANY

UDAI PRATAP COLLEGE, VARANASI-221002

September, 3, 1850 - July 14, 1913

RAJARSHI UDAI PRATAP SINGH JU DEV

Founder, Ddai Pratap College, Kashi

न हि ज्ञानेन सदृश्यम पवित्रमिह विद्यते।
तत्स्वयं योगसंसिद्धिः कालेनात्मनी विन्दति।।

भगवद्गीता 4-38

na hi jnanena sadrusham pavitramitha vidyate
tatsvayam yogasamsiddhi kalenatmani vindati

-bhagavadgita 4-39

"on earth, there is no purifier as great as knowledge. He who has attained purity of heart through a prolonged practice of karmayoga automatically sees the ligth of truth in the self in course of time"

डॉ० पृथ्वीश नाग
कुलपति

Dr. Prithvish Nag
Vice Chancellor

महात्मा गांधी काशी विद्यापीठ,
वाराणसी-२२१ ००२

Mahatma Gandhi Kashi Vidyapith,
Varanasi-221 002.

Dated : February 08, 2018

Message

I am happy to learn that the Department of Botany, Udai Pratap College, Varanasi is organizing an two day National Conference on the topic **"PROSPECTS AND RETROSPECTS OF LIFE SCIENCES IN INDIA"** on 25th to 26th Feb. 2018, and on this occasion the department will publish a souvenir. Needless to say, Souvenir is a best medium to familiarize creativity of college, as well as of the students.

The organizers have been right in selecting the topic of the Seminar incorporating the contemporary issues.

I congratulate the organizers and convey my good wishes for the success of this event and publication of Souvenir as well.

(Dr. Prithvish Nag)
Vice-Chancellor

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Udai Pratap Educational Society, Varanasi – 221002

Justice K.N. Singh

MESSAGE

It is pleasure to know that a national conference on "PROSPECTS AND RETROSPECTS OF LIFE SCIENCE IN INDIA" is being organized by Department of Botany, Udai Pratap College, Varanasi on

I wish the Conference a grand success.

K.N. Singh

Udai Pratap Educational Society, Varanasi – 221002

K.P. Singh
Secretary,
Udai Pratap Educational Society,
Varanasi

MESSAGE

I am delighted to know that Department of Botany, Udai Pratap College, Varanasi is organising a National Conference entitled ***"PROSPECTS AND RETROSPECTS OF LIFE SCIENCES IN INDIA"*** on 25th & 26th February, 2018.

At present Life Science is playing a pivotal role as far as sustenance of the Blue planet is concerned at National as well as International level.

I hope that deliberations and discussions in the Conference would be beneficial not only for Human Beings but for all the living creatures and in dealing with some well known environmental problems.

I wish all success to the conference.

K.P. Singh

(K.P. Singh)

उदय प्रताप कालेज, वाराणसी
(स्वायतशासी संस्था)
नैक पुनर्मूल्यांकित 'B' ग्रेड

Udai Pratap College, Varanasi
(Autonomous Institution)
NAAC Re-accredited 'B' Grade

College with Patential for Excellence, DST-FIST & DBT-STAR College
Phone: 0542-2282399, Fax-0542-2282399, email:princepalupc@gmail.com. Website: www.upcollege.or

MESSAGE

I am very much pleased to know that Department of Botany of our College is organizing a National Seminar on the topic entitled "**PROSPECTS AND RETROSPECTS OF LIFE SCIENCE IN INDIA**" on 25th & 26th February ,2018 . I am confident that the outcome of the seminar will establish the well known fact that science is definitely an urgent need of the hour with respect to human welfare . Without having scientific approach , it is not possible to lead a healthy life and sustainable development . I am of the opinion that discussions and deliberations in the seminar will be fruitful with respect to current well known problems like Population Explosion, Global Warming ,Ozone layer depletion and Biodiversity Conservation

I wish all success for the seminar.

Principal
Dr. (Vijai Bahadur Singh)

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FACULTY OF SCIENCE

MESSAGE

It is a matter of great pleasure that the our department is organizing two days National Conference on **"PROSPECTS AND RETROSPECTS OF LIFE SCIENCE IN INDIA"** on 25th & 26th February, 2018. The topic of conference is a burning issue of the day. Health, agriculture and education, all these three are the complete of each other and the important and basic component of living human society. With the harmony and growth of all three, society can be benefited enormously. Tremendous development has taken place in all these three areas individually in the last few decades.

This conference will provide a greater platform to the scientists of this field for exchanging their views among each other. Deliberations will be of great benefit to the teachers, students and researchers will be mutually benefited.

I, on behalf of the Faculty of Science and Department of Botany convey my good wishes to the organizers for its grand success.

Dr. (M.P. Singh)
Dean & Head

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DEPARTMENT OF BOTANY

Message from the desk of the organizing secretaries

We feel very proud that our Institution, U. P. College Varanasi , is going to creat a new chapter in its educational history on 25-26th Feb, 2018 by organizing two days "National Conference on "PROSPECTS AND RETROSPECTS OF LIFE SCIENCES IN INDIA."

The aim of this conference is to provide a plateform for interaction between academicians and students that make amicable environment for research in diverse areas. On behalf of organizing committee , we grateful to all the guest speaker and number of informative experts , visiting from different educational institutes for their laudable effort towards the addition of knowledge not only to the students but also the participants faculty members. We extend our sincere gratitude to our honorable chief patron Prof. P. Nag ,vice chancellor MGKVP Varanasi, for his blessings for this conference that have encouraged us to great deeply engrossed and work hard for its success .

We also express our gratitude to Dr. V.B. Singh , principal Udai Pratap College Varanasi for trusting us worthy for responsible task of organizing secretaries. He inspired us throughout the time with his wholehearted support and enthusiastic commitment to make this event a great success .

We are grateful to our convener Dr. M.P. Singh who has been a source of inspiration for us through his commitment to the task. We are thankful to all my seniors and colleagues for their full support in this endeavour.

Dr K K Gautam
Assistant professor
Department of Botany

Dr. Vivek singh
Assistant professor
Department of Botany

Accelerated Precision Plant Breeding

B D Singh
Ex-Rector
Banaras Hindu University
Varanasi-221 005

Plant Breeding is that branch of applied botany, which endeavours to enhance the usefulness of crop plants to humans by modification of their genotypes. It began over 11,000 years ago when humans began domestication of selected plant species. Presumably, both natural and artificial selections fashioned our early crops, but recorded selection efforts date back over 200 years. Systematic scientifically planned efforts to use hybridization and selection for crop improvement were initiated following Mendel's historic discoveries, and a variety of breeding tools and schemes were devised and applied. The decisions during various steps of breeding schemes were based on phenotype that is not readily correlated with genotype, especially in the case of quantitative traits.

Recent developments in molecular biology have generated technologies that enable indirect selection for traits based on molecular marker genotype data; these data are reliably and raoidly generated at any stage of plant development and irrespective of the prevailing environment to which the crop is exposed. Transgenic technology permits a precise transfer and controlled expression of the desired genes to create such novel traits that cannot be produced by any of the conventional breeding tools and schemes. It is also feasible to induce mutations in selected genes in the genomes using site-directed nucleases. These nucleases also permit the induction of specified mutations in the selected genes, as well as the integration of transgenes at selected sited instead of random integration in the genome. Finally, selected flowering time genes can be transferred and expressed in perennial crops like apples; these lines

can be used in marker-assisted backcross programmes as annuals. The lines developed from these programme can be made perennial again simply by removing the flowering time transgenes by selection following segregation.

The use of these and other modern tools of plant breeding requires genomic resources, bioinformatics tools and expertise, and technical expertise in molecular biology. Thus, the focus in plant breeding is shifting from the field to laboratory, and in the near future the field may be used only for evaluation and commercial cultivation of the materials developed in the laboratory.

Boosting green chemicals in agriculture in addition to pharma sector under Make in India

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The progressive "Make in India" campaign aims to turn the country into a global manufacturing hub. The vision behind this campaign is to put the country on the global manufacturing map, thereby, to facilitate the inflow of new technology and capital and creating a large number of jobs. Agricultural and pharmaceutical sectors are two important pillars on which human civilization is built up. India is a mega-biodiversity rich country and has varied climatic zones comprising approximately 17000-18000 species of flowering plants of which 6000-7000 are estimated to have medicinal usage in folk practices. In India, around 25,000 effective plant-based formulations are used in traditional and folk medicine and the country enjoys an important position in the global pharmaceuticals sector.

However, exploration of phyto-chemicals is currently gaining momentum in the agriculture sector also so as to formulate some novel plant based green pesticides for the management of agricultural pests In view of post application side effects such as pest resistance , residual toxicity , non – biodegradable nature, ozone layer depleting effects, disruption of ecological balance and interference with the reproduction of non target species, most of the synthetic chemicals (often called as grey chemicals or xenobiotics) used as pesticides have their own limitations . Hence, exploration of plant products (green chemicals) is gaining importance so as to formulate some novel plant based pesticides for the sustainable management of agriculture pests . Plant based formulations are chiefly biodegradable and are recognized as better sustainable and eco-friendly alternatives of synthetic pesticides in food security. The most attractive aspect of using such plant chemicals in agricultural pests management is their mode of action as semiochemical or behaviour altering inhibiting the growth and metabolism of pests without killing them. Such growth regulatory approach in pest control is being more accepted currently. Rotenone (root

of *Derris elliptica*), nicotine (leaves of *Nicotiana tabacum*), pyrethrins (flower of *Chrysanthemum cinerariaefolium*), azadirachtin (seeds of *Azardiracta indica*), piperine (seeds of *Piper nigrum*), eugenol (clove essential oil), and menthol (*Mentha* sps. essential oil) are some plants-derived commercially available bioactive compounds used in agri-food industries Cinnamon, clove, lemongrass, oregano, thyme, nutmeg, basil, carvone, cinnamaldehyde, citral, eugenol, limonene, menthol, linalool, etc. are kept in generally recognised as safe (GRAS) and are used as preservatives in United State with wide coverage. Biodiversity rich countries like India, China, Sri Lanka, Brazil, and Africa have n a vast traditional knowledge on use of plants and their products in agriculture in pest control. Hence, there is a lot of scope for India to achieve global leadership in the field of green pesticides to be sustainably and eco-friendly used in agriculture sector. Looking in to different acts of biopiracy exploiting indigenous knowledge on herbal products without recognition of the owner country, there is need for bioprospection of Indian flora for novel formulations to be used in agriculture as well as pharma sector.

Plant-Microbe Relationship: a boon to agriculture

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Microbial partners in plants play a significant role in growth and development of plants including agricultural crops. It is believed that microbial partners have helped plants to establish in land areas from aquatic habitats. Further, most of the plant nutrients are facilitated by microbes for their uptakes. Microbes provide benefits to plants by residing either in the rhizosphere, phylosphere, spermosphere or as endophytes or epiphytes. Recent understanding has shown that microbes not only help in promoting plant growth and development but also help in providing tolerance to biotic and abiotic stresses. Because of these significant amounts of benefits plants derive from accompanying microbes, plants also develop strategies to recruit microbes for their own benefits into their rhizosphere or endosphere. Understanding such benefits can help us to improve crop productivity through utilization of proper microbes to derive the targeted benefits in agriculture.

Microbial Biodiversity: Conservation and Exploitation

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Sun/moon, sea/ earth, hot/ cold and forests/ desert, etc; they together made an environment that is fit for our existence. The life originated on the planet earth about 4.5 billion years ago. The concept biodiversity was used to describe the range of living organisms in a given area considering the variety of life forms, the genes that they contain, and the ecosystems they form. Life forms within an ecosystem vary in their size and shape from the simplest unicellular prokaryote to the more complex multicellular eukaryotic organisms. Each organism plays an important role and contributes to ecosystem stability. Each type of environment will have its own characteristic type of microorganisms or microbes. In 1991, a workshop was conducted by International Union of Biological Society (IUBS) and International Union of Microbiological Society (IUMS) in Armsterdom and an IUBS/IUMS action statement was set forth for Establishment of International initiative of a decade called "Microbial Diversity 21" to cooperate in a programme on Functional Microbial Diversity through the production of an inventory of all known microbial species, preparation of a list of habitats meriting conservation because of importance of microorganisms in those habitats for ecological system function and maintenance of the biosphere, development of standard systems for sampling microbial communities and associations in different environment.

There is a variety of natural ecosystems that harbours various kinds of microorganisms such as acidophiles, alkalophiles, psychrophiles, thermophiles, barophiles, oligophiles, halophiles, etc. all extremophiles living in a variety of habitats e.g. deep sea vents (found thousands of metres below the sea surface), active underwater mountain ranges, sulphur springs (thermal springs), carbonated lakes, acid mine drainage, coal refuge piles, solfatra fields, saturated saline habitats, arctic and antartica regions, ocean beds, man-made disturbed sites, human digestive systems, rhizosphere, endosymbionts, etc. These microorganisms lock up approximately half

of living carbon on the planet. The number of bacteria on earth is estimated to be 5,000,000,000,000,000,000,000,000,000,000. This is five million trillion trillion or 5 × 1030 (to the 30th power).

Approximately, 90% of N and P are found in living cells. They are the primary agents in recycling of organic matter and have a critical link in global biogeochemical cycles. Besides, each of us hosts some 100 trillion bacteria in our digestive systems. Sterile before birth, human beings' digestive tracts are rapidly colonized by this complex and diverse digestive flora that stabilizes within the first few years of life. The digestive tract is a separate organ, and the interactions between the body and digestive bacteria ensure good health. Although we often associate bacteria with disease, our balanced digestive flora mainly consists of bacteria whose functions are beneficial in terms of nutrition and health. Starting at birth, what we eat has an impact on the balance between our body and the bacteria living inside. This in turn can be an important health factor.

These beneficial microorganisms cannot be cultured on a single medium ued to difference in growth pattern and nutritional requirement. Therefore the two groups, culturable and non-culturable microorganisms have been established. So far we know less than 2% microorganisms present on earth. The rest could not be studied due to lack of methods and skill. In recent years some molecular techniques have been developed for isolation and characterization of non-culturable bacteria.

The rhizosphere is a very complex environment. The interactions among microorganisms and the plant roots are essential for the nutrition, growth and productivity of the plant. On the other hand, the microorganisms also benefit from their interactions with the plant. Rhizosphere studies are of interest to agriculturists, soil biologists, chemists, microbiologists and molecular biologists. Microbial activity in the rhizosphere needs to be explored fully for keeping good health of both soil and plants. Plant growth promoting rhizobacteria (PGPR) have been isolated from a number of crop plants. Antagonistic properties between PGPR and soil-borne phytopathogens need to be exploited for production of bioinoculants. Microbial diversity can be conserved through conserving the plant and animal lives, as well as maintaining habitats as life-supportive system on the glove.

Fungal endophytes: A cryptic biodiversity and alternative source of functional metabolites for human and plant health

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Fungal diversity is an important and alternative source that could be harnessed and used to modern biology and biotechnology, and has the potential to be developed as innovative and sustainable solutions to a wide range of problems. In animal systems, diseases such as cancer, malaria, multi drug resistant bacteria, parasitic protozoans, non-curative diseases, and pathogenic fungi are important problems. In plant systems, different stresses like drought, salt and temperature tolerance, as well as disease resistance are of concern. These ever growing threats require immediate serious efforts for the acquirement of new, more effective agents that have the potential to be developed into new industrial products. Natural products are often produced by microbes and may have specific functions in nature. The abundance of microbial biodiversity is as yet largely unknown, and the defined microbes representing but perhaps a small fraction of the potential, and as such, the search and identification of novel biotopes that may provide unique and useful products, will likely be a successful endeavor.

Woody plants are found to harbor novel endophytic fungal biotopes. These endophytes reside within the living tissues of plants, and have been largely overlooked and unexplored for their potential to produce novel natural products to ultimately be developed for industry. However, the process from discovery to production is complex. The utilization of endophytic fungi and their functional metabolites on an industrial scale begins with intelligent screening of endophytes, and then requires growth of the microbe(s) and subsequent scaling up for fermentation, as well as optimization of many other necessary factors. The isolation and characterization of bioactive substances from culture filtrates is done using bioassay guided fractionation and spectroscopic methods. Some examples of novel natural products produced by endophytic microbes that have been successfully produced on an industrial levels includes taxol, jesteron, pestacin, isopestacin, pseudomycin, jasmonic acid, torryanic acid, javanicin and ambuic acid to name a few. The focus of this article is to discuss endophytic biodiversity, their role to protect plants against

abiotic environmental stresses, potentiality for discovering novel natural products that are active against different diseases representing to both humans and plants. In addition to above, an updated comprehensive list of compounds that are active against severe diseases will be provided for the readers involved in research of endophytes.

Metal nanoparticles were synthesized using fungi is considered as a unique and eco-friendly method as it is free from any solvent or toxic chemical, capping agents and also easily amenable to large-scale production The fungal isolates *Aspergillus clavatus*, *A. terreus*, *Phoma herbarum*, *Phomopsis helianthes*, *Chaetomium globosum* and *Trichoderma viride* were used for biosynthesis of silver and gold nanoprticles using aqueous solution of silver nitrate ($AgNO_3$), and tetra auro chlorate ($HAuCl_4$), respectively. *A. clavatus* and *C. globosum* induced AgNps were antimicrobial in nature. UV-Vis spectroscopy, transmission electron microscopy (TEM), Atomic force microscopy (AFM), FTIR and X-ray diffraction (XRD) were used to characterize the NPs.

Harnessing plant-microbe interactions for enhanced plant protection against abiotic and biotic stress

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Plant Growth promoting microbes (PGPM) exert their growth promoting effects on plant through nitrogen fixation, production of siderophores, phytohormones, exopolysaccharides, solubilization of nutrients, induction of pathogen resistance or decreasing pollutant toxicity. They are also an eco-friendly means to combat abiotic and biotic stress in plants. Studies were conducted to check the effect of microbes under abiotic and biotic stresses. Periods of drought has started becoming a common stress in plants due to the changing climatic conditions, which are adding new challenges to the plant biologist.Plant response to water stress is complex and it adopts different mechanisms to acclimatize which is evident in its physiological and biochemical responses. Different microbial consortia prepared from growth promoting strains of *Bacillus megaterium*, *Trichoderma harzianum*, and *Funneliformis mosseae*, were provided to medicinal plants *Eclipta prostrata* (L.) L and *Andrographis paniculata* (Burm. f.) Wall. ex Nees plants exposed to water stress to check the effect of the PGPM on plant biochemical response. The antioxidant enzyme activity [catalase (CAT) and peroxidase (POX)] and active principal secondary metabolites in plants was checked under water stressed field conditions.The consortia of *F. mosseae* and *B. megaterium* (FB) maximally enhanced the activities of CAT (71.49 %) and POX (20.10 %) under drought stress showing their synergistic behaviour. Dual consortia were found to be more effective than single treatment. *Eclipta prostrate* having wedelolactone,as the principal active component with immunomodulatory, antihepatotoxic and antihaemorrhagic role was enhanced four times while;*A. paniculata* having principal component andrographolide

known for antipyretic, antimalarial, anti-inflammatory and antihepatotoxic properties was enhanced two times after FB inoculation.Thus, a consortium of *F. mosseae* and *B. megaterium* can be useful in mitigating and protecting the plant from abiotic stress (*i.e.* drought) and may come up as better strategy to overcome the problem of drought.

Similarly the PGPM were also checked for their biocontrol ability against biotic stress caused by phytopathogens. Biocontrol strategies have been mainly focused on proposing the use of biocontrol agents (BCAs) isolated from the rhizospheric region of the plant for protection against phytopathogens. A study was conducted to evaluate the effectiveness of phyllospheric *Trichoderma* isolates in elevating the defense responses in chilli against *Colletotrichum capsici* infection and comparing its efficiency to the conventionally recommended rhizospheric *Trichoderma* strains. The elicitation of the defense network in the plants was evaluated by analyzing the important enzymes, PAL, PO, PPO, TPC, SOD along with the total protein level in challenged plants over untreated and unchallenged control plants. The results recorded 2.1,5.18, 3, 0.67, and 0.5-fold increases in TPC, PAL, PO, PPO, and total protein content in BHUF4 (phyllopsheric *Trichoderma* isolate)-treated plants when compared to control plants under *C. capsici* challenge. This was at par with the increment recorded in T16A (rhizospheric *Trichoderma* isolate) treated chilli plants. This study proposes the use of combined application of both rhizospheric as well as phyllospheric *Trichoderma* isolates for better and all around protection of plants against foliar as well as soil phytopathogens.

Why they eat, what they eat: patterns of wild edible plants consumption by tribal peoples in Sonebhadra district of Vindhyam range

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From time immemorial, wild plants have been used for edible purposes. They still continue to be a major source of nutrition for tribal people. However, unfortunately, their use is now declining. This has implications in food security, narrowing genetic base, and future leads. The present study was, therefore, carried out in Sonebhadra district of Vindhyam range to analyze uses of wild edible plants (WEP) and the motivations behind their use or abandonment. Present study was conduct by field surveys, household surveys, group discussions, free listing, and structured questionnaires were used to elicit information on WEP. WEP use was categorized into six categories (vegetables, fruits, chutney, flavoring food, raw food, and local brew). Trends of use (continuing, decreasing, increasing, and not used) and motivations (environmental, economic, sociocultural, agriculture and land use practices, and human-wildlife conflict) behind their use were analyzed.

Fifty plant species were used by the local people for edible purposes under six WEP categories. Mean and median of WEP used per respondent was 22.3 and 21, respectively. Highest number of these were used as vegetable (mean 8.9) while lowest were used as brew (mean 0.4). Out of the 50 WEP used, 20 were prioritized for motivation analyses. Though plant use is still maintained in the area, changes are evident. Almost 50% of the respondents revealed that they still continue the use of WEP while 36% reported trends of declining use as compared to 5–10 years back. Close to 10% respondents have stopped consuming WEP now and ~ 3% reported an increase in the use of WEP. Among the WEP categories, use of chutney showed an increasing trend. Sociocultural motivations were found to play a prime role, both, in limiting and promoting WEP use. Taste and aroma were the major sociocultural

reasons behind using WEP while modernization and changing lifestyle were the main reasons behind declining use of WEP.

Keywords: Wild edible plants (WEP); Sonebhadra; Vindhyam range; Field surveys; Environmental, Economic, Sociocultural, Agriculture.

In vitro evaluation of phytochemical and antibacterial activity of wild *Solanum* species

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Recently in world 80% of populations are using medicinal plant to cure diseases caused by microbial pathogens. Increasing the failure of synthetic drugs, side effects and development of antibiotic resistance by pathogenic microorganisms leads to development of the identification and screening of several medicinal plants for their potential antimicrobial activity. Present study aimed at phytochemical screening and evaluating the invitro antimicrobial activity of methanolic extracts of the seven *Solanum* species (*S. nigrum, S. vellosum, S. torvum, S. surratense, S. sysimbrifolium, S. diphyllum and S. incanum*) against 2 Gram positive *Staphylococcus aureus, Bacillus subtilis* and 3 Gram negative *E.coli, Salmonella typhi* and *Proteus vulgaris.* The zone of inhibition was determined by agar disc diffusion and agar well method varied with plant extract and the organism tested. It was observed that methanolic extract of *S. sysimbrifolium* 5gm/100ml conc. was most susceptible to all the bacterium, while *S. aureus* was the most susceptible bacterium to all extracts with maximum inhibition zone of 20±1 diameter against *S. sysimbrifolium.* The results of antimicrobial activities clearly showed that plant extracts were specific in action against the growth of bacterial species. Phytochemical screening revealed the presence of carbohydrates, proteins, alkaloids, phenols, flavonoids, glycosides, saponins, tannins and steroids as a major class of compounds.

Key Word: Wild *Solanum*, Phytochemical screening, Antimicrobial activity, Inhibition zone.

Species adulteration and its mitigation by phytochemical and anatomical screening of family Liliaceae

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Endangered medicinal plants have used as traditional and alternative medicines from last several decades. Deforestation and extinction of many medicinal plant species may cause of incorrect analysis of many plants was resulted in adulteration. In India, of the 8000 species of medicinal plants harvested from the wild, approximately 960 are in the active trade. Adulteration in market sample is one of the greatest drawback in promotion of herbal medicinal plant products. Future of herbal medicine is totally depends upon the correct identification, standardization and quality assurance. Comparative anatomical study and phytochemical screening may used for its correct authentication and prevention of adulteration. . In order to ensure the use of only genuine and uniform material of such herbal drugs, work on plant identifying features assumes vital significance. Preliminary phytochemical analysis showed that saponins, flavonoids, glycosides, steroids were present in the plant material while comparative anatomical study would serve as standard reference for identification of the different plant species of *Chlorophytum* Ker Gawl and *Asparagus* L.

Habitat destruction and biodiversity loss of some medicinal plant species of family Euphorbiaceae

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Present piece of work is a part of about seven years exhaustive observations on annual variation phytosociological parameters of herbaceous weed plants of medicinal importance. Anpara, a region of district Sonebhadra which has acquired a

noteworthy place on national level as an electricity producer. Here various Thermal Power plants are running. The thermal power plants utilize a heavy amount of powdered coal and produce hazardous fly-ash as Coal Combustion Resedue (CCR) that is poured in huge ash dams ans used as filling matter in low-lands.

Present paper deals with the effect of such deeds on biodiversity. A continuous observation had been made since 2010 on the phytosociological aspects of some medicinal plants. The data has been collected from the low lands of the study area and that has been compiled in two sets – before land filling and afterwards.

The paper depicts the annual variation in Relative Frequency, Relative Density, Relative Dominance and the Importance Value Index (IVI) of four medicinal plants of the family Euphorbiaceae, *viz. Euphorbia hirta, Euphorbia thymaefolia, Phyllanthus fratternus, and Phyllanthus debile* which have been reported to continuous degradation till the level of almost disappearance from the area (Region of land-fills by fly-ash) where were proliferating before land filling.

Biodiversity of Cyanobacteria in Paddy Soil of Varanasi

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Cyanobacteria (Blue-green algae) possess an autotrophic mode of nutrition like higher plant cells, metabolic systems like bacteria and occupy a unique position in living world. They possess chlorophyll ‘a’ and are Gram negative carry out oxygenic photosynthesis. They exhibit a great morphological diversity and their broad spectrum of physiological properties reflects their widespread distribution and tolerance to environmental stress. The paddy field ecosystem provides a favorable environment for the growth of cyanobacteria with respect to their requirement for light, water, temperature and nutrient availability. The cyanobacterial strains were isolated and identified upto species level from different experimental sites. The study recorded non-heterocystous BGA belong to family Oscillatoriaceae of order

Nostocales. *Lyngbya* was represented by species *L. laxespiralis, L. lagerheimii, L. major* and *L. truncicola, Oscillatoria* was represented by species *viz., O. sancta, O. subbrevis, O. princeps* and *O. acuta*; *Spirulina* was represented by *S. subsalsa*; while *Phormidium* was represented by *P. truncicola, P. ambiguum* and *P. oryzetorum.*

Species belonging to seven genera of heterocystous forms were belonging to family Nostocaceae, Scytonemataceae, Stigonemataceae and Rivulariaceae. Family Nostocaceae was represented by genera *Cylindrospermum, Nostoc* and *Anabaena. Cylindrospermum* was represented by species *C. stagnale* and *C. muscicola*; *Nostoc* was represented by species *viz., N. calcicola, N. muscorum,* and *N. commune*; *Anabaena* was represented by species *viz., A. oryzae, A. doliolum* and *A. variabilis.* Family Scytonemataceae was represented by 1 genera *Scytonema. viz., S. coactile, S. bohneri,* and *S. hofmanni*. Family Stigonemataceae represents 1 genera *Hapalosiphon. Hapalosiphon* represented by species *Hapalosiphon fontinalis* and *Hapalosiphon welwitschii.* Family Rivulariaceae comprises 2 genera *Calothrix* and *Gloeotrichia. Calothrix* represented by *C. castellii* and *C. marchica* and *Gloeotrichia* represented by species *Gloeotrichia ghosei* and *Gloeotrichia natans.* These algal forms showed variations in their occurrence and distribution during kharif seasons. Maximum biodiversity of the BGA forms was recorded in the middle of cultivation cycle. We concluded that cyanobacteria added nitrogen in paddy fields as a natural biofertilizer and increase the crop productivity. After their death and decomposition they added organic matter to soil and thus improve soil properties and soil fertility.

Impact of organic farming on health, biodiversity and soil fertility in Endo-Gangetic zone

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Organic farming is being practiced in 100 countries of the world. The organic area in India is 2.5 million hectare including certified forest areas. Non-certified

organic area is more than certified organic area. An understanding of agro-ecosystems is key to determining effective farming system.The agronomic and ecological performance of biodynamic, bioorganic, and conventional farming systems in endo-Gangetic plane found that, crop yields to be 20% lower in the organic systems, although input of fertilizer and energy was reduced by 34 to 53% and pesticide input by 97%. Enhanced soil fertility and higher biodiversity found in organic soils may render these systems less dependent on external inputs. Organic farming is an eco-friendly agro ecosystem that helps maintain soil health in terms of biological fertility, biodiversity, productivity and micro-organism communities in soil play an essential role. Modern farming practices have negatively impacted not only agricultural productivity but also soil health, food quality and environmental pollution. Recently, alternative farming systems especially organic farming is becoming popular around the globe. Organic farming has various advantages over modern agricultural practices especially sustainability and environmental safety of agricultural production. Biodiversity and environmental safety of agricultural production relies on eco-friendly approaches like bio-fertilizers, bio-pesticides and crop residue return. Organic farming relies heavily on the natural breakdown of organic matter to replace nutrients taken from the soil by crops, those eco-friendly approaches promoted by soil microorganism. No doubt Intensive agriculture has increased crop yields but also posed severe environmental problems.

Key-word: Organic farming, Biodiversity, Eco-friendly, soil fertility

Assessment of rice performance under different gradient of salinity stress

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Soil salinity is imposing a major problem for cultivable lands and is increasing especially in developing countries. This causes soil quality degradation, thus making the land less suitable for agriculture. Salinity is increasing due to poor agricultural

practices and high rate of evaporation, etc. The objective of this study is to compare the plant performance with respect to osmolytes and yield in rice plants growing under different salinity levels. Five sites were selected in and around Varanasi along a salinity gradient. Site 1 (Rajatalab, RJT) is reference site having lowest electrical conductivity and site 2 to 5 (Beerbhanpur- BBN, Baraipur- BRP, Dharahara- DHR and Salempur- SLM) showed electrical conductivity ranging from 0.10 to 1.70 mS/m. Photosynthetic pigments and protein contents decreased at highest level of salinity. Osmolytes like proline, ascorbic acid and glycine betaine were increased at high salinity. At site 6 (SLM) with highest salinity, no ear formation was recorded and plants reached to a maximum height of 35 cm, whereas at site 1 (RJT) with minimum salinity, plants showed highest height of 115 cm and highest number of filled grains per panicle and yield. Plants growing at intermediate salinity levels although could maintain osmolytes and other defensive strategies, but did not maintain height as well as yield.

Air borne fungi and bacteria in indoor environment of Mohd. Hasan PG College, Jaunpur

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This study was carried out to determine the variation in microflora of college lab and class rooms. Sample were collected using the settled plate method for the fungal and bacterial isolates, PDA media are used for this experiment. The petriplates were exposed for sample collection at different places in morning, afternoon and evening. The highest fungal population was recorded in the afternoon compared to morning and evening. Some pathogenic fungal and bacterial colonies were observed and identified in exposed petriplates, namely *Pseudomonas, E. coli, Aspergillus sp., Penicillium sp., Mucor sp., Alternaria sp., Fusarium, Rhizopus.* The degree of frequency of microbial distribution was highest in Botany lab compared to class rooms.

Key words: indoor, airborne microflora, pathogen.

Screening of tomato (*Solanum lycopersicum* L.) genotypes for morphological, reproductive and biochemical traits across the different season

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High temperature is a major environmental stress that limits plant growth, metabolism, and productivity worldwide, plant growth and development involve numerous biochemical reactions that are sensitive to temperature. Twenty three tomato genotypes were evaluated in the autumn-winter (main season) and spring-summer (high temperature stress) in the field condition. Pollen viability decreased greatly during summer season. Maximum viability of the pollen grains was observed in EC-538156 (94.33%), PS-1 (90.00%) and Kashi Amrit (90.00%) and the minimum pollen grains were recorded in EC362941 (72.00 %) during winter season. Whereas, increment of pollen viability were noted during summer in EC-538156 (94.67%), Hisar Lalit (93.33%) and 15-SB (82.67%). In summer season Hisar Lalit showed highest yield plant-1 1.39 kg and exhibited higher degree of heat tolerance whereas, in winter season Pant T-3, EC-605696 and Hisar Lalit performed better in terms of yield. It was observed that pigments lycopene (2.6% to 62.3%), proline (0.9% to 32.3%) and titrable acidity (3.2% to 37.5%) concentration enhanced during spring summer season. Chlorophyll b is highly sensitive to high temperature and thus its concentration severely effected, and its reduction (21% to 47.9%) amongst tomato leaf in spring-summer was observed. There were not significant differences amongst total soluble solids content in both the season. From these observations, Hisar Lalit, EC-538156 and EC-538441 showed better performance under both the seasons.

Keywords: Autumn-winter, Polar diameter, Spring-summer season, Tomato

Arthrobotrys oligospora have potentiality to manage Root knot Nematode in Tomato

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Tomato (*Lycopersicon esculentum* Mill.) is an important vegetable crop across the world. The fruits of tomato are popular throughout the world and are used in all kinds of vegetable and also eaten as raw salad. Tomato crop is severely affected by a large number of diseases which can be easily diagnosed by their symptoms in the field. Nematode problems often go unnoticed due to the absence of conspicuous above ground symptoms and known as "hidden enemies" or "unseen enemies" because of their presence in the soil and attack on the roots of tomato plant. The nematode trapping fungi may be used for the biological control of plant parasitic nematodes. Among them *Arthrobotrys oligospora* have been reported and establish as effective biocontrol agents of plant parasitic nematodes in vegetables. *In vitro* test was done to assess the parasitism of *A. oligospora* against second stage juveniles of *M. incognita* in the Petri plates in controlled conditions and was concluded that with increase in nematode population and time interval enhances the killing of second stage juveniles might be due to inducement of more number of traps with increasing number of population and time period. Tomato plants were also tested in pot trials for the assessment of bioefficacy potential of *A. oligospora* for root knot management in pots. *A. oligospora* was first mass multiplied on solid substrates of sorghum grains and applied as soil application in pot trials and result was found very effective against root knot of tomato plants. Although these observations are encouraging, relationship between nematode trapping fungi, host and nematode needed intensive and interactive studies to establish the mechanisms involved in the reduction of root- knot nematode population in different ecological habitats of tomato. In view of this intensive work is required to observe the incidence of root knot nematode of tomato on farmers field which would be helpful for making strategy to manage this disease as well as culminate losses in tomato production.

Grassland community response to elevated ozone exposure by assessment of plant injury, soil nutrients and total biomass.

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Tropospheric ozone (O_3) is a serious threat to global food security as well as to natural vegetation and is also considered as an important component of global climate change. The phytotoxic effects of O_3 on agricultural plants are well known, but its effects on natural grassland community and their belowground soil health are yet to be ascertained. Considering these facts, plant composition and soil nutrients of grassland (semi-natural community) were assessed in response to ambient (48ppb) and elevated (Ambient+20ppb) O_3 treatments in open top chambers installed directly on semi-natural grassland community. Elevated ozone induced leaf injury and early senescence. The negative effects of O_3 are species specific and depend on canopy layer with the more effect on upper canopy. Forbs species were relatively more sensitive compared to grasses under elevated O_3 concentration. O_3 treatment also caused significant decline in most of the soil nutrient contents (Na, Mg, K, Zn, Fe and Cu) compared to ambient, suggesting influence of O_3 in altering soil nutrient availability. The total above ground biomass measurement of community showed increase in grass contribution whereas forb biomass declined significantly under elevated O_3 compared to ambient. The variabilities in most of the soil nutrient parameters and differential sensitivity of two functional groups clearly suggest that elevated ozone may cause shift in community pattern due to variations in responses of functional groups under changing nutrient status.

Key words: Ozone; grass; forb; soil nutients; semi-natural grassland community.

Effect of neem (*Azadirachta indica* L.) essentail oil on chickpea (*Cicer arientium* l.) seeds.

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Neem oil is used as biopesticide extracted from seeds of neem. The most important bioactive agent in neem oil is azadirachtin. Essential oils are ephemeral, biodegradable, volatile and safe so they are highly suitable for their use as plant based pesticides and preservatives. It has antimicrobial, insecticidal, antibacterial, antiviral and antifungal properties. The chickpea a legume belongs to family Fabaceae, its seeds are high in protein content. It is important crop for nitrogen fixation and reducing pathogen inoculums for cereal crop cultivation. The experiment was carried out to evaluate the effect of neem essential oil in chickpea (*Cicer arientium* L.) seeds. Chickpea seeds were treated with different concentrations of neem essential oil *i.e.* 0.5 ml., 1.0 ml., 2.0 ml., and 2.5 ml. and control in three replicates respectively. The treated and control chickpea seeds were kept in petridishes containing three layer moistened blotting paper and parameters *i.e.* germination percent, germination energy, seed vigor test, seedling characters were observed. The neem essential oil was found very effective, it was found maximum at 0.5ml and control treatments while at 2.5ml observed parameters were found minimum respectively. Therefore, we can conclude that it can be exploited for good protection, preservatives and growth promotion in chickpea crop.

Studies on yield and its components in early segregating generation of rice

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Morphological and quantitative observations were recorded on five randomly selected plants. Genotypes has sufficient amount of variation for the characters flag leaf attitude of blade, spikelet density of pubescence, lemma colour, spikelet colour of tip of lemma, panicle exertion, panicle attitude of branches, panicle awns and panicle distribution of awns. Analysis of variance indicated that the differences among genotypes were highly significant for all the traits studied. High GCV and PCV exhibited harvest index followed by grain yield per plant, panicle index, biological yield per plant, panicle weight per plant. Grain yield per plant exhibited positive and significant association with flag leaf width, biological yield per plant, panicle weight per plant, number of spikelets per panicle, fertile spikelets per panicle and spikelet density. The highest positive direct effect on grain yield per plant was observed for stem length followed by panicle length, panicle index, fertile spikelets per panicle, panicle weight per plant, spikelet density and decorticated grain. It indicates true relationship between them and direct selection for these traits will be rewarding for yield improvement. Out of thirty six genotypes, only sixteen principal components (PCs) exhibited more than 0.5 Eigen value and showed about 86.73% total variability. The PC1 showed highest variability i.e. 15.77% while, PC2, PC3 exhibited 11.14%, 8.91% variability, respectively among the genotypes of the traits under study. Therefore, the genotypes from PC1 and PC2 will be given due importance. On the basis of yield attributing and disease resistance for blast, five genotypes had highest PC values. Thus, these genotypes were selected and can be used in future breeding programme.

Keywords: Variability, Genotypes, GCV and PCV, Principal Components etc.

Isolation of Mycoflora and effect of garlic (*Allium sativum* L.) on bread slice.

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Present paper deals with effect of aqueous extract of garlic (*Allium sativum* L.) on bread slice and isolation of mycoflora. Effect of garlic aqueous extract at control, 25%, 50%, 75%, and 100% has done in three replicates respectively. Bread slices were dipped into variable garlic aqueous extract at control, 25%, 50%, 75%, and 100% respectively and kept in transparent box fully covered and observed for 7 days. Mycoflora were identified on basis of colony characters and microscopic examinations. Only in control, fungus *i.e. Aspergillus* and *Rhizopus* were observed and at variable concentrations of aqueous extract of garlic no mycoflora were found only few water droplets were observed on 7th day. So, it can be concluded that garlic aqueous extract gave better results and it may be economically important and free from residual side effects.

Gamma ray and EMS induced genetic variability in M_2 and M_3 generations of aromatic rice

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Mutations affecting polygenic characters can be inferred to a great extent by the estimates of ranges, mean, coefficient of variation and other genetic parameters in the mutagen treated populations. The mean performance showed improvement in most of the mutagenic treatments in M_3 generation as compared to corresponding treatments of M_2 generation. There was wider range in the treated population as compared to the untreated population. The magnitude of coefficient of variation in

treated population was generally higher as compared to the control for most of the characters in both the generations for both the varieties. The higher doses of mutagens were comparatively effective in inducing variability. The observed changes in CV values revealed that the magnitude of variability declined from M_2 to M_3 generation. There was a significant increase in mean value for days to flowering and days to maturity and decrease in mean values for other characters in both the varieties.

Key word: Aromatic rice, gamma rays, EMS, micro-mutation

Diversity of angiosperms in wetlands: A crucial ecosystem for underutilized plants

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Underutilized plants, being more resilient and better adapted to grow in marginal environments like wetlands offer cost-effective and viable solutions for food production. Wetlands constitute a resource of great economic, cultural, scientific and recreational value, and their loss would be irreversible. We have investigated the diversity of angiospermic plants in two wetlands, *Turanala* and *Talkandala* of Gorakhpur with respect to natural as well as anthropogenic disturbances. A total of 236 species under 63 families were observed during study. In which, only 2% species were abundant, 10% rare, 20% less frequent and remaining species were common in occurrence. As evident from the periodicity of the phenological events, the wetlands of the region provide maximum resources in terms of food, forage, fuel and pasture during October to December. Helophytes were the most prevalent among growth form categories. In these wetlands, 22% species were regenerated through clonal growth organs enabling them a plastic response to the changing environmental conditions and other disturbances. Excessive and unsustainable harvesting practices like, fishing, grazing and farming may cause these species at the risk of various abundance classes.

The economically important underutilized plant species of this wetland warrants their protection and enhancement practices.

Keywords: Growth forms, abundance class, disturbance, regeneration, riverine, lacustrine.

Role of Plant Growth Promoting Bacteria in heavy metal tolerance

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Accumulation of heavy metals is one of the severe environmental concern that adversely affect the health of human, plant and soil. In the normal concentration, heavy metals constitute an essential nutritional requirement for the living organisms, due to their participation in wide variety of biological activities like enzymatic cofactors, proteins stimulator or biological pathways. Currently the levels of some heavy metals in the environments are increasing, due to industrialization of fertilizers, pesticide, metallurgy industry, combustion of fossil fuels and reaches to the level of toxicity. It has been estimated that the anthropogenic industries and domestic sources enhances the emissions level of lead, cadmium, vanadium, and zinc up to 100 fold. Excess accumulation of some heavy metals in the soil adversely affect the texture and productivity of soil, growth, yields, nutrient availability in the plants, microbial community and also the health related issues of humans. Use of plant growth promoting bacteria for the mitigation, tolerance, detoxification of heavy metal, effect is environmentally safe and sustainable approach. *Pseudomonas, Bacillus, Azotobacter, Klebsella* sp. is some most common PGPR strains used in the mitigation process of heavy metal tolerance.

Keywords: Plant growth promoting bacteria (PGPR), heavy metals, toxicity, mitigation

Want life or death: Stop water pollution!

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Water pollution is very important problem of 21st century and is a major cause of global concern as it leads to onset of numerous fatal diseases which is responsible for the death of people every day. Both developed as well as developing countries are facing water pollution problems, while the problem in developing countries is more alarming. Due to water pollution, pure water is becoming scarce day by day. The biggest cause of water pollution is industrialization and increase in population. By drinking polluted water people becoming more and more ill. Evaluation of water resource policy is needed to counter this problem. Natural phenomena such as volcanoes, algae blooms, storms, and earthquakes also cause major changes in water quality and the ecological status of water. Measures are needed to protect the quality of water. Keeping the seriousness of pesticides contamination in water systems and its impact on humans and animals in addition to the environment, an endeavor has now been needed in present to compile and project the current information available on this issue with special reference to India. Water quality is influenced by many factors like precipitation, climate, soil type, vegetation, geology, flow conditions, ground water and human activities. The great threat to water quality is posed by point sources of water pollution as ditch, pipe industry, storm drain and sewage treatment plants etc. Non-point source pollution is very difficult to control and is the main leading cause of water pollution may come from different sources like pesticides, fertilizers industrial wastes etc. Thus the whole ecosystem of water bodies is disturbing due to water pollution leading to deaths and diseases of land animals and human beings also.

Effect of NPKS and bio-fertilizers on the performance of green gram (*Vigna radiata* L.) and soil properties

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A field experiment was conducted during 2016-17 to evaluate the influence of integrated use of major nutrients and bio-fertilizers performance on green gram and properties of soil. The treatments were control (T_1), 100 % NPKS (T_2), 50% NPKS (T_3), 150%NPKS (T_4), 50% NPKS +PSB+ Rhizobium (T_5) and 100% NPKS +PSB+ Rhizobium (T_6). Application of 100% NPKS along with bio-fertilizer significantly increased the growth and yield as well as soil fertility status as compared to chemical fertilizers alone. Significantly higher number of pod, plant height, leaves per plant, dry pod, grain and straw yield of green gram and soil properties in terms of organic carbon, available NPK and S were obtained with application of 100% NPKS +PSB+ Rhizobium (T_6) in comparison to other treatments. Significantly higher NPKS uptake was also observed with application of 100% NPKS +PSB+ Rhizobium (T_6). This experiment indicated the superiority of integration between chemical fertilizer and bio-fertilizer over chemical fertilizer alone at all level of fertility.

Effect of integrated nutrient management (INM) on soil properties and performance of rice crop (*Oryza sativa L.*)

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A field experiment was conducted to investigate the effect of integrated nutrient management (INM) on soil properties and performance of rice crop (*Oryza sativa L.*). The treatments were Control (T_1) , 50%NPK through inorganic

fertilizer+50% N through FYM (T_2), 50% NPK through inorganic fertilizer(T_3), 75% NPK through inorganic fertilizer + 25 % N through FYM (T_4), 75% NPK through inorganic fertilizer(T_5) and 100% NPK through inorganic fertilizer (T_6). Application of 50%NPK through inorganic fertilizer+50% N through FYM recorded significantly higher organic carbon content, available N, P, K, S and soil physical properties as well as higher growth rate in terms of plant height, number of tillers and also yield as compared to other treatments. Effect of 50%NPK through inorganic fertilizer+50% N through FYM on availability of nutrients and growth and yield of rice was significantly superior. Integration of organic and inorganic fertilizers increased soil available nutrients (N, P, K and S) status in comparision to chemical fertilizer alone. Application of 50%NPK through inorganic fertilizer+50% N through FYM recorded significantly higher nutrients (N,P,K,S) uptake by crop as compared to other treatments.

Inoculation of Plant Growth Promoting Bacteria in Cadmium Stressed Trigonella and Lentil plants

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Rhizosphere plant-microbe interactions are important determinants of soil fertility, plant health and productivity. A green-house pot-experiment was carried out to investigate the effect of Plant growth-promoting rhizobacteria (PGPR) on the cadmium uptake, growth, proline, MDA, chlorophyll content, enzyme activities, yield responses and plant resistance index (RI) in two important legumes of methi (*Trigonella foenum-graecum* L.) and lentil (*Lens culinaris* Medik) against different levels of soil cadmium (0, 50 and 100 mg Cd kg^{-1}). Plants raised in soil amended with Cd and inoculated with and without PGPR. Experiment was conducted in randomized block design. Plant growth-promoting bacteria colonization increased the growth and other associated parameters of the legumes, indicated plant growth prevention under

Cd stress. The favorable changes in biochemical parameters of two legumes on inoculation with PGPRs showed alleviation of Cd toxicity. Leaf chlorophyll (Chl a and b) level and activities of enzymes nitrate reductase and carbonic anhydrase were also significantly higher in PGPR inoculated test plants. Resistance index (RI) of both leguminous plants was increased in the presence of PGPR than in their absence in Cd polluted soil. This study provides evidence for benefits of PGPR in the protection of host plants against the detrimental effects of heavy metals. Potential use of selective PGPRs could be a new approach to increase the heavy metal resistance of leguminous plants under heavy metal polluted soil.

Keywords: cadmium, lentil, methi, PGPRs, resistance index

Effect of chlorobenzoates on the degradation of polychlorinated biphenyls by *Pseudomonas putida.*

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Polychlorinated biphenyls are co-metabolized by biphenyls degrading bacteria to chlorinated benzoates. These benzoates accumulates in the growth medium. They can inhibit the bacterial growth and consequently slow down polychlorinated biphenyls degradation.

The complete mineralization of PCB require the presence of two sets of genes one for the bioconversion of PCB to CBA and other for the degradation of CBA. In this study the effect of chlorinated benzoic acid on growth of *Pseudomonas putida* of different substrates and on the poly chlorinated biphenyls degradation by this strain in a liquid mineral medium were tested.

Growth and yield attributes of two cultivars of eggplant sown at different times

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The yield attributes of the two cultivars (Pusa Kranti and Pusa Cluster) of eggplant shown at four different times i.e., 1st July, 1st August, 1st September and 1st October during 2017 were assessed. Of the four sowing times the plants raised from August sowing resulted into maximum fruit length, fruit diameter and fruit weight. The fruit setting and total number of fruits (in 180 days), however, were noticed to be maximum for July-sown seeds. This was directly related to climatic factors-temperature, relative humidity and rainfall.

Key words : Growth & yield, cultivars of eggplant.

Impact of climate change on host cell growth and cyanophage n-1 multiplication

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Cyanophages possess attributes that appear to be attractive novel ways to control Cyanobacterial population in Ganga river. Multiplication of Cyanophage N-1 was studied in different seasons at confluence of Ganga - Varuna rivers. Latent period of Cyanophage N-1 was increased by four hours. Temperature was main factor in nature to regulate Cyanophage growth. This study summarizes the seasonal dynamics of Cyanophage N-1 and host cells.

Climate change in relation to disease

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Climate is continually changing locally, regionally and globally in space, as well as from minutes to millennia in time. Note that climate is not simply average weather, but the long term integral of the range of weather including extremes Furthermore, year to year climate variability such as El Nino is superimposed upon longer-terms trends. A dramatic change in extremes may have unpredictable outcomes for health effects. Increased heat and greater variability in temperature and precipitation can generally be expected to lead to more health impact, especially for heat waves, air quality and water and food born diseases.

Climate Change: Impacts, Vulnerabilities and Adaptation in Developing Countries

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Developing countries are the most vulnerable to climate change impacts because they have fewer resources to adapt: socially, technologically and financially. Climate change is anticipated to have far reaching effects on the sustainable development of developing countries including their ability to attain the United Nations Millennium Development Goals by 2015 (UN 2007). Many developing countries' governments have given adaptation action a high, even urgent, priority.

These countries need international assistance to support adaptation in the context of national planning for sustainable development, more capacity-building and transfer of technology and funds. Systematic planning and capacity-building are also needed to reduce the risk of disasters and raise the resilience of communities to increasing extreme events such as droughts, floods and tropical cyclones. Funding for adaptation in developing countries must be sufficient and sustained. Least developed

countries (LDCs) and small island developing States (SIDS) in particular need special consideration due to their extreme vulnerability.

Developing countries have very different individual circumstances and the specific impacts of climate change on a country depend on the climate it experiences as well as its geographical, social, cultural, economic and political situations. As a result, countries require a diversity of adaptation measures very much depending on individual circumstances. However there are cross cutting issues which apply across countries and regions. The same sectors are affected by climate change, albeit to differing degrees. These main sectors include: agriculture, water resources, human health, terrestrial ecosystems and biodiversity and coastal zones

Although knowledge of how best to do adaptation is still in its infancy, the Parties of the UNFCCC are increasing their support for action on adaptation. This includes the development of national adaptation programmes by some developing countries including least developed countries, and their integration into national strategies. Climate change solutions need to identify and exploit synergy, as well as seek to balance trade-offs, among the multiple objectives of sustainable development, disaster risk reduction and adaptation policies. Such initiatives also require new and sustained funding sources.

There are adaptation needs and responses of developing countries on climate change and how the work of the UNFCCC helps to catalyse more work on adaptation in these countries as well as plans and implement adaptation in the context of sustainable development .

Integration for adaptation into policy at all levels gives a way forward to give an indication of possible next steps for the UNFCCC, including within a future climate regime beyond 2012, in addressing adaptation options for the threats posed by climate change.

Studies on the effects of the burning of mosquito coilson human health across world

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A study of mosquito coils sold in the India and other countries found that some mosquito coils contain octachlorodipropyl ether (s-2) that, during the smouldering of the coils, produces an extremely potent lung carcinogen as a byproduct called bis(chloromethyl)ether (BCME)). Fortunately, s-2 is banned in many countries. It is no longer used commercially in the U.S. and prompted by reports of the risks associated with mosquito coils, Hong Kong authorities released a statement in 2005 regarding the recall of mosquito coils containing s-2.It is not listed as an active ingredient in mosquito coils registered for use in Australia. Given that in most circumstances, particularly in Australia, mosquito coils don't contain s-2, it is the particulate matter that is of greatest concern.An often quoted study published in 2003 titled "*Mosquito coil emissions and health implications*" analysed the components of commercially available mosquito coils from China and Malaysia and found that burning mosquito coils in an enclosed room may pose "*significant acute and chronic health risks*" with the fine and ultra fine particulate matter released from a single mosquito coil equaling that of up to 137 cigarettes!In addition, they found that emission of formaldehyde (a by product of the combustion process) from burning one coil can be as high as that released from burning 51 cigarettes.Doesn't sound too good does it? The combustion of the coil itself is the main concern, not the insecticides used.More recent studies have indicated that changing the base materials used in mosquito coils (i.e. switching to charcoal from other organic material) can reduce the volume of particulate matter substantially. Would these "smokeless" mosquitoes be more "healthy"?Probably.Billions of mosquito coils are sold across Asia every year. Millions of families use them as their primary mosquito bite prevention strategy. Why aren't we seeing more substantial health impacts in local communities?It is worth noting that two papers published in 2006 investigated the different methods used to assess the health risks associated with burning mosquito

coils. The researchers tested different methods to expose laboratory rats to particulate matter from mosquito coils. They firstly reported that "protocols devised evaluate and assess the acute inhalation toxicity of mosquito coil smoke demonstrating that the nose-only mode of exposure of rats to the smoke of mosquito coils is suitable to assess the toxic potency of different coils.The nose-only mode has clear advantages over the whole-body exposure mode." Then, using the "nose-only" exposure method that they proposed, the researchers concluded that "overnight exposure to the smoke from burning mosquito coils (manufactured in Indonesia) is unlikely to be associated with any unreasonable health risk." This is a noteworthy conclusion given that the level of exposure to those rats (6 h a day, 5 days a week for 13 weeks) was substantial.

Biodiversity Conservation and Future Strategies

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Biodiversity is the variability among the living organism, animals, plants and micro-organism, ecosystems and the ecological complexes on the earth. Biodiversity has made our lives both pleasant and possible. It is estimated that about 80 million species is present on this earth. Out of 80 million only 1.4 million species have been identified but due to industrialization and modernization we are losing this acquired heritage of millions of years at a very fast rate.

World Health Organization (WHO) has listed over 21000 plant species used around the world for medicinal purposes. Out of 21000 plants 2500 plants are used extensively in India as medicines by the tribal people for the ailment of various diseases. The Red Data Book listed about 427 Indian medicinal plants as endangered species such as *Aquilaria malaccesis, Rauvolfia serpentina, Saussurea costus, Taxus wallichinia*. So there is an immense need for conservation of diversity of medicinal plant wealth for present and fore coming generation. For conservation various

strategies has to be develop like construction of gene pool, sacred groves, ethno-medicinal plant gardens etc.

Dynamics of broad leaf weeds in wheat (*Triticum aestivum* L.) as influenced by crop establishment methods and weed management practices

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The experiment was conducted during winter (*rabi*) season of 2014-15 and 2015-16 at Agricultural Research Farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi (25° 18´- N latitude, 83° 03´- E longitude and altitude of 129 m above mean sea level). It is characterized by the low land sub-tropical climate often subjected to extreme of weather conditions i.e. heat of summer and cold of winter with an average annual rainfall of 1080.4 mm and potential evapotranspiration (PET) account for 1500 mm annually. The experiment was laid out in a split plot design and was replicated three times. Twenty four treatment combinations of which four crop establishment methods *viz*. conventional tillage no-residue, conventional tillage with residue (6 t ha^{-1}), zero tillage no-residue and zero tillage with residue (6 t ha^{-1}) were assigned to main plots and weed management practices *viz*. weeded check, weed free (Weeds were removed with the help of hand hoe during entire crop period), mesosulfuron 12 g ai ha^{-1} at 30 days after sowing (DAS) *fb* one hand weeding at 45 DAS, metsulfuron (4 g ai ha^{-1} at 30 DAS) *fb* one hand weeding at 45 DAS, clodinafop +metsulfuron (60+4 g ai ha^{-1} at 30 DAS) and mesosulfuron + iodosulfuron (12+2.4 g ai ha^{-1} at 30 DAS) were allocated to sub plots. In the present study, zero tillage with residue recorded the lowest density of BLW *viz*. *Rumex dentatus*, *Chenopodium album*, *Anagallis arvensis*, *Melilotus indica* and *Vicia sativa*, total weed density; and the highest WCE as compared to conventional tillage no-residue, zero tillage no residue and conventional tillage with residue, respectively. However,

conventional tillage with residue recorded significantly the highest grain yield of wheat. Among herbicidal treatments, mix application of mesosulfuron + iodosulfuron recorded significantly lowest density of all the BLW and total weed density, highest WCE and grain yield over mesosulfuron *fb* one hand weeding at 45 DAS and metsulfuron *fb* one hand weeding at 45 DAS and it was statistically at par with clodinafop +metsulfuron during both the years of experimentation.

Key words: Herbicides, Broad leaf weed, WCE, Wheat yield, Tillage

Chemical control of *Curvularia* leaf spot of Spong gourd

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Curvularia leaf spot is the most important disease of Sponge gourd. The disease were tested with seven different fungicides and one antibiotics against the pathogen *In- Vivo* and *In- vitro*. The namely fungicides *Viz*- Indofil Z-78, Indofil M-45, Karathane, Bavistine, Blue copper, Vitavax, Plantavax,and antibiotics Streptomycin. All the fungicides and antibiotics were control the disease intensity excepted the control one. The two fungicides Indofil Z-78 and Indofil M- 45 were found most effective in controlling the disease. Karathane and Bavistine which show 11.60% and 24.26% average disease incidence. Remaning fungicides Blue copper, Vitavex, Plantavax and streptomycin were showed 44.75%, 46.30% , 51.09%, and 58.24% average disease incidence.

Habitat suitability analysis of species richness in Bandhavgarh Tiger Reserve, Central India

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Species richness linked with spatial characteristics of ecosystem. Ecologist to predict species richness area and isolation have been interpreted as supporting the theory of island biogeography MacArthur and Wilson1967), metapopulation

dynamics (Hanski 1999;Levins 1969), source–sink dynamics Pulliam 1988),dispersal theory (Fahrig and Merriam 1985), optimalforaging theory (MacArthur and Pianka 1966), and scapemetrics (McGarigal et al. 2002; Vos et al.2001), metacommunity dynamics (Holyoak et al.2005), erarchical patch dynamics (Wu and Loucks1995), wildlife–habitat relationship modeling (Morrison et al. 1998), and predicting species occurrences(Scott et al. 2002).

The observed species richness is affected not only by the number of individuals but also by the heterogeneity of the sample. If individuals are drawn from different environmental conditions (or different habitat, the species richness of the resulting set can be expected to be higher than if all individuals are drawn from similar environments. Species richness is often used as a criterion when assessing the relative conservation values of habitats or landscape However, species richness is blind to the identity of the species.

Bandhavgarh National Park is one of the popular Tiger Reserve in India located in the Umaria district of Madhya Pradesh. The buffer is spread over the forest divisions of Umaria, Katni and Sahdol forest division. The park derives its name from the most prominent hillock of the area, the name of this fort known as Bandhvagarh. This park has a large biodiversity and park has a large breeding population of tiger, and various species of deer. Bandhavgarh has the large density of Bengal tigers.

Impact of environmental degradation on biodiversity: A threat to existence of life

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Healthy environment and opulent biodiversity make a life sustainable ecosystem. Survival of an organism rely on its circumambient environment. With the advancement of science and technology, we achieved great success in each and every facets of life but at the cost of environment. Excessive exploitation of natural

resources like soil, water, air causes environmental degradation. Rate of environmental degradation put life on our planet at risk as it cause bulk obsolescence of various species resulting in loss of biodiversity. Biodiversity refers to diversity of plants and animals in a particular habitat or in the world as a whole. If there is biodiversity crisis, our life are at risk too. It has been figured out that almost 30% of all species populated on our planet will be exterminated by 2050 which is a threat to life. Biodiversity ensure natural sustainability of life on earth as it amplify ecosystem's productivity and provide important resources so that we can survive. Due to biodiversity depletion and environmental degradation, compete meshwork of life including us will collapse. Thus, there is great need to take effective and urgent action to halt these global ecological problem. This paper provide insight view about various determinants accountable for environmental degradation that bring on changes in biodiversity and also discusses that how to acquire greater success to maintain healthy life sustainable ecosystem.

Investment opportunity in dairy sub sector of district Azamgarh U.P.

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Azamgarh is a rural district of (Uttar Pradesh) with a land area of 4054 Sq. Km. at an attitude ranging from 120-150 mt above to sea level. It has some natural resources and minimal industry. About 60% house holds having holding of less than 0.5 ha^2. Family farms are continuously sub divided into increasingly smaller plot, field are over cropped, marginal lands and pasture lands have been converted to arable lands. The issue of land of farms size is therefore has great influence on cattle production in the district Azamgarh. Agriculture contributes 40% (above 18% of which is from livestock) of the Azamgarh GDP employee 90% of the population and over 80% of its exports. The major challenge facing the livestock sector and dairy sub-sector in particular is to safety the rise in general demand for livestock product by the increasing human population at the technological level that the natural resource

base can sustain without destroying the environment. A annual animal production is estimated at 97,981 tons of milk, 15,650 tons of meat, 1,80,785 number of eggs, 22,000 tons of fish and 59,000 tons of hide and skins. The dose not satisfy the needs and requirements of the population. Consumption in Azamgarh is 0.045 ltr/day (13 ltr. of milk per person per year) and 75% of that consumed in rural areas. Meat consumption is 4.5 kg. per person per year. I.C.M.R. recommends respectively 220 ltr. of milk and 50 kg. of meat per person per year. Specific constraints for dairy development in Azamgarh are numerous such as deficiency in animal feed both quality and quantity, the arise from poor and narrow pastures, water shortage poor quality of communalized feeds and limited use of agricultural by product and animal disease etc.

Despite a few constraints on stock breed, provide healthy environment and agro-climatic ecosystem make it possible to increasing productivity of livestock and domestic animals. Some authorized bank provide loan for razing livestock and increasing dairy sub sector. This scenario provides a number of challenges but also business opportunities in the dairy sub-sector of Azamgarh.

Climate Change Impacts on Ground Water Resources

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Water, the “Liquid Gold” is sacred and precious for health and wealth of society. It is one of the life sustaining elements of nature for survival of every living creature over the globe but its availability at a sustainable quality and quantity is threatened by many factors, of which climate change plays a leading role. Climate change poses uncertainties to the supply and management of water resources. Temperature increases also affect the hydrological cycle by directly increasing the rate of evaporation and evapotranspiration. Consequently, these changes can influence precipitation amounts, intensity rates and indirectly impact on the percolation and storativity of groundwater.

Groundwater resources are related to climate change through the direct interaction with surface water resources, such as lakes and rivers, and indirectly through the recharge process. The direct effect of climate change on groundwater resources depends upon the change in the volume and groundwater recharge. Therefore, quantifying the impact of climate change on groundwater resources requires not only reliable forecasting of changes in the major climatic variables, but also affect the groundwater recharge.

The greater variability in rainfall could mean more frequent and prolonged periods of high or low groundwater levels. While climate change affects surface water resources directly through changes in the major long-term climate variables such as air temperature, precipitation and evapotranspiration, the relationship between the changing climate variables and groundwater is more complicated and poorly understood. This paper presents the status of research studies carried out at national level to evaluate the impacts of climate change on groundwater resources and attention for carrying out the research and development studies to assess the impact of climate change on groundwater resources.

Keywords: Climate change; Hydrological cycle; Groundwater recharge.

Diversity and Distribution of Soil Fungi in Eastern Uttar Pradesh

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Biodiversity refers to the variability of life on Earth, all the living species of plants, animals and microorganisms. Fungi are a major component of biodiversity, essential for the survival of other organisms and are crucial in global ecological processes. Fungi being ubiquitous organisms occur in all types of habitats and are the most adaptable organisms. The soil is one of the most important habitats for microorganisms like bacteria, fungi and nematodes. The filamentous fungi are the major contributors to the soil biomass. Soil is a complex ecosystem, delimited by physicochemical parameters that hold enormous number of living organisms. The soil

microbes decompose the plant and animal residues entering the soil and convert them into soil organic matter, which influences on soil physical, chemical and biological properties and creating a complimentary medium for biological reactions and life support in the soil environment.

Fungi are one of the important microbial components of the soil. It has been estimated that 1.5 million fungal species are present in natural ecosystems, but only 5-10% have been described formally. Schmitt and Mueller estimated that there is a minimum of 7, 12000 fungal species worldwide. The actual number of fungi is still unknown; however, only 5-13% of the total estimated global fungal species have been described. Research on fungal diversity provides a basis for estimating the functional role of fungi in ecosystems. The present study was undertaken to throw a light on the diversity and abundance of fungal species to reveal the characteristic distribution and diversity with special reference to soil fungi. The study involves isolation, identification and enumeration of fungal species from different ecological soil types in Eastern Uttar Pradesh.

Key-words: Diversity, Distribution, Soil fungi, Eastern Uttar Pradesh

Achieving green growth by efficiently incorporating principles of Sustainability Science

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Green growth describes the path of economic growth using natural resources in a judicious or sustainable manner. Green economy aims at reducing environmental risks and ecological scarcities, and aims for achieving sustainable development without degrading the environment. Green growth finds it's close association with ecological economics. A growth paradigm characterizes the balance between economic and environmental sustainability. This is going to be an important international platform for establishing link with youth across the globe and to seek

ideas and solutions to work towards sustainable development. This concept s originated from the Fifth Ministerial Conference on Environment and Development (MCED) held in March 2005 in Seoul, Korea. 52 Governments and other stakeholders from Asia and the Pacific in the said conference agreed to move beyond the sustainable development rhetoric and pursue a path of "green growth". The green growth is a regional and global initiative with a vision to achieve sustainable development as directed also through Sustainable Development Goals, 2015.

In the present Anthropocene, sustainable development is of prime importance in all aspects and areas of human involvement. I as a student am engaged working in sustainable science where low emission of carbon plays a pivotal role in green growth. The economics should support environmental policy, where we can also understand the value of sustainability in solving problems of the global economy *i.e.* climate change, ozone depletion, tropical deforestation, and resource loss. Present article explains the green growth through sustainable science that plays key role in partially attaining SDGs thereby, benefitting the entire world at large. My participation can help me in gaining a larger vision for youth and helping them understand a few pertinent issues to the best of my ability.

Key word:- sustainable development, environmental policy, ecological scarcities, Green growth.

Role of Swachh Bharat Mission in Conservation of Natural Environment

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Swachh Bharat Mission is a Nation Cleanliness campaign established by the Government of India. This mission was launched on 2nd of October, 2014 (145 Birth Anniversary of Mahatma Gandhi). It is a step ahead to the Mahatma Gandhi's dream of swachh Bharat for maintain the National Environment Health & prosperous life. The mission has been implemented to cover all the Rural & Urban area of the India under the Ministry of Urban Development and Ministry of Drinking Water and Sanitation. The first cleanliness drive on 25th September, 2014. This Mission started by the Indian Prime Minister Shri Narendra Modi. The mission was aim solved the

basic problems sanitation, waste management and creating sanitation facilities to all. Indian Society play role in the conservation of natural environment through Swachh Bharat Mission. The Mission impact Indian social behavioral changes the people and motivated health practice, spreading cleanliness environment and eco-friendly policy adopt to clean environment on the behalf of Swachh Bharat Mission. Indian Government launched India's First National Air Quality Index (NAQI) in April 2015.

The NAQI raise awareness about level of Air quality of pollution across the country. Indian Govt. focus on the through Role of Swachh Bharat Mission in conservation of natural environment for future of Incredible Bharat.

Key point - Eco-friendly, conservation, and NAQI.

Modified method for Agrobacterium mediated transformation in *Arabidopsis thalina*

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Plant transformation technology offers an array opportunities for basic scientific research and modification of food and fiber crops. Transgenic plants are topically produced by complex methods. They require careful preparation of plant cells or tissue, introduction of DNA using Agrobacterium tumefaciens or particle bombardment.

Agrobacterium vacuum infiltration method is relative new and simple procedure for transformation. The method involved the growth of *Arabidopsis thaliana* to flowering stage. The plant uprooting application of Agrobacterium tumefaciens by vacuum infiltration in sucrose growth medium, replanting and identification of transformed progeny by selection on media containing antibiotics. These modification may be most important for use in large scale transformation such as enhancer trapping and other form of gene tagging mutagenesis.

Nitrogen Fertilizer: Wonder Nutrient become threat

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New technology lowers the price of N-fertilizers enough that farmers applying more (nearly 100Kg ha $^{-1}$) and raising yields. Nitrogen fertilizer use appeared to rise exponentially (approx. 10% per year) and rises the threats also for environment. Excess level of nitrogen in water can create conditions that make it difficult for aquatic life to survive and harmful to human health. The rising nitrogen fertizer use accompany prompted fears of polluted water. It also has raised alarmed about green house warning and an altered global nitrogen cycle. In this issue we concentrate on "How fast nitrogen fertilizer use has risen in the world and also studied the effect of it on aquatic life and human health". Nitrogen accelerated the eutrophication of surface water and degrade the natural quality of ecosystem leading to rapid proliferation of algae and other aquatic weeds. It creates death zones or areas in water with depleted oxygen level, where aquatic life cannot suvive. Aquatic animals must leave the affected areas or die results in more losses into environment. Ingested nitrogen from polluted drinking water can induce methemoglobinemia. It also has a potential role in developing mutagenicity, teratoginicity, birth defect, gastroenteritis and cancer of digestive tract. Thus keeping in mind the fatal consequences and ill effects of nitrogen fertilizer on ecosystem strategies could be evolved to control the emerging threat. If we are careless in using N-fertilizers, this is going to pose a greater threat in near future. It is our duty to preserve the originality of nature and hand it over to our children

Prospect and Retrospects of Aquatic Life in India

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Most of water bodies become darkens with domestic sewage, chemical, agricultural runoff, industrial effluents & undesirable foreign & extraneous matter. It has been heavily abused as including agriculture and a fishery is of significant value

for human life. Therefore, study of this ecosystem can provide ravening into ecological principles as well as issue of environmental management of its economical utility. The government has "the Namami Gange" programmed & they are talking about free flow, swatchh kinara (river front development) and preserving the Zoological and ecological integrity of the River, it doesn't mean free flow of water only. It means free flow of everything including nutrients, biota & everything that's there in the river including wildlife.

With the main river flowing over 2,500 km, The Ganga and its tributaries, are home to over 140 fish species, 90 amphibians and many birds, apart from the famous reptiles and mammals. The Ganga river dolphin is still found in the river in U.P., Bihar and West Bengal. But these animals depend on echolocation to find their food. So they are highly vulnerable to changes in water flow and depth. The water level in the river has really gone down. Earlier the deep pools used to be 50 miters in depth but they have now reduced to 30 meters.

Effect of Foliar Application of Boron at Different Growth Stages on Rice (*Oryza sativa* L.)

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A field experiment was conducted during *Kharif* season of 2016 on research plot of Department of Agricultural Chemistry and Soil Science, Udai Pratap (Autonomous) College, Varanasi (U.P.) to study the effect of foliar application of boron at different stages of crop growth on rice (*Oryza sativa* L.). The experiment was carried out in randomized block design (RBD) with six treatments and three replications. Treatments were T_0= RDF, T_1= RDF + B@ 1.5% at TFG stages, T_2= RDF+ B @ 1.5% at TF stages, T_3= RDF + B@ 1.5% at TG stages, T_4= RDF + B @ 2.0% at T stage, T_5= RDF + B@ 1.5% at FG stages. The result obtained in respect of the effect of foliar application of boron on growth and yield (grain and straw) of rice revealed that the maximum yield of grain (42.00 q ha^{-1}) and straw (94.87 q ha^{-1}) were

recorded with T_3 when boron was applied at tillering and grain filling stages @ 1.5% foliar spray. T_3 also increased the uptake of B by grain and straw which was found to be significantly superior over all the treatments.

***Keywords**:* Boron, Rice, Foliar application, Growth stages.

Effect of nickel with different sources of nitrogen on rice (*Oryza sativa* L.)

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A field experiment consisting of 6 treatment combinations of two levels of Ni (@ 1 and 2 kg ha^{-1}) with two nitrogen sources (urea and ammonium sulphate) was conducted during ravi season of year 2016 with three replications under randomized block design at research plot of Udai Pratap (Autonomous) College, Varanasi (U.P.). The main objective of the study was to find out the effect of Ni with different sources of nitrogen on rice (*Oryza sativa* L.). Treatments were T_0 (Control =No input), T_1 = RDF (N through AS) + Ni_1 (Ni @ 1 kg ha^{-1}), T_2 = RDF (N through AS) + Ni_2 (Ni @ 2 kg ha^{-1}), T_3 = RDF (N through urea) + Ni_1 (Ni @ 1 kg ha^{-1}), T_4 = RDF (N through urea) + Ni_2 (Ni @ 2 kg ha^{-1}), T_5 = RDF (N 50% through AS + N 50% through urea) + Ni_2 (Ni @ 2 kg ha^{-1}). The results revealed that the growth and yield of rice were significantly increased by application of Ni @ 1 and 2 kg ha^{-1} with different nitrogen sources (urea and ammonium sulphate) as compared to control. However maximum were recorded with the treatment T_4. Similar results were also observed with nutrients (N, P and K) content and uptake by the rice crop. Maximum organic carbon and available N, P and K status of soil were registered with T_4.

***Keywords*:** Nickel, Nitrogen, urea, ammonium sulphate, rice

Impact of Climate change on Human Health across world

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We are facing the biggest environmental challenge our generation has ever seen. No matter what we are passionate about, something we care about will be affected by climate change. Over the past 150years, we have changed the balance of our planet by living beyond our means. We have burnt enormous amount of fossil fuels (such as coal, oil, gas), bred vast amount of methane –producing livestock and cut down huge swathes of forests, which would naturally absorb carbon dioxide from the air. Due to the impact of climate change the frequency, severity, duration and location of weather and climate phenomena-like rising temperatures heavy rains and droughts, and some other kinds of severe weather-are changing. This means that areas already experiencing health-threatening weather and climate phenomena, such as severe heat or hurricanes, are likely to experience worsening impacts, such as higher temperatures and increased storm intensity, rainfall rates and storm surge. It also means that some locations will experience new-climate related health threats. For example, areas previously unaffected by toxic algal blooms or waterborne diseases because of cooler water temperatures may face these hazards in the future as increasing water temperatures allow the organisms that cause these health risks to thrive. Even areas that currently experience these health threats may see a shift in the timing of seasons that pose the greatest risk to human health. Impact of climate change can therefore affect human health in two ways: first by changing the severity or frequency of health problems that are already affected by climate or weather factors; and second, by creating unprecedented or unanticipated health problems or health threats in places where they have not previously occurred.

Climate Change and its Impact on Agricultural Productivity in India

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Climate change has a serious impact on the availability of various resources on the earth especially water, which sustains life on this planet. Changes in the biosphere, biodiversity and natural resources are adversely affecting human health and quality of life. Throughout the 21stcentury, India is projected to experience warming above global level. India will also begin to experience more seasonal variation in temperature with more warming in the winters than summers. Longevity of heat waves across India has extended in recent years with warmer night temperatures and hotter days, and this trend is expected to continue. The average temperature change is predicted to be 2.33°C-4.78°C with a doubling in CO_2 concentrations. These heat waves will lead to increased variability in summer monsoon precipitation, which will result in drastic effects on the agriculture sector in India. Climate models predict a gradual rise in carbon dioxide (CO_2) concentration and temperature across the globe. These models, however, are not very precise in predicting future changes in local weather conditions. Local weather conditions such as rain, temperature, sunshine and wind, in combination with locally adapted plant varieties, cropping systems, and soil conditions can maximize food production as long as plant diseases can be controlled.

Keywords: Agriculture productivity, Climate change, Rainfall

Role of mushroom in diet as preventive treatment for coronary artery disease

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Mushroom plays an important role in prevention or treatment of coronary artery disease and hypercholestromia as the modification of nutritional regime with diets low in fats and saturated fatty acids and rich in crude fibres (ROSS, 1993)

Mushrooms in general are ideal diets due to high fibre content plant sterols, protiens, microelements and low calorific value, to prevent cardiovascular disease. Consumption of mushroom in diet decrease antherogenic effects by 20-40% in sera collected from coronary heart disease patients. It can lower both blood presure and free cholestrol in plasma and accelerate accumulation of lipids in the liver by removing them from circulation via a factor eritadenine. Eritadenine lowers blood pressure of cholesterol and lipids in in animal. Addition to the diets of rats, eritadenine (90%) caused a 25% decrease in total cholesterol in a week. Studies on mice and rats this mushroom has shown effects such as anticoagulation, lowered total cholesterol, anti-aggregatory activity on blood platelets. Animal studies on mushroom has shown that it decreases heart rate, reduces peripheral and coronary vascular resistance and increase cerebral blood flow.

Effect of crude aqueous extract of *Ocimum sanctum* leaves on testicular histology and serum calcium of rat

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Tulsi or Holy Basil (*Ocimum sanctum*) is widely distributed in India and in neighbour countries. Its medicinal properties have been described in Indian medicinal text Ayurveda, the 'science of life' which is believed to be about 5000 years old. Several medicinal properties have been attributed to the Tulsi plant not only in Ayurveda and Siddha but also in Greek, Roman and Unani systems of medicines. Tulsi has been used since time immemorial to treat common colds, bronchitis, skin infections, earaches, urinary tract infections and in many more diseases in Ayurveda and various folk systems of medicine in Southeast Asia.

Fresh leaves of *Ocimum Sanctum* (OS) were used to study its effect on male reproductive function and serum calcium in male albino rats. Animals in the test group of 6 rats received supplementation of 1 g of fresh leaves of OS per rat for 45 days, while the control group of 6 rats was maintained on normal diet for the same

duration. Histology of testes was done and serum samples of both groups are kept for calcium analysis. A significant decrease was noted in the seminiferous tubules width and wider space was found in inter follicular space in test group rats along with some erosion of tissues. Serum calcium level was found significantly increased in test groups (9.50±0.17 mg/dl) rats then the control groups (9.36±0.27 mg/dl). The results suggest that the OS exerts anti fertility effect on testis of male rats and acts as calcium booster. It can be concluded that OS has potentiality for effective male contraception which needs further study in this field.

Effect of municipal sewage on riparian ecosystem of river ganga at Ghazipur

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Human culture and civilization have started and flourished around rive corridors. Since the dawn of civilization people have shown their attachment and reverence towards rivers. The river banks were the place of religious discourse and certain rituals since the time immemorial in India. Rapid growthof population, technological progress and industrial revolution has led not only to disproportionate utilization of limited resourcesbut also to generation of very diverse type of municipal and industrial wastes. River corridors have acted as sink for these wastes brought into the river through sewers. Consequently the fragile riparian ecosystems have become vulnerable.

Sewage in collectively used to represent liquid or solid wastes carried in sewers. It consists of domestic waste water including human and animal excreta, washing water and everything that goes down the drains of a town or city including ground,surface and atmospheric water which enter the sewerage system.

The word riparianis derived from Latinripa meaning river bank. It is a narrow typical ecotone or transitional zone is between river and upland terrestrial system and considered ‘open’ ecosystem because a large percentage of the material and energy in the system are derived from the surroundings terrestrial system. It is represented by a particular type of vegetation, called riparian vegetation. It links terrestrial and aquatic

habitat. Riparian vegetation consists of macro-phytes, grasses, sedges, climbers, shrubs and trees (Dutta et. al., 2011).

The Ganga rise in the Garhwal Himalayan and flows through Haridwar, Kannauj, Kanpur, Allahabad, Varanasi, Ghazipur, Ballia and goes up to Bay of Bengal. Ganga receives several tributaries at frequent intervals. It is the most sacred,legendary and revered river in India. It is a symbol of our traditions and values, providing physical and spirituals nourishment to millions of devotees.It is also the largest and most important watershed of India.

Key word : Riparian ecosystem, Sewage, Reservoir.

Harvesting period and yield of *Pleurotus florida* on different agro-substrate

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Pleurotus species is simply a macrofungus. Cultivation in rural area helps to solve the problem of agro- waste management in a profitable way by producing a highly nutritious food item the mushroom along with upliftment of those area. *P. Sajor-caju* the most common oyster mushroom species, on dry weight basis contains protein 47.93% reducing sugar 0.28% ascorbic Acid 0.06% ash 8.25% non reducing sugar lacking starch 9.12% and fat 2.26% Bahl, 1994 and Dhoke 2001.

Pleuroturs florida prefers different agro wastes for its cultivation. The present investigation was planned with the objective to study the effect of different agro-wastes on harvesting and yield of basidiocarp of *P. florida.*

Influence of certain treated wheat straw on basidiocarp of *P.Sajor-Caju*

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Oyster mushroom are botanically the species of *Pleurotus* which grow naturally in the temperate or tropical forests on dead and decaying wooden logs or sometimes on outer bark of living trees. The fruiting body of this mushroom are

distinctly Shelly or oyster shaped white cream, grey, yellow, pink or light brown depending upon the species. Wheat straw is most common substrate of wheat straw are essential for proper impregnation of the substrate by the spawn for obtaining maximum growth of basidiocarp.

Plant Growth Promoting Rhizobacteria (PGPR): A Biological tools for control of Early Blight Disease of Tomato

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The Plant Growth Promoting Rhizobacteria (PGPR), *Pseudomonas fluorescens* (*Pf*) were practical for growth promotion and the Induction of Systemic Resistance (ISR) against "Early Blight Disease of Tomato''. An apparent increase was observed in plants in reference to shoot and root length treated with *P. fluorescens*. However, the root development was reduced by a combination of *P. fluorescens* and *Alternaria alternata* (*A. alternata*). *Pseudomonas fluorescens* isolates systemically induced resistance against early blight of tomato caused by *A. alternata* and reduced the disease significantly. All the isolates of *P. fluorescens* produced salicylic acid (SA) in King's B (KB) broth and induced its accumulation in tomato leaf within 24 h of bacterial inoculation. SA levels were significantly increased in plants treated with bacteria compared to the split control from one to five days following inoculation. Endogenous SA accumulation in plant tissue is considered to be involved in induced systemic resistance to early blight disease of tomato caused by *A. alternata*. PR- Proteins and defense enzymes bioassay showed the relevant of study.

Key Words: ISR, SA, Tomato, PGPR, *Pseudomonas fluorescence*

Extracellular enzyme activities in riverbed sediment as indicator of pollution status in the Ganga River

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We studied the activities of four extracellular enzymes in the riverbed sediment along a 518 km long stretch of the Ganga River. The objectives were to test, if the extracellular enzyme activities (EEA)can be used to assess health status of the river; and where the heavy metals accumulated in the riverbed sediment inhibit enzyme activities. To validate data comparison, we selected a least polluted site Dev Prayag, situated 624 km upstream to the main study stretch. Despite increase in EEA along the study gradient, between-site differences were in concordance with the levels of carbon, nitrogen and phosphorus in the sediment. Alkaline phosphatase showed negative correlation with P. However, fluorescein diacetate hydrolysis (FDAase), β-glucosidase (Glu) and protease were positively correlated with C, N and P. Ecological risk index (E_R^i) varied with site although EEA were found negatively correlated with heavy metals. The study forms the first report linking microbial enzyme activities to heavy metal accumulation in the riverbed sediment of the Ganga River. Our study suggests that EEA in the riverbed sediment can be used as an indicator of C, N and P accumulation,provided that the heavy metal concentrations have not exceeded the toxicological limits. The study has relevance from biomonitoring as well as from ecotoxicological perspectives.

Keywords: Ecological indicator;Ecological risk index; Extracellular enzyme activity; Ganga River; Heavy metal

Tree leaves as organic amendment in soil for sustainable crop productivity

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In this study chopped leaves of three N rich tropical tree species, *Dalbergia sissoo* (*D. sissoo*), *Cassia fistula* (*C. fistula*) and *Azadirachta indica* (*A .indica*) alone and in combination with low quality wheat straw (WS) and chemical fertilizer were incorporated in soil to evaluate its effects on wheat total biological productivity (including grain yield) under dryland conditions. *D. sissoo, C. fistula* and *A. indica* leaves have low lignin+polyphenol/N ratio (LIG+PPL/N, 4.5-12.4) compared to combined treatments. The N rich species leaf treatment, TNP was 68-161% greater than control whereas in combination and fertilizer treatments this increase was 23-48% and 14%, respectively. Among all treatments, after chemical fertilizer treatment, application of *D. sissoo, C. fistula* and *A. indica* tree leaf alone showed substantially higher productivity than others. Thus, for immediate effects on soil fertility and total increase in plant biomass including grain yield, application of N rich tree leaves may however be a viable management option.

Key words : *Dalbergia sissoo*; *Cassia fistula; Azadirachta indica; S*ustainability; productivity.

Antibacterial Potential of Algal Weed *Pithophora oedogonia* (Mont.) Wittrock

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In India, traditional medicine plays an important role in the primary health care. Most of the botanical remedies used as medicines are obtained from the

terrestrial habitats, but the lower aquatic flora are also rich source of structurally novel and biologically active metabolites (secondary/primary) that creates great attention to the pharmaceutical industry as a source of antimicrobial drugs. The first investigation on the antibiotic activity of an alga was carried out by Pratt *et al.* (1944). Amongst several such algae, *Pithophora oedogonia,* a green filamentous nuisance aquatic algal weed, which forms a cottony matt in the water bodies, is also now known for its bioactivity. The methanolic extract of *P. oedogonia* found to exhibit strong activity against gram positive as well as gram negative bacteria. Phycochemical screening of the extract of filamentous green alga *Pithophora* indicated the presence of secondary metabolites, such as phenolic compounds, terpenoids, tannins and alkaloids in the eluted fraction of methanolic extract, which resulted into excellent zone of inhibition in contrast to those of standard antibiotics. Through the application of biotechnological technique particularly methods for culturing these alga, should provide new means for the commercial processing of even some rare chemicals they produce. By the application of new technology and results of this study reveal fruitful utilization of *P. oedogonia* causing great nuisance in the municipal water supply and recreational reservoirs.

Morpho-Taxonomic Screening on Seedlings of Some Common Monocots from Varanasi District

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Present study incorporates the morphological features of 50 monocot seedlings of the families Commelinaceae, Cyperaceae and Poaceae from Varanasi district, Uttar Pradesh, India. Morphological attributes of monocot seedlings which are recorded significant from morpho-taxonomic view point are shape and size of scutelum, coleoptile and eophylls, presence/absence of Lemma, palea and ligule. Visual observations and comparative study with the help of taxonomy key, amplified morphology and photographs demonstrates that the seedling morphology of the reported taxa of monocots are taxonomically significant and can be exploited for taxonomic delimitations.

Key Words: Morphology, Seedling

Validation of Genes/ QTL for Sheath Blight and Bacterial Leaf Blight

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The twenty nine rice genotypes were screened for the presence of 8 major rice sheath blight resistance genes, viz., qSBR 7-1, qSBR 9-1, qSBR 8-1, qSBR 1-1, qSBR 11-2, qSBR 11-1, qSBR 11-3 and qSBR 3-1, and these were determined by visualization of amplicons on (near) 158, 146, 138, 162, 129, 133, 183 and 144 bp of positive fragments, respectively. The genotype Tetep was used as gene differential lines for all the 8 sheath blight resistance genes. For sheath blight resistance genes, the resistance genotypes showed similar banding pattern as to check genotype Tetep. The results of genotypic screening for sheath blight resistance genes are presented in Table 3, and electrophoretic patterns of SSR markers RM 336 and RM 257 for sheath blight resistance gene qSBR 7-1 and qSBR 9-1, respectively are shown in Fig. 2. The 55 genotypes contained at least 1 and the maximum 8 positive bands of the 8 rice sheath blight resistant markers. The genetic frequency of the 8 major sheath blight resistance genes ranged from 26.67 to 56.67%. The SSR marker RM 336, linked to sheath blight resistance gene qSBR 7-1, revealed the presence of 158 bp fragment specific to qSBR 7-1 mediated sheath blight in the differential line Tetep. The sheath blight resistance gene qSBR 7-1, which has been mapped on chromosome 7, was found to be the most prevalent in 56.67% genotypes, followed by qSBR 9-1, qSBR 8-1, qSBR 1-1, qSBR 11-2, qSBR 11-1, qSBR 11-3 and qSBR 3-1 in 48.33, 45.00, 41.67, 36.67, 31.67, 31.67 and 26.67% genotypes, respectively. These results are in conformity with the earlier report25, wherein 35 inbred and 13 hybrid varieties showed moderate susceptibility to sheath blight. Genotype CR- 3488- 1-2-1-2 harbored all the 8 sheath blight resistance genes, followed by LC-22 and IC 256649 had 7 sheath blight resistance genes. Thus, these rice genotypes may offer a potential source of genes for improving sheath blight resistance in the rice gene pool worldwide, because only

limited resistance to sheath blight has been identified in the cultivated rice genotypes. These results also showed that the analysis of the distribution of resistance genes in ancient populations of rice cultivars can direct the sheath blight resistance breeding program and rice sheath blight control by genetic diversity.

Information Seeking Behaviour of Life Science Professionals

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Scholarly communication is the essence of all scientific work. With the emergence of digital information resources and internet, the modes of accessing, searching, retrieving and consuming scholarly information have been rapidly changed. This scenario is effectively transforming science into e-science. Information seeking behaviour is an essential component in the designing and developing of need for meeting the information requirements of users. The undertaken study is an output of work in which a comprehensive review research scanned in the field of life sciences. The study covers various facets related to information seeking behaviour of life sciences professionals, findings and their conceptual meanings. The findings of the studies are organised into various categories i.e., theories of information seeking; information needs; users characteristics; information browsing; information seeking; and information seeking behaviour The major developments in scientists' world are: globalization, exponential growth of S&T literature, increasing tendency of team research (multidisciplinary & interdisciplinary), collaboration at local, national and international level, and rapid disseminations of research results through sophisticated technologies. The literature reports that science academicians of higher education are heavy users of e-scholarly communication besides traditional sources. All over the world library subscription, online subscribed and unsubscribed sources are playing an important role in meeting their scholarly needs at local, national and international level. Life scientists were found the biggest users and online repositories featured strongly in the ranked lists of life sciences .The scientists have high expectation for being able to access all the information they need in the online format. The networked

academic environment demands that S&T teachers and researchers to make effective use of the available resources for competitive teaching and research. At the same time, for library and information science professionals it is vital to probe into the pattern and practices of life sciences professionals regarding seeking and using the digital resources at their disposal.

A Review of What is an Emerging Contaminant

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Emerging contaminants have now become a fashionable and trendy research venue. Emerging contaminants (ECs) are mainly substances that many of them are unregulated or inadequately regulated and has raised the public attention to their presence in the environment used by different kinds of aspect, for instance, industrial and domestic. This begins with global lead contamination from the Romans two millennia ago, moves on to arsenic-based and DDT issues and more recently to nanomaterials, pesticides, pharmaceuticals, industrial compounds, personal care products, fragrances, water treatment by-products, flame retardants and surfactants, as well as caffeine and nicotine. The presence of these substances has become an issue of great concern within the scientific community during the last few years. Increasing contamination of aquatic systems by ECs is a major problem for aquatic life, as well as for human health, as they are highly mobile and often of toxicological concern. The large number of emerging contaminants poses a challenge for regulatory agencies. How to prioritize research about emerging contaminants? How to prioritize the definition of quality criteria or norms for all of these new substances for which we generally have only sparse knowledge on their behavior in the environment or on their toxic effects on human health or the environment? For this reason, the availability of sensitive, accurate and reliable

analytical techniques is essential in order to assess their occurrence, removal and fate in the environment.

Comparative study of Integrated Nutrient Management of Okra *(Abelmoschus esculentus* (L.) Moench cultivars Kashi Mohini (VRO-3) and Arka Anamika

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The experiment was carried at Udai Pratap Autonomous College, Varanasi under Horticulture field experiment during the summer season in 2015.The treatment comprised of different sources of nutrients (organic and inorganic sources) *i.e. Azotobacter,* Phosphate Solubilizing Bacteria and recommended dose of NPK alone or combination with biofertilizres and macro-nutrients. The experiment contained seven treatment including (T_0) i.e. control. The details of treatment are as follows :To: Control, T_1:*Azotobacter* (@ 5 kg ha^{-1}), T_2 : PSB (@ 7.5 kg ha^{-1}), T_3 : NPK (@ 100:50:50 kg ha^{-1}), T_4: NPK (@ 100:50:50 kg ha^{-1}) + *Azotobacter* (@ 5 kg ha^{-1}), T_5 : NPK (@ 100:50:50 kg ha^{-1}) + PSB (@ 7.5 kg ha^{-1}), T_6: NPK (@ 100:50:50 kg ha^{-1}) + *Azotobacter* (@ 5 kg ha^{-1}) + PSB (@ 7.5 kg ha^{-1}). The experiments were laid out in the Randomized Block Design with three replication. The growth parameters like Plant height (cm), No. of leaves per plant, No. of fruit per plant, No. of nodes per plant, Length of fruit (cm), Internodal distance (cm), Diameter of fruit (cm) was highest in the treatment T_5 and T_6 in Kashi Mohini (VRO-3) than Arka Anamika. The best treatmet was recorded in to Kashi Mohini (VRO-3) as compared to Arka Anamika. In Okra cultivars Kashi Mohini (VRO-3) and Arka Anamika the best quality parameters was Total Soluble Solid (^{0}Brix) at maturity stage and Vitamin –C (mg/100g) at after harvesting were highest in the treatment T_3, T_4 and T_6 .Hence, the treatment T_4, T_5 and T_6 in Kashi Mohini (VRO-3) were significantly superior than Arka Anamika in growth parameters. Since both the cultivars Kashi Mohini (VRO-3) and Arka Anamika are greatly affected by the application of source of nutrients and produces fruit yield about at par therefore, in

both the cultivars by the effect of the Integrated Nutrient Management the production can be increased as compared to the application of chemical fertilizers.

Physiological, Biochemical and Molecular Basis of Heat Stress Tolerance in plant : Role of Salicylic acid

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Environmental stresses are among the most challenging threats to agricultural system and economic yield of crop plants. These stresses induce numerous adverse effects in plants, impair biochemical/physiological and molecular processes, and eventually cause severe reductions in plant growth, development and overall productivity. High temperature (HT) stress is a major environmental stress that limits plant growth, metabolism, and productivity worldwide. Plant growth and development involve numerous biochemical reactions that are sensitive to temperature. Rising in temperature is now a big concern for crop production and approaches for sustaining high yields of crop plants under HT stress are important agricultural goals. Plant survival under HT stress depends on the ability to perceive the HT stimulus, generate and transmit the signal, and initiate appropriate physiological and biochemical changes. Plants possess a number of adaptive, avoidance, or acclimation mechanisms to cope with HT situations. Phytohormones have been recognized as a strong tool for sustainably alleviating adverse effects of abiotic stresses in crop plants. In particular, the significance of salicylic acid (SA) has been increasingly recognized in improved plant temperature stress-tolerance via SA-mediated control of major plant-metabolic processes. SA is involved in the regulation of important plant physiological processes such as photosynthesis, nitrogen metabolism, proline (Pro) metabolism, production of glycinebetaine (GB), antioxidant defense system, and plant-water relations under stress conditions and thereby provides protection in plants against these stresses. Exogenously sourced SA to stress plants either through seed socking, adding to the nutrient solutions, irrigating, or spraying was reported to induce major abiotic stress Tolerance mechanisms.

Photosynthetic and yield responses of two wheat cultivars under present and projected levels of tropospheric ozone

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Tropospheric ozone (O_3) is the most phytotoxic air pollutant and is also considered as an important component of global climate change. A study was undertaken to assess the responses of wheat cultivars to elevated O_3 using open-top chambers. Two wheat cultivars (HUW234 and HD3118) were grown in ambient (51.7 ppb) and elevated levels of O_3 (ambient+20 ppb). Gas exchange parameters (photosynthetic rate: *Pn*, stomatal conductance: gs), chlorophyll fluorescence (Fv/Fm) and photosynthetic pigments in the flag leaf at 60 days after germination (DAG) were measured. Upon harvesting, yield attributes were also measured. Elevated O_3 depressed *Pn* and gs significantly in both the cultivars. Reductions of 20.8 and 14.2 % in *Pn* were observed in HUW234 and HD3118, respectively. Reduction in gs was more in old cultivar (HUW234) than new (HD3118). Elevated O_3 depressed the variable fluorescence (Fv/Fm) more in HUW234 compared to HD3118. Total chlorophyll reduced by 12.6 and 6.1% in HUW234 and HD3118, respectively, however, an inverse trend was observed for carotenoids at elevated O_3. Variations in the magnitude of response exhibited in physiological characteristics under elevated O_3. Reduction in weight of grains per plants was more in HUW234 (22.2%) compared to HD 3118 (23.9 %) under elevated O_3. However, no significant difference was observed in harvest index, though more reduction in test weight was observed in HUW234 (13.5%) than HD3118 (4.8%). The study suggests that tropospheric O_3 would be a threat for wheat production in future due to its negative influences on physiological characteristics leading to yield reductions. The recently released wheat cultivar though performed better in terms of physiological and growth characteristics, but could not maintain the same for yield loss under elevated O_3.

Key words: Ozone; Photosynthesis; Stomatal conductance; *Tritium aestivum* L.; Chlorophyll

Climate Change and Human Health

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As a human-generated and worldwide process, global climate change is a qualitatively distinct and very significant addition to the spectrum of environmental health hazards encountered by humankind. Historically, environmental health concerns have focused on toxicological or microbiological risks to health from local exposures. However, the scale of environmental health problems is increasing day by day and various larger-scale environmental hazards to human population health have begun to appear. Appreciation of this scale and type of influence on human health entails an *ecological* perspective. This perspective recognizes that the foundations of long term good health in populations reside in the continued stability and functioning of the biosphere's life-supporting ecological and physical systems. The wide range around the projection reflects uncertainties about aspects of the climate system and future human economic activity and technology choices. World temperature has increased by around 0.4 °C since the 1970s and now exceeds the upper limit of natural (historical) variability. Climate is one of several factors that can influence the spread of infectious diseases. Human activities and behaviors also are critical determinants of disease transmission. Socio demographic factors include (but are not limited to): increasing trends in travel, trade, and migration; erratic disease control efforts; emerging drug or pesticide resistance; and inadequate nutrition. Environmental influence include: changes in land-use, such as the clearing of forested land, agricultural development and water projects, urban sprawl; as well as ecological influences. Climate change will likely modify the relationships between pathogens and hosts directly by: altering the timing of pathogen development and life histories; changing seasonal patterns of pathogen survival; changing hosts' susceptibility to pathogens. However, ecosystem processes can influence human infectious diseases indirectly.

Impacts of soil and water pollution on food safety and health risks in India

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Environmental pollution and food safety are two of the most important issues of our time. Soil and water pollution, in particular, have historically impacted on food safety which represents an important threat to human health. Nowhere has that situation been more complex and challenging than in India, where a combination of pollution and an increasing food safety risk have affected a large part of the population. Water scarcity, pesticide over-application, and chemical pollutants are considered to be the most important factors impacting on food safety in India. Inadequate quantity and quality of surface water resources in India have led to the long-term use of waste-water irrigation to fulfill the water requirements for agricultural production. In some regions this has caused serious agricultural land and food pollution, especially for heavy metals. It is important, therefore, that issues threatening food safety such as combined pesticide residues and heavy metal pollution are addressed to reduce risks to human health. The increasing negative effects on food safety from water and soil pollution have put more people at risk of carcinogenic diseases, potentially contributing to 'cancer villages' which appear to correlate strongly with the main food producing areas. Currently in India, food safety policies are not integrated with soil and water pollution management policies.

Synthesis and antimicrobial activity of fused Indino - Thiazines heterocycles

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Many heterocyclic compounds containing nitrogen and sulphur in their structure, a strong feature to show biological activity in the presence of either (S/O) linkage.

Keeping these observation in mind it was planned to synthesize molecule which contain biolabile residue in their structure in addition to other structural feature responsible for biocidal performance.

4-(4-Substitutedphenyl)-2-imino-1,2dihidroindino-[1,2-d]-thiazin-5-(4H)-ones was synthesized by refluxing a mixture of 2- (methoxybenzylideno)- indinane-1,3dione, thiourea and KOH in methanol for four hours. The reaction mixture was cooled and poured in water the resulting solid mass was filtered, washed with water and recrystallized from aq. ethanol . The final compounds were characterized by spectral studies and evaluated for their antimicrobial activities.

Mutation Breeding: A Prospect for Crop Improvement

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Mutation breeding has become increasingly popular in recent times as an effective tool for crop improvement and an efficient means of supplementing existing germplasm for cultivar improvement in breeding programs. It is also believed that mutation breeding can be used to generate mutant plants with a determinate growth habit without loosing beneficial adaptations and other agronomic traits in the base population. The prime strategy in mutation-based breeding has been to upgrade the well-adapted plant varieties by altering one or two major traits. These include characters such as plant height, maturity, seed shattering and disease resistance, which contributes to increased yield and quality traits, e.g. modified secondary metabolite profile and content. However, in many cases, the changed traits have a synergistic effect on the cultivation of the crop, agronomic inputs, crop rotation and utilization. Moreover, mutant varieties are not restricted by the international Genetically Modified Organism (GMO) regulations, which make them more acceptable to consumers.

Keywords: Mutation, crop improvement, plant traits.

Phenotypic expression of ammonia-excreting mutants of *Anabaena* sp. under nitrogen limitation

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Anabaena sp. strain PCC 7120 is filamentous diazotrophic cyanobacterium capable of oxygenic (plant-like) photosynthesis. When deprived of fixed N_2, a small percentage of the vegetative cells of *Anabaena* sp. differentiates into N_2-fixing heterocysts at semi-regular intervals along the filaments, which permit aerobic fixation of dinitrogen by nitrogenase. Excretion of N_2- fixed ammonia is generally observed when its assimilation is blocked by treatment of cells with MSX, an inhibitor of glutamine synthetase activity. In addition, periodic addition of MSX to cultures is required for ammonia to be released continuously. The other alternative approach for obtaining ammonia-excreting mutants is to isolate and select mutants with reduced GS activity for ammonia excretion, but with a basal activity to sustain metabolism. We have isolated several GS-defective mutants of *Anabaena* 7120 that are partially defective in glutamine synthetase activities and capable of extracellular liberation of ammonia into the culture medium. Mutants showed about 60% less GS activity in N_2-grown aerobic cultures than the wild-type strain and were resistant to the glutamate analogue L-methionine-DL-sulphoximine (MSX). These mutants had the capacity to excrete N_2-fixed ammonia continuously into the culture medium and showed an enhanced level of aerobic nitrogenase activity. The intracellular ammonium pool generated in N_2-grown cells of mutants was found to be less than that of the wild-type strain. Similarly, ammonium uptake by these mutants was 50% less in mutants compared to the wild-type, suggesting a possible role of GS in controlling this function.

Key words: Ammonia excretion, glutamine synthetase activity, GS-defective mutants, N_2-fixing cyanobacterium.

Assessment of ROS scavenging activities in leaves of *Curcuma caesia* Roxb. against supplemental ultraviolet-B radiation

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Abiotic stresses significantly affect the growth, physiology, and biochemistry of plants. Depletion of ozone (O_3) layer increases ultraviolet-B radiation reaching to the earth surface. This increase of UV-B radiation affects plant's life both positively and negatively. Based on the above facts it is important to identify and assess plant responses against UV-B radiation. *Curcuma caesia* is commonly known as kali haldi and used in the traditional system of medicine. Leaves and dried rhizomes of *C. caesia* Roxb. are used in treating leucoderma, diabetes, asthma, tumors, piles, bronchitis, bruises etc. Several diseases generated due to generation of free radicals and reactive oxygen species and as we know that medicinal plants are good source of natural antioxidants, they are used to treat diseases throughout the world. The effects of supplemental ultraviolet-B (s-UV-B; 3.6 kJ m-2 day-1 above ambient) radiation on free radical scavenging activities of *C. caesia* at 40 and 70 days after treatment (DAT) under field conditions were investigated. The methanolic extracts of leaves were examined for their DPPH radical, superoxide radical, hydrogen peroxide scavenging activities, ferric reducing power (FRP) and ferrous ion chelating (FIC) activity. The result of this study showed an increase in DPPH and H_2O_2 scavenging activities while reduction in superoxide scavenging activity at both the stages. FRP and FIC ability of *C. caesia* showed variable changes with time. At 40 DAT, increase in the FRP and FIC actiities were observed while at 70 DAT reductions were observed. Hence, it was observed that most of radical scavenging activities were increased at 40 DAT compared to 70 DAT in leaves of *C. caesia*.

Keywords: Supplemental UV-B (sUV-B), radical scavenging activity.

Stevia rebaudiana (madhupatra): A bio-sweetener

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Studies revealed that Stevia has been used throughout the world since ancient times for various purposes; for example, as a sweetener and a medicine. As we know that the leaves of Stevia plants have functional and sensory properties superior to those of many other high-potency sweeteners, Stevia is likely to become a major source of high-potency sweetener for the growing natural food market in the future. Although Stevia can be helpful to anyone, there are certain groups who are more likely to benefit from its remarkable sweetening potential. These include diabetic patients, those interested in decreasing caloric intake, and children. Stevia is a small perennial shrub (2n=22) that has been used for centuries as a bio-sweetener and for other medicinal uses such as to lower blood sugar. Its white crystalline compound (stevioside) is the high potency natural herbal sweetener which is heat-stable, pH-stable, not fermentable, non-nutritive, non-toxic and no calories and 100−300 times sweeter than table sugar. In addition to its sweetening property, it has medicinal plant and the pollination behavior is entomophilous. The WHO's Joint Experts Committee on Food Additives has approved, based on long-term studies, an acceptable daily intake (ADI) of steviol glycoside of up to 4 mg/kg of body.

Keywords : Stevia leaves, rebaudioside, stevioside, , medicinal use, acceptable daily intake.

Responses of *Eclipta alba* var. *prostrata* against elevated UV-B at two developmental stages

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Medicinal application of plants is nowadays receiving a greater consideration, but changing climatic conditions, anthropological activities and over exploitation of plants cause excessive degradation and pressure on these plants, leading to habitat destruction, phyto-chemical constituent alterations and degradation of vital compounds. Depletion of ozone layer causes the increased penetration of UV-B which is reported as a severe abiotic stress for various plants. To evaluate the effects of

elevated UV-B on medicinal plants, an experimental study was conducted using *Eclipta alba* var *prostrate* as test plant at two developmental stages to evaluate their physiological, biochemical and morphological changes. Photosynthetic pigments showed significant reductions under elevated UV-B at reproductive stage compared to pre-reproductive stage. Total phenolic contents showed a positive response at both the stages under elevated UV-B. An interesting pattern of increase in anthocyanin accumulation was observed with advancement in growth phases, but opposite trend was observed for membrane damage (lipid peroxidation). Physiologically, plant showed reduction in photosynthetic rate and internal CO_2 levels under UV-B stress. All the morphological parameters showed positive response against UV-B exposure with growth stages. So, it can be concluded that developmental stage sensitivity varied against elevated UV-B with plant species and might be responsible for counteract the imposed stress.

Keywords: *Eclipta alba* var *prostrata*; UV-B; ozone layer depletion; phytochemical constituents; morphological; physiological; biochemical parameters.

Waving towards future food; selenium fortified broccoli for reduced health risk

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Micronutrient deficiencyis one of the bottleneck affecting both industrial as well as developing countries. To ensure food security and sustainable growth, bio-fortification proved to be an effective strategy to nullify micronutrient malnutrition. Selenium is one of the micronutrient with profound health benefits. It is an essential nutrient for humans and animals to form selenoproteins such as glutathione peroxidase (GPx) and thioredoxin. These Selenoproteins play critical roles in reproduction, thyroid hormone metabolism, DNA synthesis, and protection from oxidative damage and infection. Epidemiological studies have suggested dietary

intake of selenium can minimise risk of colorectal, prostate, lung, bladder, skin, esophageal, and gastric cancers. Broccoli (*Brassica oleracea*) is a cruciferous vegetable rich in noteworthy nutrients *viz.*,vitamin C, vitamin A (mostly as beta-carotene), folic acid, calcium, fibers and precursor of anticancer compound, glucoraphane. Although there is reciprocal relationship between accumulation of Se and glucosinolates in mature Brassica plants, Se supply generally did not affect glucosinolate accumulation in Brassica sprouts. Thus, Brassica vegetable sprouts can be biofortified with Se for the accumulation of SeMSCys (Selenium-Methylselenocysteine) without negative effects on chemo-preventive glucosinolate contents. Various strategies have been incorporated for production of biofortified broccoli sprouts from conventional to molecular advances. The inoculation of soil with specific microbes might be beneficial for enhancing Se biofortification strategy for crops. Either foliar or soil application of Se fertilizer is a popular practical way for producing Se-enriched foods. The transgenic technology in combination with functional genomics is gaining importance in production of Se fortified broccoli sprouts. Understanding the regulation and expression of genes involved in Se homeostasis will benefit the development of variants with enhanced Se utilization to improve broccoli output and quality.

Keywords: Bio-fortification, Chemo-preventive, Homeostasis, Malnutrition, SeMSCys

Application of *Phanerochate chrysosporium* for bioremediation of Acid Yellow-9

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Azo and reactive dyes constitute the largest class of dyes used commercially in textile industries for dying nylon, polyacrylonitrile modified nylon, wool, silk, cotton,

etc. Dyes are recalcitrant molecules difficult to be degraded biologically. Basidomycetous fungi, *Ganoderma lucidum* and *Phanerochate chrysosporium* have been found very effective in bioremediation of the textile effluents . In this study we use *Phanerochate chrysosporium* was obtained from National Chemical Laboratory, Pune India that was adapted to grown in broth supplemented with of Acid Yellow-9 for adaptation against the dye. These break down compounds were non-toxic in nature. Thus *Phanerochate chrysosporium* can be used for bioremediation of the textile effluents containing of Acid Yellow-9.

Biodiversity of Cyanobacteria in Paddy Soil of Varanasi

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Cyanobacteria (Blue-green algae) possess an autotrophic mode of nutrition like higher plant cells, metabolic systems like bacteria and occupy a unique position in living world. They possess chlorophyll 'a' and are Gram negative carry out oxygenic photosynthesis. They exhibit a great morphological diversity and their broad spectrum of physiological properties reflects their widespread distribution and tolerance to environmental stress. The paddy field ecosystem provides a favorable environment for the growth of cyanobacteria with respect to their requirement for light, water, temperature and nutrient availability. The cyanobacterial strains were isolated and identified upto species level from different experimental sites. The study recorded non-heterocystous BGA belong to family Oscillatoriaceae of order Nostocales. *Lyngbya* was represented by species *L. laxespiralis, L. lagerheimii, L. major* and *L. truncicola, Oscillatoria* was represented by species *viz., O. sancta, O. subbrevis, O. princeps* and *O. acuta*; *Spirulina* was represented by *S. subsalsa*; while *Phormidium* was represented by *P. truncicola, P. ambiguum* and *P. oryzetorum.*

Species belonging to seven genera of heterocystous forms were belonging to family Nostocaceae, Scytonemataceae, Stigonemataceae and Rivulariaceae. Family Nostocaceae was represented by genera *Cylindrospermum, Nostoc* and *Anabaena. Cylindrospermum* was represented by species *C. stagnale* and *C. muscicola*; *Nostoc*

was represented by species *viz., N. calcicola, N. muscorum,* and *N. commune*; *Anabaena* was represented by species *viz., A. oryzae, A. doliolum* and *A. variabilis.* Family Scytonemataceae was represented by 1 genera *Scytonema. viz., S. coactile, S. bohneri,* and *S. hofmanni*. Family Stigonemataceae represents 1 genera *Hapalosiphon. Hapalosiphon* represented by species *Hapalosiphon fontinalis* and *Hapalosiphon welwitschii.* Family Rivulariaceae comprises 2 genera *Calothrix* and *Gloeotrichia. Calothrix* represented by *C. castellii* and *C. marchica* and *Gloeotrichia* represented by species *Gloeotrichia ghosei* and *Gloeotrichia natans.* These algal forms showed variations in their occurrence and distribution during kharif seasons. Maximum biodiversity of the BGA forms was recorded in the middle of cultivation cycle. We concluded that cyanobacteria added nitrogen in paddy fields as a natural biofertilizer and increase the crop productivity. After their death and decomposition they added organic matter to soil and thus improve soil properties and soil fertility.

Effect of organic manures on growth and yield of Cauliflower cv. Snowball-16

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Field experiment was conducted during Rabi season 2014-15 at the experimental farm of the U.P. College, Varanasi, UP (India) on growth and yield of cauliflower cultivar Snowball-16, the experiment consisted in 3 replication and 9 different combinations of organic manures. Investigate the response of different sources (FYM, Vermicompost, Poultry manure and Dhaincha) on growth and yield attributing characters in Cauliflower (*Brassica oleracea var. botrytis* L.) cv. Snowball-16. The results revealed that application of Poultry manure (100%) @ 20 t/ha showed the significant superiority in plant height (48.7 cm at 60 days), no. of leaves/plant (18.8 at 60 days), spread of plant (53.5 cm at 60 days), application of FYM (50%) + Poultry manure (50%) showed the significant superiority in giving the

minimum no. of days taken the curd initiation as 35.7 and no. of days taken curd maturity as 59.2. The maximum value for diameter of curd (16.9 cm), weight of curd (552.0 gm), volume of curd (682.0 ml), and yield (245.4 q/ha) was noted with the application of FYM (50%) + Vermicompost (25%) + poultry manure (25%).

Key words: FYM, Vermicompost, Poultry manure and Dhaincha and Cauliflower.

Potential of Plantation for Rehabilitation of Degraded Lands and Role in Soil Carbon Sequestration

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Land use change, in dry tropics, has major implications for global carbon cycle as it results not only in alteration of soil carbon stock but also green house gas emissions from soil. One of the effective mechanisms for mitigation of loss of carbon from the soil is **soil carbon sequestration**. Restoration/rehabilitation of degraded ecosystems, the results of land use change, is one of major global concern and poses great challenge especially in dry tropics. Potential of plantations as rehabilitation strategy in degraded ecosystems has been advocated, however its impact on carbon dynamics in dry tropics is least studied. The broad objective of the present study was to evaluate the changes in soil organic carbon (SOC) dynamics in response to various land use patterns involving natural forest, degraded forest, agroecosystem and *Jatropha curcas* plantation in dry tropics. Level of SOC was highest in natural forest which was followed in decreasing order by *Jatropha* plantation, degraded forest and lowest in agroecosystem. Conversion of natural forest to degraded forest resulted in 55% loss of SOC. Cultivation of degraded forest resulted in further loss of SOC by 33% whereas plantation of *Jatropha* on degraded land enhanced the level of SOC by 50% i.e. loss of SOC from natural forest to agroecosystem was 70% and that of *Jatropha* plantation was only 9%. On the basis of this study it may be concluded that *Jatropha* plantation has large potential of carbon sequestration in the soil and could be recommended for rehabilitation strategies of degraded lands in dry tropics.

Key words: Land use change, Soil organic carbon, Plantation, Agroecosystems, Rehabilitation

Identification of D of transcription factor gene family in bitter gourd and phylogenetic analysis of candidate genes with cucumber and Arabidopsis

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Bitter gourd (syn. bitter melon, *Momordicacharantia* L.), an economically important member of the genus *Momordica* (Family: Cucurbitaceae) is widely cultivated in India, and it is highly used plant in traditional medicinesystem. TheDOF transcription factors were studied in bitter gourd involved with multiple roles. In this study, total 25 putative Dof genes have been predicted *in silico*in gynoeciousline and 27 putative Dof genes in monoecious linefrom the available bitter guard transcriptomes (Gy323TSA Accession: GANF00000000; DRAR1 TSA Accession: GANG00000000). The comparative phylogenetic analysis of identifiedMcDof proteins (52) along with CsDof(38) and CmDof(35) proteins revealed three major groups. Motif analysis revealed the presence of conserved 50–52 amino acids.

Keywards: Bitter gourd, Gynoecium, Monoecious, Transcriptome sequencing, Dof transcription factor

Spatio-temporal Variations in Water Quality of River Varuna-A Major Tributary of the River Ganga, India

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This study reports the spatio-temporal changes in water quality of River Varuna, a major tributary of the River Ganga, India. River water samples were collected at ten sampling sites on seasonal basis from January 2016 to December 2017 and were analyzed for 16 water quality parameters. Most significant parameters which contributed in spatiotemporal variations were assessed by statistical techniques such as Hierarchical Agglomerative Cluster Analysis (HACA), Factor Analysis/Principal and Components Analysis (FA/PCA). HACA identified three different classes of sites: Relatively Unimpaired, Impaired and Less Impaired Regions on the basis of similarity among different physicochemical characteristics and pollutant level between the sampling sites. FA/PCA identified six significant factors (sources) which were responsible for major variations in water quality dataset of River Varuna. The results signify that parameters identified by statistical analyses were responsible for water quality change and suggest the possibility of industrial, municipal and agricultural runoff. The results suggest dire need for proper management measures to restore the water quality of this tributary for a healthy and promising aquatic ecosystem and also highlights its importance for objective ecological policy and decision making process.

Keywords: River Varuna, Statistical analysis. Surface water pollution, Urban sewage

Water Quality in the Lower River Varuna Basin, Varanasi: The Impacts of Land Use/Land Cover in Riparian Buffer Zone

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Vegetated riparian zones adjacent to rivers and streams, can greatly mitigate nutrients, sediment from surface through deposition, absorption and denitrification, yet, human activities primarily land use practices have dramatically reduced the

capacity. In this study, 10 sampling sites were selected in the riverine network throughout the lower River Varuna basin. A total of 30 water Samples were collected during the time period of January 2017-December 2017 and analyzed for physico-chemical variables and major ions. Correlation analysis, principal components analysis and stepwise least squares multiple regression were used to determine the spatio-temporal variability of water quality variables and in particular their correlations with land use/land cover in the 100m riparian zone along the stream network. The basin in general has a better water quality in the post-monsoon season than the pre-monsoon season followed by monsoon season, indicated by the primary pollutants including DO, BOD, COD, Pb and Nitrate. Major ion compositions display large spatial and seasonal differences and are significantly related to land use and land cover in the riparian zone, while riparian landscape could not explain most of the water quality variability in T, pH, turbidity and COD. The research could provide help develop sustainable land use practice of the riparian zone for water conservation in the basin.

Keywords: Water quality, Riparian, Land use and land cover, River Varuna, Physico-chemicals

Environmental Pollution and its effects on Biodiversity

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Environmental pollution is "the **contamination** of the physical and biological components of the earth/atmosphere system to such an extent that normal **environmental processes** are adversely **affected**". Pollution occurs in all habitats land, sea, and fresh water and in the atmosphere. Environmental pollution consists of five basic types of pollution, namely, air, water, soil, noise and light. All the biological and physical components of the planet are related to each other, such that harm to any of these components has the tendency of triggering a domino effect on various other components. The end result is large-scale destruction. Biodiversity is

the delicate ecological balance within biological systems such as species and populations. Environmental pollution is causing a lot of **distress** not only to humans but also animals, driving many animal species to endangerment and even extinction. Evidence suggests environmental pollution disrupts and impoverishes ecosystems processes, and genetic and population diversity.

The effects of environmental pollutants on humans and other life forms on the planet have already started to surface, and they are only going to worsen with time. It is high time we acknowledge the fact that we are the ones who are responsible for this mess, and being the most intelligent species, the onus is on us to take the initiative to save our planet. The need of the hour is to get into a damage-control mode to save the environment. That, however, is only possible when we realize that the pollution of various biological and physical components of environment is affecting us and threatening our existence.

Antimicrobial Activities of Molybdenum Complexes

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A trace element, molybdenum is distributed widely in nature which plays an important role in animal nutrition and in our industrial society. Molybdenum is essentially present in the enzymes (like nitrogenase, nitrate reductase, aldehyde oxidase, xanthine oxidase and fermate dehydrogense) which are responsible for number of catalytic reactions of redox nature. Molybdenum complexes were synthesized by physico-chemical method like IR and NMR spectral studies. Antimicrobial activity of complex compounds against certain microbial species has been carried out by serial dilution method using biological oxygen demand (BOD) incubator to evaluate the minimum inhibitory concentration (MIC) value.

Climate Change and Impact on Human Health

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The impacts of climate change include warming temperatures, changes in precipitation, increases in the frequency or intensity of some extreme weather events, and rising sea levels. These impacts threaten our health by affecting the food we eat, the water we drink, the air we breathe, and the weather we experience.

The severity of these health risks will depend on the ability of public health and safety systems to address or prepare for these changing threats, as well as factors such as an individual's behavior, age, gender, and economic status. Impacts will vary based on a where a person lives, how sensitive they are to health threats, how much they are exposed to climate change impacts, and how well they and their community are able to adapt to change.

People in developing countries may be the most vulnerable to health risks globally, but climate change poses significant threats to health even in wealthy nations such as the United States. Certain populations, such as children, pregnant women, older adults, and people with low incomes, face increased risks.

Given that the impacts of climate change are projected to increase over the next century, certain existing health threats will intensify and new health threats may emerge. Connecting our understanding of how climate is changing with an understanding of how those changes may affect human health can inform decisions about mitigating (reducing) the amount of future climate change, suggest priorities for protecting public health, and help identify research needs.

A useful approach to understand how climate change affects health is to consider specific exposure pathways and how they can lead to human disease. The concept of exposure pathways is adapted from its use in chemical risk assessment, and in this context describes the main routes by which climate change affects health. Exposure pathways differ over time and in different locations, and climate change related exposures can affect different people and different communities to different degrees. While often assessed individually, exposure to multiple climate change threats can occur simultaneously, resulting in compounding or cascading health

impacts. Climate change threats may also accumulate over time, leading to longer-term changes in resilience and health.

Whether or not a person is exposed to a health threat or suffers illness or other adverse health outcomes from that exposure depends on a complex set of vulnerability factors. Vulnerability is the tendency or predisposition to be adversely affected by climate-related health effects, and encompasses three elements: exposure, sensitivity or susceptibility to harm, and the capacity to adapt or to cope .Because multiple disciplines use these terms differently and multiple definitions exist in the literature, the distinctions between them are not always clear. All three of these elements can change over time and are place- and system-specific.

Keywords: Climate change, Health risks, Exposure pathways, Human health

Climate Change And Impact of Human Health

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The influences of weather and climate on human health are significant and varied. They range from the clear threats of temperature extremes and severe storms to connections that may seem less obvious. For example, weather and climate affect the survival, distribution, and behavior of mosquitoes, ticks, and rodents that carry diseases. Climate and weather can also affect water and food quality in particular areas, with implications for human health. In addition, the effects of global climate change on mental health and well-being are integral parts of the overall climate-related human health impact.

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Climate Change: Impacts, Vulnerabilities and Adaptation In Developing Countries

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Developing countries are the most vulnerable to climate change impacts because they have fewer resources to adapt: socially, technologically and financially. Climate change is anticipated to have far reaching effects on the sustainable development of developing countries including their ability to attain the United Nations Millennium Development Goals by 2015 (UN 2007). Many developing countries' governments have given adaptation action a high, even urgent, priority.

These countries need international assistance to support adaptation in the context of national planning for sustainable development, more capacity-building and transfer of technology and funds. Systematic planning and capacity-building are also needed to reduce the risk of disasters and raise the resilience of communities to increasing extreme events such as droughts, floods and tropical cyclones. Funding for adaptation in developing countries must be sufficient and sustained. Least developed countries (LDCs) and small island developing States (SIDS) in particular need special consideration due to their extreme vulnerability.

Developing countries have very different individual circumstances and the specific impacts of climate change on a country depend on the climate it experiences as well as its geographical, social, cultural, economic and political situations. As a result, countries require a diversity of adaptation measures very much depending on individual circumstances. However there are cross cutting issues which apply across countries and regions. The same sectors are affected by climate change, albeit to differing degrees. These main sectors include: agriculture, water resources, human health, terrestrial ecosystems and biodiversity and coastal zones

Although knowledge of how best to do adaptation is still in its infancy, the Parties of the UNFCCC are increasing their support for action on adaptation. This includes the development of national adaptation programmes by some developing countries including least developed countries, and their integration into national strategies. Climate change solutions need to identify and exploit synergy, as well as seek to balance trade-offs, among the multiple objectives of sustainable development, disaster risk reduction and adaptation policies. Such initiatives also require new and sustained funding sources.

There are adaptation needs and responses of developing countries on climate change and how the work of the UNFCCC helps to catalyse more work on adaptation in these countries as well as plans and implement adaptation in the context of sustainable development .

Integration for adaptation into policy at all levels gives a way forward to give an indication of possible next steps for the UNFCCC, including within a future climate regime beyond 2012, in addressing adaptation options for the threats posed by climate change.

Human Ethics and Biodiversity

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The word ethics is science of morals. It is a branch of philosophy which is concerned with human character and conduct. It is a system of morals or rules of behaviour, which are shaped by family, society and education.

Biodiversity can be defined as variability among different living organism from one ecosystem to another or within one ecosystem. Thus we can say that the various diverse groups in flora and fauna is called biodiversity. Every organism contributes to balance the environment. Balance in ecosystem is maintain naturally, but this natural process has been interfered by human being according to their needs and interest, which disturb biodiversity.

It is well established that human interference in natural ecosystem without eco ethics led to generate biological chemical and psychological hazards. These lead to pollutions which have become lethal. Thus the future of human survival depends on human eco ethics.

Besides the efforts to control the pollution or to conserve the natural resources, the main effort should made through formal and informal education at all level to develop human eco ethics, which is base of all efforts to maintain biodiversity.

Effect of some seed- borne fungi on seed germination of *Pisum sativum* L.

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In India ,the crop pea is grown on field scale for its dry seed and on a smaller scale for green peas.The most important state cultivating pea on a field scale in India is Uttar Pradesh which includes about 83% of total area under this crop in the country (Anonymous,1969).In the present investigation, eighty seed samples of *Pisum sativum* were collected from vegetable market of different areas of Ghazipur district and stored for six months. The fungi were grown on Potato Dextrose Agar (PDA) medium by using blotter method. Forty (40) fungi of different genera were isolated .It was observed during the study that *Alternaria alternata, Aspergillus flavus, A.niger, Curvularia lunata, Fusarium moniliformae, F.solani, Helminthosporium* sp., *Penicillium sp.* caused 5.1% - 38% reduction in seed germination.

Key words: Storage fungi, Pea, PDA medium, Ghazipur district

Effect of Triacontanol on Biochemical Attributes and Yield of Safflower (*Carthamus-Tinctorius* L.)

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A lab experiment was conducted the effect of various consontrations (2,4,6,8 and 10 ppm) of C-30 long chain aliphatic alcohol (Miraculan), a component of epicuticular waxes of alpha-alpha (*Medicago sativa*; **Chibnall et al**., 1933). Miraculan, a Triacontanol is a active growth substance which at low consontrations increased chlorophyll, carotenoid, freshweight, dry weight, grouth and yield of oil yielding crop Safflower (Carthamus tinctorious L.).

Triacontanol or TRIA increased the growth and yield by foliar application during preflowering, flowering and post flowering stages where more increase was observe from 50 to 65 days. As for as number of branches or laterals, root length, shoot length, leaf area, pod length, number of seeds are concerned, all the lower consontrations (2,4 and 6 ppm showed significant enhancement at all the three stages but 2 ppm consontration of miraculan (TRIA) increase in weight of 100 seeds than other consontration and control.

Environmental Influences on Length - Weight Relationship of the Anchovy, *Setipinna phasa* (Ham.)

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For the study of length-weight relationship 303 live specimens of *Setipinna phasa* were collected from river Ganga (logic environment) and about 349 specimens

were collected from Hooghly estuary (lentic environment). The length-weight relationship was calculated by using the general formula as suggested by Le Cren (1951).The correlation coefficient 'r' for these relationships were found to be 0.875 for juveniles, 0.9123 for males and 0.8471 for females in the specimens collected from river Ganga while the values of 'r' for length-weight relationship calculated in the individuals of estuary were 0.9368, 0.8563 and 0.8961 in juveniles, males and females respectively. The values of correlation coefficient were highly significant at $P< 0.001$. The exponent value 'b' was 3.1415 for juveniles, 2.6744 for males and 2.8361 for females of the fish from river Ganga, while values of this for the individuals of Hooghly estuary fish were 3.3241 for juveniles, 2.8610 for males and 3.2205 for females. The significance of variation in the estimates of coefficient 'b' for expected cube law was tested by 't' test, which are highly significant at 5% level. It was observed that the weight of the fishes of Hooghly estuary was always higher than the weight of the fishes of river Ganga at the given length.

Excessive use of natural products

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With a realistic threat against biodiversity in rain forests and in the sea, a sustainable use of natural products is becoming more and more important. Basic research directed against different organisms in Nature could reveal unexpected insights into fundamental biological mechanisms but also new pharmaceutical or biotechnological possibilities of more immediate use. Many different strategies have been used prospecting the biodiversity of Earth in the search for novel structure-activity relationships, which has resulted in important discoveries in drug development.

Prospects of Fodder crop production in India

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India sustains about fifteen per cent of the world's livestock population. The productivity of our livestock often remains low due to inadequate and nutritionally unbalanced supply of feed and fodder. Recurring natural calamities particularly drought and flood, fodder scarcity during lean period, encroachment of grazing lands for other purposes increasing pressure on cultivated lands for food crops and industrial purposes compounded by ever increasing livestock population have widen the gap between forage demand and supply in the country. Livestock production is backbone of Indian agriculture contributing 13.9% to national GDP and source of employment and ultimate livelihood for 70% population in rural areas. At present, the country faces a net deficit of 61.1% green fodder, 21.9% dry crop residues and 64% feeds.

It can be observed that 54% of the total fodder is met from crop residues, while 18% fodder is met from grasslands and only 28% fodder is met from cultivated fodder crops. Diversion of crop residues for packaging and other industrial requirement as well as incorporation of crop residues into soil will worsen the demand and supply situation. If farmers are selling crop residues at a lower price, it is clear that there is no demand for fodder in certain agriculture-rich areas, while certain other regions are facing fodder shortage. Seed availability of forage crops is only 15-20% of national requirement due to unorganized seed market of fodder crops.

The major fodder crops cultivated in India are sorghum, maize, bajra, oats, hybrid Napier, Guinea grass, paragrass, lucerne, berseem, cowpea and others. Among these crops, sorghum, maize, oats, lucerne and berseem are more popular because of easy availability of seeds of improved varieties and well developed technology to increase the forage yield and quality. Potential large areas of 187.7 million hectares under the category of wastelands /degraded lands as well as forest margins are available; if that could be scientifically managed and regulated for appropriate fodder production by a

sensible policy frame at local levels for sustainable use, it will completely bridge the gap in forage demand and supply. Important technologies like hydroponics should be adopted and popularizes in farmers to provide green fodder based balanced ration to the livestock under limited land holding. Selection of appropriate crops / varieties and adoption of proper harvesting schedules should be proposed to regular supply of the quality forage throughout the year.

Impact of elevated UV-B radiation on growth, physiology, biochemistry and secondary metabolites of selected medicinal plants

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In recent years stratospheric ozone depletion has been largely attributed to rapidly changing climatic conditions, altered land use pattern and newly discovered ozone depleting substances and is directly responsible for increased penetration of biologically active UV-B radiation reaching to Earth surface. Global climatic change factors including UV-B is one of the major problem of all the developing countries. Plant responses depend largely on UV-B dose and other environmental variables such as quality and quantity of visible and UV-B light, presence of gaseous pollutants and availability of soil nutrients. In general, the effects of elevated UV-B radiation are negative for biological life. Plants display reductions in growth, photosynthesis, and increase of antoxidative defense enzymes and secondary metabolites against exposure to eUV-B. Despite, a rich history and economic importance, potential of medicinal plants has not been fully explored. Therefore, a comprehensive study of selected medicinal plant responses against eUV-B is reviewed. Variations in various physiological, biochemical and medicinal compounds were identified in relation to eUV-B stress. eUV-B become a critical issue for herbal community, affecting cultivation and properties of medicinal plants. The current limitation of new drugs has

fostered interest in plant based drug discovery. Despite progress in synthetic chemistry, plants still constitute an important source of pharmaceuticals and other compounds of economic importance. UV-B radiation is one of the important environmental factors for many plants with remarkable influence on defense related secondary metabolite biosynthesis that can be beneficially exploited for production of medicinally important compounds.

Keywords: Ozone (O_3). Chlorofluorocarbon (CFC). Elevated UV-B radiation (eUV-B) . Medicinal plants . Secondary metabolites.

Impact of papaya (*Carica papaya* Linn.) leaves extract on the treatment of dengue fever

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Invasion of various infectious organisms in natural ecosystem leads the human health problems. Dengue fever is one of the leading ailments considered as serious threat to human worldwide. Dengue fever is a viral fever spread through the Aedes mosquitoes. People suffering from dengue observed with sharp reduction in his platelet and WBC's count. This sharp reduction is due to viral induced haemolysis of human blood cells. Mostly humans are dependent on plant in order to meet various requirements for primary health care. By the use of *Carica* leaves extract, it is easy to elevate the total white blood count and platelets .Fresh papaya leaves were grind in a grinder for the preparation of extract. Leaf extract with honey was administrated to person suffering with dengue fever. It was observed that PLT (Platelets count) and WBC's (White blood count) increased significantly.

Many studies reported membrane stabilizing property and protect blood cells against stress- induced destruction .This finding may observed due to presence of flavonoids , phenolic compounds and other bioactive compounds present in the leaves of papaya thus *Carica* leaves can strengthen immunity of body and neutralise the deficiency caused by virus.

Key words: *Carica papaya*, immunomodulation, Dengue fever

Phytochemical analysis of rare medicinal plants of District Sonebhadra

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Medicinal plants have bioactive compounds which are used for curing of various human ailments and also play an important role in healing and cure of diseases. The ethnomedicine involving the use of different plants extract or the bioactive compound of vital importance in the health application.

Phytochemical have two categories i.e. primary and secondary constituents. Primary constituent have proteins, carbohydrates and nitrogen containing compounds. Secondary constituents contain terpennoides, alkaloids and phenolic compounds.

The present study involves 5 different plants viz *Gymnema sylvestre*, *curiculigo orchoides Acorus calamus, Hemidesmus indicus, Tinospora cordifolia,* and *Withania somnifera*. The plant parts like leaf, stem root and bark of selected rare medicinal plants were washed, air dried and powdered. The aqueous extract of the plants sample were used for the phytochemical analysis by standard method (H.P.L.C.) to find out the phytochemical constituent in the plants. The main objectives of the research work have to check the carbohydrates, protein and phenolic compounds.

The result of photochemical analysis of the rare medicinal plants showed that the terpenoides, sugar and protein, flavonoides, alkaloids and glucosoides e.t.c. was found in rare medicinal plants.

The Phytochemical analysis of the plants is very important. Commercially it is used for the manufacturing of different medicine and drugs for cure and healing of acute and chronic diseases.

Identification of some medicinally important biomolecules contained in *Asparagus racemosus* Willd. root tubers

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Herbal products have been used traditionally to cure almost all ailments of human as well as other animals. Plants still remain the basis for development of modern drugs and have been used for years in daily life to treat diseases all over the world. *Asparagus racemosus* Willd. (Shatavari) is extremely healthful Ayurvedic drug which has been exploited since ancient time. Although, a lot of literature on *Asparagus racemosus* Willd. is available, but crystal clear identification of its constituents and biomolecules have not been reported till date. In this view, characterization of this medicinal plant becomes quite necessary. The plant extracts usually are occurring as a combination of various types of bioactive compounds or phytochemicals having different polarities. Thus, their separation still remains a big challenge for the process of identification and characterization of bioactive compounds. Various modern techniques have been employed to determine and estimate the presence of such biomolecules in medicinal plants. Spectroscopic and chromatographic techniques are the most useful and popular techniques to identify and authenticate the phytoconstituents/natural drugs. FT-IR, UV-Vis and HPLC measurement encompasses a wide variety of chemical and biochemical applications which involves in research.

Advances in sequencing technologies for exploration of microbial community in life sciences

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To study the microbial community structure from a particular field it's very hard to study by cultivation based approaches. Still no culture medium are available that favors the growth of complete aimed microbes. Several molecular techniques such as Phospholipid Fatty Acid (PLFA), Denaturing Gradient Gel Electrophoresis (DGGE), Terminal Restriction Fragment Length Polymorphism Fingerprinting (T-RFLP), Temperature Gradient Gel Electrophoresis (TGGE), Amplified Ribosomal DNA Restriction Analysis (ARDRA) etc. are used in order to map the complete community structure. Most of these techniques used classical Sanger shotgun sequencing technologies. This sequencing technique is time consuming and require major cloning step as well as unable to detect microbes present in lesser number. To overcome these flaws unculturable approaches (High throughput sequencing technologies) have been used. High throughput sequencing technologies, also known as NGS (Next Generation Sequencing), and used plateforms like 454 Life Sciences (Roche), Solid (Applied Biosystems), Illumina (Solexa) and also the newest commercially available platform Ion Torrent (Life Technologies). For metatranscriptomic purposes high throughput sequencing used USA based sequencing technologies like Ion Personal Genome, PacBio RS SMRT system (Pacific Bioscience) and Heliscope (Helicos Bioscience Corp.).

Behavior of shock waves in a non-uniform gravitating atmosphere

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The propagation of weak and strong spherical shock waves through a non-uniform medium under the force of gravitation has been studied by using the method developed by Whitham. Analytical expressions for the variation in stock strength and in flow variables behind the shock have been obtained.

Propagation of blast waves generated by intense flares

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The behaviour of shock waves in an atmosphere of rotating star under the force of gravitation by using the method developed by Whitham. The variation in density strength of the spherical shock wave has been derived. The particular cases of very strong and weak shocks have been discussed. In case of steady mass motion, the expression for the gradient of temperature and gradient of Mach number have been derived.

Pathological studies and management of fungal disease of mango

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Mango (*Mangifera indica* L.) belongs to the family *Anacardiaceae*is one of the most popular fruits in India and other parts of the world. It is the leading fruit crop of India and considered to be the king of fruits in the world market due to its excellent

flavour, attractive fragrance, beautiful colour, delicious taste and juice content. These include anthracnose (*Colletotrichum gloeosporioides*), malformation (*Fusarium moniliforme var. subglutinans*), Macrophoma blight (*Macrophome mangiferae*), Phoma blight (*Phoma glomerata*), wilt and root rot (*Fusarium solani*), Dieback (*Botryodiplodia theobromae*) and Red Rust (*Cephaleurus virescens*) which are considered to be important as they are widely prevalent over different mango growing tracts of India under nursery condition. A total number of 5 fungicides belonging to both systemic (Saaf 75 WP, Beam 75 WP, Bavistin 50 WP, Tilt 25 FC) and non systemic (Blitox 50 WP) groups were used to find out their efficacy against both *C. gloeosporioides* and *F. moniliforme* var. *subglutinans*. *In vitro* study by food poisoning of PDA medium suggests that all 4 systemic fungicides belonging to Carbendazim (Bavistin 50 WP), Tricyclazole (Beam 75 WP), Carbendazim 12%, Mancozeb 63%, (Saaf 75 WP), Propiconazol (Tilt 25 EC) in general were superior to non systemic fungicide belonging to Copper Oxychloride group (Blitox 50 WP). However, Bavistin was the best in its action over the remaining fungicides for the inhibition of linear growth of *C. gloeosporioides*. Similar phenomenon was also recorded against linear growth and spore germination of *F. moniliforme* var. *subglutinans* where Bavistin was the best in its action over the remaining test fungicides.

Incidence of *C. gloeosporioides* nursery diseases on different mango cultivars in different nursery

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Mango is the leading fruit crop of India and considered to be the king of fruits in the world market due to its excellent flavour, attractive fragrance, beautiful colour, delicious taste and juice content. Mango fruit is utilised at all stages of its development both in its immature and mature state. Raw fruits are used for making chutney, pickles and juices. The ripe fruits besides being used for desert are also utilised for preparing several products like squashes, syrups, nectars, jams and jellies. Incidence of *C. gloeosporioides* showed that 14 cullivars under different nursery were

affected, the intensity of infection of which varied from very slight to very heavy infection expressed by different disease index. During 2010 the average disease index ranged from (i) 1.4 to 4.6 at Deras Horticulture Farm, Mendhasal (ii) 1.5 to 4.6 at Saptasajya Fruit Farm, Dhenkanal and (iii) 1.4 to 4.8 at Baliguali Farm, Puri while it was 1.3 to 4.8, 1.4 to 4.6 and 1.3 to 4.5 during 2011 and 1.5 to 4.6, 1.3 to 4.6 and 1.6 to 5.0 during 2012 in the respective nursery mentioned above.

Seasonal distribution and succession of cyanobacteria in 'Usar' soils

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The vast areas of 'Usar' Lands occurring in Uttar Pradesh are found with varying degrees of salinity and alkalinity. In Uttar Pradesh, 'Usar' soils are distributed in Allahabad, Gazipur, Mau, Jaunpur, Varananasi, Azamgarh and many other districts covering about 1.29 million hectares. 'Usar' soils exhibit extreme pH, high degree of salinity and low moisture contents during dry season. Soil salinity is one of the most serious factors limiting the productivity of crops including staple diet in many countries. A study was conducted from May 2016 -June 2017 to observe the distribution and succession of cyanobacteria in different 'Usar' soils. We selected three experimental sites from Azamgarh district for present study. On the basis of our results we could reach to the conclusion that the growth of cyanobacteria were slow in highly saline soils during summer season due to high pH. Only a few alga like *Nostoc sp.* and *Calothrix sp.* could survive during highly saline conditions. The algal strains found to be more resistant to salinity were *Nostoc calcicola*, *Nostoc punctiformae, Anabaena fertilissima*, *Calothrix javanica* while *Microcoleus sp., Cylindrospermum sp.* and *Microcystis sp.* favored less saline conditions and began to appear after few rain showers.

Propagation of blast waves generated by intense flares

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The behaviour of shock waves in an atmosphere of rotating star under the force of gravitation by using the method developed by Whitham. The variation in density strength of the spherical shock wave has been derived. The particular cases of very strong and weak shocks have been discussed. In case of steady mass motion, the expression for the gradient of temperature and gradient of Mach number have been derived.

Transcriptome wide Sequential and Structural Classification of Catalase (CAT) genes from *Momordica charantia*: An *in silico* prospective

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Catalase (CAT) is a common antioxidant enzyme in nearly all living organisms exposed to oxygen. In the present study, Catalase gene family members were identified from bitter gourd (*Momordica charantia*) transcriptome. Total three candidate Catalase genes were identified in bitter gourd in 10 homologous transcripts. Phylogenetic analysis revealed that McCAT1-McCAT3 are closely related to *Cucumis melo* and *Cucumis sativus*. The three dimensional structure of identified McCAT1-McCAT3 proteins were predicted and submitted to PMDB with PMDB ID

PM008124-27. Further protein structure classification analysis revealed that identified catalase proteins may involve in catalase activity, cobalt ion binding, heme binding, metal ion binding and protein binding at molecular functional level. In biological process showing the roles in cell death, cell redox homeostasis, cellular response to nitrogen starvation, phosphate starvation, sulfate starvation, hydrogen peroxide catabolic process, oxidation-reduction process, photoperiodism, response to cold, light stimulus, oxidative stress, cellular oxidant detoxification, response to abscisic acid, cadmium ion and hydrogen peroxide.

Keywards: Bitter gourd, Gynoecium, Protein structure, Transcriptome sequencing, CAT gene, oxidative stress

Effects of Endosulfan Treatment on Cyanobacterial Distribution in Paddy Soils

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Cyanobacteria are widely distributed in tropical wet land rice fields and play important role in nitrogen fixation.Currently huge amount of chemical fertilizers and pesticidesare being used in the rice fields to enhance the crop productivity.To evaluate the impact of one of the commonly used insecticides in India, a plot area cultivated with paddy was sprayed with endosulfan. Some of the biochemical criteria of the treated paddy and the biodiversity and biochemical activity of its companion cyanobacteria were comparedwith those of the untreated ones. The results revealed that endosulfan application caused inhibition inthe attendance and biodiversity of the soil cyanobacteria found in the rhizosphere of the treated paddy, specially the filamentous species. The treated soil showed a highly significant inhibition intheir ARA (acetylene-reducing activity) and exopolysaccharides. Fromthe results, it could be concluded that application of endosulfan has a significant potential to changeecosystems and soil biological processes and could potentially reduce future farm productivity andcause harmful impact to agriculture.

Differential plasticity in response of two wheat cultivars to elevated CO_2: Gas exchange parameters, allocation of photosynthates, growth, sink: source ratio and yield

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The present study were conducted to understand the intraspecific yield variability between two wheat cultivars (HUW 234 and PBW 343) and traits influencing yield performance (photosynthesis, stomatal conductance, photosynthetic pigments, leaf protein, nitrogen content free amino acid content, non-structural carbohydrates, free amino: sucrose ratio, allocation priorities and also on sink development) at futuristic carbon dioxide concentrations using twelve open top chambers (OTCs) three per treatment. The result showed stimulation of photosynthesis in HUW 234, which led to increased growth and yield due to higher sink activity (higher number of ears and weight of ears) which led to no feedback inhibition in HUW 234.While, PBW 343 showed stimulation of photosynthesis at initial stages leading to enhancement of source activity and higher carbohydrate accumulation. But at latter age, no stimulation of sink activity causing photosynthetic acclimation hence higher availability of CO_2 didnot translate into higher yield under elevated CO_2. HUW 234 maintained higher nitrogen use efficiency (NUE) under ECO_2 which helped the cultivar to maximize use of N in carbon assimilation especially during reproductive development but PBW 343 did not respond similarly to NUE and N content under elevated CO_2. The result suggests that photosynthetic capacity and nitrogen use efficiency may be crucial in understanding intraspecific variations between cultivars under elevated CO_2.

Keywords: wheat, CO_2, source: sink ratio, photosynthesis, nitrogen use efficiency

Diversity of Cyanobacteria in 'Usar' Lands of Varanasi

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'Usar' soils are extensively distributed in northern part of India and are characterized as saline/alkaline depending on their salt contents. These salt affected soils are not suitable for crop production and affects plant growth. Environmental constraints including salinity and alkalinity significantly influence the diversity of microorganisms, their number, morphology and activity in the soils. Cyanobacteria (blue-green algae) are a group of primitive phototrophic Gram-negative prokaryotic micro-organisms occurring in a wide range of habitats, including saline/alkaline. We surveyed three different 'Usar' lands of Varanasi to investigate the diversity of cyanobacteria in different seasons. The maximum diversity was found at lowest pH (7.6) in rainy season followed by winter and summer. A number of cyanobacteria were identified to grow on 'Usar' soil surfaces were *Calothrix brevissima, Microcoleus chthonoplastes, Microcoleus vaginatus, Aphanothece sp., Lyngbya sp., Phormidium anamola, Oscillatoria subbrevis, Nostoc punctiformae, Anabaena orientalis, Anabaena fertilissima Nostoc commune,* and *Nostoc calcicola*.

Effects of malathion on Growth, Biochemical composition and some enzymes of *Nostoc ellipsosporum* NDUPC002

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Effects of malathion on growth, biochemical composition and some enzymes of *Nostoc ellipsosporum* NDUPC002 was studied. Cyanbacterial strain was isolated from agricultural fields of Varanasi, India. Strain was characterized by morphological as well molecular means. Organism was deposited at NAIMCC (NBAIM), Mau, India (Accession No. NAIMCC-C-000122). 5ppm, 10ppm and 15ppm were concentrations

of malathion treatments and 10ppm was LC_{50} value. All treatments of malathion inhibited the growth of cyanobacteria and maximum inhibition was observed in 15ppm treatment. Chl.-a was induced (12.33%) in 5ppm treatment and decreased in other two treatments with maximum reduction of 15.41% in 15ppm treatment. Total protein and carbohydrate content was slightly induced with maximum induction of 5.72% and 8.08% respectively in 10ppm treatment. Nitrate reductase (NR) activity was induced in 5ppm (12.47%) and reduced in other two treatments with maximum inhibition of 46.56% in 15ppm treatment. Activity of glutamine synthetase (GS) increased in 5ppm treatment (10.74%) and decreased in other two treatments with maximum inhibition of 32.29% in 15ppm treatment. Finding of experiment suggested that 10 ppm (LC_{50}) and above conc. of malathion was inhibiting the growth, biochemical composition and some of enzymes (NR and GS) of *Nostoc ellipsosporum* NDUPC002.

Antibacterial activity of two soil cyanobacteria *Nostoc polludosum* and *Cylindrospermum licheniforme*

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Antibacterial activity of two cyanobacterial strains i.e. *Nostoc polludosum* and *Cylindrospermum licheniforme* was studied. Both cyanobacterial strains were isolated from agricultural fields of Varanasi, India. Crude extracts of both strains in five solvents i.e. Ethanol, Petroleum ether, Acetone, Methanol, and Chloroform were screened against two human pathogenic bacteria i.e. *S. aureus* and *E. coli*. Crude extracts of each strain showed the differential antibacterial response to test organisms. Crude extract only in Acetone of *Nostoc polludosum* showed antibacterial activity

against *E. coli* and no antibacterial activity was noticed against *S. aureus*. Acetone extract of *Nostoc polludosum* showed maximum

inhibition zone of 11.3±0.45 mm against *E. coli* which is near approximately twice the antibacterial activity due to the standard antibiotic. Crude extract, only in four organic solvents i.e. Ethanol, Methanol, Acetone & Petroleum ether of *Cylindrospermum licheniforme* showed antibacterial activity against *S. aureus* and *E. coli*, but in all extracts, the antibacterial activity was less than the standard antibiotic. Findings of experiment suggested that acetone extract of *Nostoc poludossum* was suitable for mining of antibacterial agent against *E. coli.*

Physico-chemical and Microbiological characteristics Of Ganga River at Varanasi City

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The indiscriminate discharge of large volume of highly putrescible waste from the Assi nala and Ramnagar Industrial effluents created serious pollution problem in river near Varanasi city. In present investigation an attempts has been made to ascertain present water quality condition of Ganga river in relation to domestic sewage and industrial effluents. The samples were collected from the upstream and downstream of the flow path of the river from point source of pollution. The high degree of water quality degradation is reflected by the changes in physicochemical parameter like BOD, COD, DO, alkalinity, acidity etc. and microbiological parameter like total coliform count & faecal coliform count in downstream.

Prospects of genetic ecotoxicology in conservation of reptilian biodiversity

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Reptiles are key participants in energy flow in aquatic and terrestrial ecosystems and play vital role in proper functioning of such ecosystems. Reptilian decline from various natural ecosystems is a serious threat as reptiles appear to be in a greater danger of extinction worldwide and this is a cause of great concern for conservation biologists. Pesticide pollution is potentially one of the most dreadful causes for population decline and mass extinction of several species contributing to a loss of reptilian biodiversity. Introduction of new, more toxic and rapidly disseminating pesticides into the environment has necessitated accurate identification of their potential hazards and risk to several reptilian species. Genetic ecotoxicology is an approach that applies the principles and techniques of genetic toxicology to assess the potential effects of environmental pollution, in the form of genotoxic agents, on the health of the ecosystem and its components. It is concerned with the effects of pollutants or chemicals such as mutagens, clastogens, aneugens, and teratogens on the genetic material of organisms. It is a relatively young field that has benefited tremendously from the growth of molecular biology, molecular genetics, computational biology, bioinformatics and advance tools and techniques. The prospects of such studies are tremendous as the results will add up to the existing status of research in the field of genetic ecotoxicology of reptile. It will help researchers to design future hypothesis related to reptilian decline problem and establishment of standard methods and techniques for bio- monitoring studies and in evolving appropriate strategy for increased survival and conservation of reptilian biodiversity.

Onstatistical features of reactant concentration field in turbulence mixing with first order reaction

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We have defined the distribution functions for simultaneous velocity magnetic and concentration fields in convective MHD turbulence and derive the equations for evolution of distribution functions.

Studies on Phytoplankton ecology in Gomati river at Jaunpur (U.P.), India

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The phytoplankton forms a very important component of aquatic vegetation, occurring in all kinds of water bodies and consequently enjoying a worldwide distribution. The present study is going to centralize on the Gomati river of Jaunpur district in Uttar Pradesh in year 2013. The phytoplankton were collected, counted and identified by using the method suggested by APHA (1985), Prescott (1969) and fresh water biology. Although, there are a number of major groups of phytoplankton, those relevant to the present study are Bacillariophyceae, Chlorophyceae, Cyanophyceae and Euglenophyceae were identified. 10 species of phytoplankton have been collected from various freshwater habitats in the Out of 28 genera Bacillariophyceae (12), Cyanophyceae (05), Chlrophyceae (09), Euglenophyceae (02). The study among all these phytoplankton Bacillariophyceae was recorded as a dominant class in Gomati river at Jaunpur. Result shows that diversity of species Bacillariophyceae

42.85%, Cyanophyceae 17.85%, Chlorophyceae 32.14%, Euglenophyceae 7.14% were composed.

Keywords : Phytoplankton, Ecology, Gomati, River.

Climate change and its demographical effect

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Climate is a persistence of weather for a longer duration in an area. It is measured by the pattern of temperature, humidity, atmosphere, pressure, wind and precipitation. Flora and fauna get themselves accustomed with weather of the area and live their life peacefully. But with exploitation of the resources available to human being and for the plant too, we have disturbed Earth's environment. As a result climate is changing. Due to change of climate many disasters are happening including heavy to very heavy rain fall, snow fall, rising of Earth's temperature etc. Rise in Earth's temperature caused due to green house effect, man-made instruments to live life lavishly also a cause. We run behind air conditioners, refrigerators, automobiles and many more things which releases CO_2, CFC and other gases cause a rise in Earth's temperature. The rise in Earth temperature cause rise in sea level. Some of the countries entity may vanish due to rise in sea level because the will be inundated under sea water. It is going to dreadfully affect on the flora and fauna.

It is utmost required that we must take care of our planet Earth so flora and fauna could survive. Think for the development but sustainable development. Ecological balance must be maintained.

COMPUTERS IN BIOLOGY

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Computers have played an important role in biological research scientists have used both mainframe and personal computers to organize results of their data. Creating databases and new analytical tools for other scientists to use in their laboratory investigations. For example, in the middle of the 1960's the innovative dynamics of cell multiplication made use of computer codes originally created for Livermore's weapons program. The study also contained an resourceful calculation system with the help of computer codes to excite cell activity in an effort to design an optimal radiation dosage program for cancer therapy.

It's a recently new area of research that uses exciting tools from first principles of quantum mechanics to describe the electronic structure of atoms and their chemical properties. Computational biology allows researchers to construct quantum simulations to see within biochemical processes to learn how reactions are taking place on a molecular and amazingly an atomic level too. Computational biology uses mathematical and informational techniques including statistics to solve biological problems.It does so, by using computer programs or mathematical models or creating both.One of the major areas of computational biology is data mining which includes the analysis of the data collected by several genome projects Genome projects are scientific projects that are utilized to map the genome of a living being in other words the complete set of genes carried by this being or virus computational biology uses mathematical and informational techniques including statistics to solve biological problems.

One of the major areas of computational biology is data mining which includes the analysis of the data collected by several genome projects.Genome projects are scientific projects that are utilized to map the genome of a living being in other words the complete set of genes carried by this being or virus.

Assessment of responses of barley cultivars to low and high salinity levels

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The two cultivars of barley were irrigated with 40 and 100 mM NaCl solution corresponding to medium and high salinity levels. Cultivar, RD2552 showed better growth and developments, hence better adaptation against two salinity levels compared to cultivar, HUB113. Different salinity levels led to different morphogenic adaptation like reduction in leaf expansion, stunting n plant height and elongated root length. Antixoidative enzymes studied also showed higher induction in cultivar RD2552. High salinity led to maximum induction in POX in RD2552.Unlike RD2552, HUB113 showed maximum enzymatic activities in control plants followed by low salinity level. Fm', Fo' and Y(II) reduced under 40 and 100 mM NaCl treatment in RD2552 with higher reduction at 100 mM. Fm' and Fo' increased at different salinity levels in HUB113. Y(NPQ) reduced more at 40 mM in RD2552 than at 100 mM. Compared to RD2552, HUB113 showed more reduction in Y(NPQ). NPQ reduced in both the cultivars at both the salinity levels. qN and qP also reduced under different salinity levels in both the cultivars. ETR also reduced at both the salinity levels in both cultivars. ACi curve revealed maximum Ps in control plants at 1200 µl l^{-1} , in 40 mM at 1400 µl l^{-1} and in 100 mM at 500 µl l^{-1} of HUB113. In RD2552, maximum Ps was observed at 1400 µl l^{-1} in control plants and in 40 mM and in 100 mM at 900 µl l^{-1}. Light curve shows no significant increase in Ps beyond 1600 µml of PAR in RD2552 and 1800 µml of PAR in HUB113. At 40 mM, decline in Ps was observed beyond 1600 µml in RD2552 and 1800 µml in HUB113; at 100 mM, reduction was observed beyond 1400 µml in RD2552 and 1600 µml of PAR in HUB113. A better adaptive feature displayed by RD2552 conferred it a kind of

resistance against different salinity levels while in HUB113, adaptation is only showed at low salinity level.

Keywords: Barley, Salinity; Aci; Light curve; Antioxidative enzymes

Climate Change and Human Health: Global Challenges and Preventive Measures

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This paper discusses the different issues related to the Global challenges posed by the adverse effects of Climate Change on Human health and the measures that should be undertaken for their prevention. The long-term good health of populations depends on the continued stability and functioning of the biosphere's ecological and physical systems, often referred to as life-support systems. The world's climate system is an integral part of this complex of life-supporting processes, one of many large natural systems that are now coming under pressure from the increasing weight of human numbers and economic activities. By inadvertently increasing the concentration of energy-trapping gases in the lower atmosphere, human actions have begun to amplify Earth's natural greenhouse effect. The primary challenge facing the world community is to achieve sufficient reduction in greenhouse gas emissions so as to avoid dangerous interference in the climate system. National governments, via the UN Framework Convention on Climate Change (UNFCC), are committed in principle to seeking this outcome.

As a human-generated and worldwide process, global climate change is a qualitatively distinct and very significant addition to the spectrum of environmental health hazards encountered by humankind. Global climate change would affect human health via pathways of varying complexity, scale and directness and with different timing. Environmental health concerns have focused on toxicological or microbiological risks to health from local exposures. However, the scale of environmental health problems is increasing and various larger-scale environmental hazards to human population health have begun to appear. Appreciation of this scale and type of influence on human health entails an ecological perspective that

recognizes that the foundations of long-term good health in populations reside in the continued stability and functioning of the biosphere's life-supporting ecological and physical systems. Emission rates increased markedly (around twelve-fold) during the twentieth century, as worldwide industrialization proceeded and land-use patterns changed at an accelerating rate. The scale of environmental health problems has expanded from household (e.g. indoor air pollution) to neighborhood (domestic refuse) to community (urban air pollution) to regional (acid rain) to global level (climate change). This requires consideration of the "ecological footprint" and how to curtail its size within the limits of global ecological sustainability

This paper seeks to describe the context and process of global climate change, its actual or likely impacts on health, and how human societies should respond, via both adaptation strategies to lessen impacts and collective action to reduce greenhouse gas emissions.

Blue to green tunable emission from Tb^{3+} doped La_2O_3 nano-phosphors

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The present manuscript deals with a simple, facile and effective Polyol type sol-gel approach to synthesize Tb^{3+} doped La_2O_3 nanophosphors and subsequently to investigate its photoluminescence properties. The as synthesized nanophosphors have been characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM), and Raman spectroscopy. The XRD studies confirm the proper phase formation and the surface morphology of the respective as synthesized products by scanning electron microscope. The Raman and photoluminescence spectroscopy have been used to analyze the structural and optical properties of the as fabricated particles. The

samples under investigation showed excitation peaks centered at 305, 350 and 375 nm for 543 nm emissions corresponding to transition $^5D_4 \rightarrow ^7F_5$. Emission spectra with 305 nm excitation have shown characteristic emission peaks of Tb^{3+} ion at 472, 487, 543 and 580 nm. The intensity of emission increases with Tb^{3+} concentration and is most prominent for 7 at% Tb^{3+} ion. The characteristic emissions of Tb^{3+} ion owes to the transition [in] which intensities of blue and green emission are prominent. The dominant intensity has been found for 472 nm (for blue emission). Commission international d 'Eclairage (CIE) co-ordinates have found in the light blue to green region as (0.25, 0.37), (0.24, 0.44), (0.22, 0.38) and (0.22, 0.39) for 2, 5, 7 and 10 at% Tb^{3+} doped La_2O_3, respectively. The research work provides a new interesting insight dealing with tunable properties with Tb^{3+} doping in La_2O_3 nanophosphors, to be useful for for display devices, solar cells, LEDs and optoelectronic devices.

Chlorophytum borivilianum: a white gold for pharmaceuticals

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Chlorophytum borivilianum Santapau & Fernandes (Liliaceae) also known as 'Safed Musli' is a traditional rare Indian medicinal herb which has many therapeutic applications in Ayurvedic, Unani, Homeopathic and Allopathic systems of medicine. Its roots (tubers) are widely used for various therapeutic applications. It is used to cure physical illness and weakness, as an aphrodisiac agent and revitalizer, as general sex tonic, remedy for diabetes, arthritis and increasing body immunity, curative for natal and postnatal problems, for rheumatism and joint pains, increase lactation in feeding mothers, as antimicrobial, anti-inflammatory, antitumor agent, also used in diarrhea, dysentery, gonorrhea, leucorrhea etc. It has spermatogenic property and is found useful in curing impotency, now it is considered as an alternative 'Viagra'. Its root contains steroidal and triterpenoidal saponins, sapogenins and fructans which act as therapeutic agents and play vitalrole in many therapeutic applications. It is a rich source of over 25 alkaloids, vitamins, proteins, carbohydrates, steroids, saponins,

potassium, calcium, magnesium, phenol, resins, mucilage, and polysaccharides and also contains high quantity of simple sugars, mainly sucrose, glucose, fructose, galactose, mannose and xylose. The commercial exploitation of this plant and their secondary metabolites, germplasm conservation and in vitro production of secondary metabolites for quality control are some of the major prospects of this rare medicinal herb. The focus of the present review is to galvanize the potential of therapeutic and nutritive values of this herb and production of their secondary metabolites.

Effect of dye Monastral fast blue and rhizobium inoculant on total amino acid of green gram (*Vigna radiata)*

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In normal agricultural practice, pollutants are applied by irrigation channel have waste chemicals, which interfere with growth with polluted water lead to deceptive pollution problem. To ensure their effect on bacterial biofertilizer and after inoculation to green gram which is also treated with dye MONASTRAL FAST BLUE, the formation of amino acid of plant is affected. Treatment of higher concentration (viz. 50, 75, 100%) proved effect and resulted in decreased amount of amino acid in the crop.

Comparative study of Ni and As(III) toxicity on antioxidative responses of *Anabaena* sp.

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Diazotrophic cyanobacteria due to their intrinsic capability of N_2-fixation hold a major position in ecosystem, however often appended with metal load. They are well known to play crucial roles in maintenance of soil fertility and rice productivity.

Ni has gained considerable attention due to its increasing concentration in water, soil and air. Although, Ni is an essential metal that play an important role in cellular physiology for eukaryotes and prokaryotes. Also it is a necessary cofactor for enzymatic function in prokaryotes, but high concentrations could be potentially harmful. Arsenic is another toxic metalloid that negatively affects the cyanobacterial proliferation. However species specific comparative responses under As and Ni is largely unknown. The present study focuses on the comparative effects of nickel (Ni^{2+}) and arsenite (As(III)) on two diazotrophic cyanobacterial species (*Anabaena doliolum* and *Anabaena* sp. PCC7120) in terms of antioxidative aspects. Oxidative damage measured in terms of lipid peroxidation and peroxide content was significantly higher after As(III) than Ni treatment as compared to control. Similarly all the studied enzymatic and non-enzymatic parameters of antioxidative defense system except glutathione reductase (GR) showed greater induction against As(III) than Ni. Moreover, integrating comparative analysis of all studied parameters also demonstrated interspecies variation in terms of stress adaptive strategies reflected through higher sensitivity of *Anabaena doliolum* over *Anabaena* PCC7120.

जैव विविधता का संरक्षण और बचाव

डा0 अशोक कुमार,
असिस्टेंट प्रोफेसर, समाजशास्त्र, राजकीय स्नातकोत्तर महाविद्यालय, मगरहॉ, मीरजापुर (उ0प्र0)।

मानव की आवश्यकताओं को देखते हुए जैव विविधता का संरक्षण एक चुनौती बन गया है। अगर इसका संरक्षण न किया गया तो हमारी भावी पीढ़ियॉ एक ऐसे माहौल में रहने को विवश होंगी जहॉ न तो शुद्ध वायु होगी और न ही शुद्ध जल होगा। पारिस्थिति की असंतुलन की इस स्थिति में प्राकृतिक निवासों के नष्ट हो जाने के कारण जीव मंडल गहरे खतरे में पड़ जायेगा। जैव विविधता मानव जीवन और मानव हितों की रक्षा के साथ–साथ पर्यावरणीय संतुलन भी कायम करती है। जैव विविधता एक गतिशील प्रक्रिया है जो आनुवंशिक तत्वों के बढ़ने से बढ़ती है तथा इसके घटने से घटती है। यदि किसी क्षेत्र विशेष में किसी भी कारण से उपलब्ध प्रजातियों की संख्या में कमी आ जाती है तो जैव विविधता में कमी आ जाती है। इस प्रकार हम कह सकते हैं कि जैव विविधता एक ऐसी अवधारणा है जो सभी जीव–जन्तुओं के मध्य पारस्परिक सम्बन्ध को दर्शाती है तथा एक दूसरे को प्रभावित भी करती है। जैव विविधता को निम्नलिखित तीन स्तरों में विभाजित किया जा सकता है–पारिस्थितिकीय विविधता, प्रजातीय विविधता व आनुवंशिक विविधता।

मानव अपने आदिम अवस्था से ही प्रकृति पर निर्भर रहा है। मानव सभ्यता की शुरूआत से ही जैवीय विविधता मानव के खाद्य तथा स्वास्थ्य का आधार रही है। चूँकि मानव सभ्यता की शुरूआत जंगलों से ही हुयी है। अतः मानव ने बड़ी संख्या में वन्य जीवों एवं वनस्पतियों को अपने जीवन का आधार बनाया। हमारे पारिस्थितिकीय तन्त्र पर जैविक व अजैविक दबाव निरन्तर बढ़ रहा है। ऐसे में जीव विविधता की कमी भोजन तथा अन्य आवश्यक वस्तुओं की बढ़ती मॉग पूरी करने में प्रमुख बाधा बन रही है।

Influence of cyanobacteria on the biological reclamation of saline/ alkaline soils

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'Usar' soils are either saline or alkaline. Such soils have high pH, high exchangeable sodium, K^+ and low Ca^{2+}. 'Usar' soils have high concentration of free carbonate and bicarbonate, very low total nitrogen content; low amount of sulphate and phosphate, unproductive, impermeable, hard, poor water availability, hydraulic conductivity and water logging poor water infiltration limits plant growth and thus can't support normal growth of plant species. Cyanobacteria are a group of prokaryotic,

photoautotrophic micro-organisms, occurring in a wide range of saline/ alkaline 'Usar' habitats. They could be used to reclaim such soils because cyanobacteria act as a good natural fertilizer. The growth of cyanobacteria tolerates high sodium concentration and grows enormously on the soil surface in rainy season. A scientific approach for practicing crop cultivation and to enhance crop productivity in saline/ alkaline soil is the reclamation (amelioration) of soil salinity. The reclamation of such soils basically requires the replacement of exchangeable sodium by calcium and thereafter leaching of the exchanged sodium. It is done by the approach of addition of Gypsum ($CaSO_4.2H_2O$) or pyrite ($FeSO_4$) followed by leaching of excess salts by flooding or extensive irrigation. Biological reclamation through Cyanobacteria (BGA) is an another approach. In present study, a possible reclamation of soil salinity by using halotolerant Cyanobacteria has been described with certain success. We have tested the role of 3 important halotolerant BGA like *Nostoc calcicola, Calothrix sp.* and *Anabaena sp*. along with Gypsum on soil properties. On the basis of our findings, it could be suggested that *N. calcicola* supplement could be suitable for biological reclamation of 'Usar' soils. The objective of the present study was to explore the role of halotolerant Cyanobacteria in the biological reclamation of saline - alkaline 'Usar' soils and to study their influence on soil properties.

Comparison of agricultural wastes for growth behaviour and yield performance of Oyster mushroom Pleurotus ostreatus

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Mushroom cultivation is the most suitable technology for creating wealth and health out of waste from plants, animal and industries which are abundantly available on earth in India. There are agricultural waste are available in huge quantity

but maximum part of these agricultural waste are burnt after harvesting. This poor management of agricultural waste are increasing environmental pollution. Therefore present investigation was on the basis of evaluation of agricultural waste for production of Oyster mushroom (Pleurotus ostreatus) during the year 2015-2016 under mushroom spawn laboratory Department of Mycology and Plant Pathology, Institute of Agricultural Sciences, B.H.U.

The result showed that, wheat straw was colonized by mushroom mycelium in fifteen days followed by mixed substrate of wheat and paddy straw (16 days). The maximum spawn run period (17 days) was recorded from mushroom bed of paddy straw. Other growth period like initiation of fruiting bodies, harvesting of 1st flush, harvesting of 2nd flush and harvesting 3rd flush were also recorded earlier from mushroom bed of wheat straw. The minimum cropping period was recorded from mushroom bed of wheat straw and maximum cropping period recorded from mushroom bed of paddy straw. The Highest yield was obtained from mushroom bed of wheat straw were it took 965gm per bed. The mixture of wheat and paddy straw was also given good yield (930gm/bed). The lowest yield was obtained from mushroom bed of paddy straw were it measured 890gm/bed. Present piece of work concludes that the wheat straw is obtained best for both growth behaviour and yield potential of Pleurotus ostreatus for mushroom growers.

Morphology of ultrasonically prepared composites of polyaniline and agar gel

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Ultrasonically prepared PAni / Agar composites; shows enhanced electrical, mechanical performance and good environmental stability and has natural decomposition over one year on free standing. The IR, UV / vis. characterizations showed characteristic peaks and wt % dependence of intensity. SEM photographs showed channel growth at lower PAni content and fibrilliar growth at high PAni content. XRD spectrograms confirm the encapsular growth of PAni in agar framework. Stress - strain vs. wt % PAni relationship showed, due to presence of agar mechanical strength of PAni / agar composite increases either as pellet or film. Dc (I-V and dc vs. $T^{-1/1+n}$) data showed percolation at 15 wt % of PAni and semiconducting nature of composite. Regression analysis of data showed 1- D, 2 - D, 3 - D, Mott's VRH or TE model for explaining transport phenomenon of phonon in PAni or PAni / agar composite. The AC impedance spectroscopy (performed in the range 40 Hz to 100 kHz) separates grain, grain boundary and electrode contributions on simulation by CNLS fitting software EG & G (PARC). Thermoelectric power 'S' was also calculated at 303 K and has value <1.

Key Words: Polyaniline, Agar, Biocompatible, Scanning Electron Microscopy, Thermoelectric power.

NUTRIENT DYNAMICS IN MONOCULTTIRE PLANTATION FOREST

OB A. auriculiformis A.Cunn. ex. Benth

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Nutrients return from vegetation to soil pool through leaching via rainfall and litterfall, and its subsequent decomposition. Major parts of nutrients retum to the forest floor through litterfall, while canopy leaching also contributes significant amount. But leaching via rainfall was not observed in the present study. The apportionment of nutrients in phyllode, twig + wood, fruit + inflorescence are retum to the forest floor through litterfall prosesses. The recycling of nutrients via litterfall are dependent of seasonal, periodic liuer

production and its progressive decomposition. The nutrient concentration value of litter fractions did not vary during observation period. The phyllode component account for approx. 72-79 % of the total litterfall and its higher nutrient concentration regulate the total nutrient content input to the soil system. The nutrient concentration of phyllode component 'has been observed to be comparatively higher side of the range reported for tropical rain forest. The annual input of nutrient through litterfall were 68.76Kg ha-ryr-r, 9.87kg ha-lyr-r, 36.41Kg ha-lyr-',87.59 Kg ha-lyrt, in the successive 3-4 years of age and

85.98 Kg ha-ryr',12.66 Kg ha-ryrt,46.60 Kg ha-ryr",110.44 Kg ha-ryr-t, during successive 4-5 years of age, consequently for nitrogen, phosphorus, potassium and calcium.

These estimated values are covering the range reviewed for over fifty tropical stand by Vitousek (1984). The percentage return of nutrient of the total uptake were.approximately 27-51%,23-440 ,21-43Yo and24-450lo consequently for nitrogen, phosphorus, potassium and calcium. The higher calcium input is due to its higher concentration in phyllode tissues. The quantitative nutrient retums to the soil surface was found in the order of calcium > nitrogen > potassium) Phosphorus.

Diversity of microflora having diverse habitat and ensure healthy environment all over the globe

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India is one of the world's megadiversity zone where almos all the biogeographic zones in the world are represented. It has a rich flora and fauna. According to available data india is in the tenth position in the world and fourth in asia in plant diversity.There are great diversity and complexity among microorganism. They not only belongto different taxono-mic groups of organism and even in the same group . There are great diversesity in relation to their size,shape,structure and mode of nutrition. The prokaryotic cell different from true bacteria (eubacteria)it constitute a third form of life. The interesting group of prokaryotes is highly diverse, they have different morphology like rods,cocci and helixes and some have also different morphology. Some are found extreme temperature and some of them in to deep sea. They can reproduce by different methods and physiologically differentiated from aerobic, photoautotrophs, chemoautotrophs as well as chemohetrotrophs.They have also having diverse extreme habitat of heat, cold, pH, salinity and pressure,halophites,acidophiles,alkaliphiles thermophiles andthermoacidophiles.

The diversity of microorganisms have played important role in different discipline in relation to environment and or diversity of life on earth.they take part in different life forms of the ecosystems. It make foundation for sustainable development, constitute the basis for the environmental health of our planet and is the source of economic and ecological security for future generations and also played important role in different industries for development as well as food, health, environment, medicine and different industries are based upon these microorganisms.

Assessment of preservative potential of *Pelargonium graveolens* Essential oil against food borne molds and Aflatoxin B_1 synthesis

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Economic loss and health concern due to mycotoxin because of its carcinogenic, genotoxic, teratogenic, nephrotoxic and hepatotoxic nature. Currently use of synthetic fungicides developed resistant species and pose adverse impact on the health and environment which attracted research interest towards exploring novel approaches to discover ecofriendly food preservatives. The present investigation reveals efficacy of *Pelargonium graveolens* (EO) on *Aspergillus flavus* and Aflatoxin B_1 production. PGEO exhibited strong antifungal and aflatoxin B_1 supressing activity with their Minimum inhibitory concentration (MIC) and minimum antiaflatoxin inhibitory concentration (MAIC) at 1.25µl/ml and 1.00µl/ml respectively. The detailed antifungal mode of action was investigated through measurement of ergosterol content, ion leakage through AAS assay at the level of fungal cell membrane. The findings suggest that PGEO could be used for the development of eco-friendly food preservatives.

Keywords: *Aspergillus flavus*, Aflatoxin B_1, Essential oil

Significance of Plant-Microbe Interactive Phenomena in Sustainable Agriculture

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Modern agriculture practices and increasing awareness about plant-microbe interactions tends to focus more on the development of breeding or crop-protection schemes than making the attempt to eliminate the potential pathogens as making it sustainable. The understanding of plant-microbe interactions mechanism could be helpful in minimizing disease incidence, pathogen outbreaks, enhancing biodiversity, plant productivity, and maximize the profitable functions in sustainable agriculture. In addition, these interactive ventures also influence the resource allocation between root and shoot, biodiversity, mediating the above-ground below ground interactions with herbivores and other natural enemies of the plants. Moreover, the interactive dialogues between plant and microbes can modify the chemical, physical, and biochemical properties of the soil to help the plants indirectly by manipulating the abiotic factors. Recent advancements in several meta- and omics- technologies viz. proteomic, metabolomic, genomic, metagenomic and transcriptomic approaches laid the desired manipulations easy in plant-microbe interactive conquest to facilitate organic agro-practices and ensuring complete utilization of beneficial microbial ecological interactions for additional benefits.

Keywords: Sustainable agriculture; Organic agro-practices; Plant-microbe interactions; Beneficial microbes; Crop-protection schemes.

Eugenol as an effective plant-based preservative against aflatoxin B1 production and elucidation of mode of action

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Eugenol, a phytogenic bioactive compound is commonly found in diversified herbal plants. Major sources of eugenol are clove, cinnamon, tulsi and pepper. Eugenol have various properties as Antimicrobial activity, Anti-cancer activity, Antioxidant activity, Anti-inflammatory potential, Neuro-protective & anti-stress related perspectives and antidiabetic potential etc. Fungal and aflatoxin contamination causes quantitative and qualitative losses of food commodities and adversely affect their shelf life. Aflatoxin contamination of agri-food commodities is the driving force area of research since the 1960s because of its genotoxic and carcinogenic potential (IARC, 1993). In 1993, the International Agency for Research on Cancer assessed and classified naturally occurring mixtures of aflatoxins as class 1 human carcinogen (IARC, 2002, pp. 82e171). Eugenol have strong antifungal activity against *A. flavus*, both minimum inhibitory concentration (MIC) and minimum afltoxin inhibitory concentration MAIC 0.5µl/ml and also have strong antioxidant activity 0.0068µg/ml (IC_{50}). Mode of actions of eugenol on *A. flavus* was elucidated targeting the ergosterol and vital cellular ion content in the cell membrane.

Mentha arvensis Essential oil (MAEO) as an herbal food preservative and self-life extension of stored food products.

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Mycotoxin contamination in various food commodities viz., cereals, legumes and vegetables etc is one of the severe problems that may causes health hazardous effect on human being and livestock. Among different mycotoxin Aflatoxin B1 (AFB1) is potent hepatotoxic, mutagenic, carcinogenic and immunosuppressive. Biological control, sorting technology, electomagentic radation, chemical preservatives are expensive and adverse effect on environment. The present study revealed the antifungal and preservative potential of *Mentha arvensis* (MAEO) with probable mode of action. MAEO exhibited strong Antifungal and antiaflatoxigenic activity with minimum inhibitory concentration (MIC) and minimum aflatoxin inhibitory concentration (MAIC) of 1.5µL/mL and 1.0 µL/mL respectively. The mechanism of action was elucidated via targeting the membrane integrity using AAS assay and ergosterol measurement. The finding could be great significance and improved performance as a plant based preservatives during storage of food commodities.

Important of Yoga in Sports

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Yoga is a science and yoga is a complement to medical technology : a holistic system of heath care that addresses the problem of the mind and spirit , as well as those of the body . An ancient tradition with the goal of the stilling of the restlessness of the mind and the joining of mind, body and spirit in the search of health, self-awareness and spiritual attunement. In Sanskrit : the balance of integration of the mind/body/breath the union of the whole person-soul, mind, emotions , and physical body . Yoga plays an important role in sport yoga; Asana, Pranayama, Suryanamaskara, Meditation and kayotsarga are usually performed by sportsperson for various purposes in Sports. Yoga improves their concentration. It helps in developing physical fitness and it is also good for relaxation, good for rehabilitation after sports injury. The present paper focuses upon the role of Yoga in sports with special reference to the Indian population. Effort have been made to acknowledge the benefits of yoga : 1. Improves concentration – some yogasana [balancing pose], Pranayama like anulom-vilom, bhramari etc. Meditation helps to increase concentration, 2. Weight control- Sportsmen often gains weight during off-season. This can easily be prevented by practicing all yoga techniques, 3. Increase immunity – Yoga also increase immunity, 4. Improves all system, Yogasana , Pranayama and suryanamaskar improves all body systems, 5. Improves glandur function – Daily practice of yoga improves fitness especially flexibility, coordination and endurance, 7. Tone up muscular and nervous system, 8. The breathing exercise of yoga helps to control

the breath which is very important for sportsperson , 9. Meditation , relaxation poses and some pranayama cure stress and anxiety , 10. It cures all components of physical fitness like speed, strength, flexibility etc.

Analysis of Water Quality Aspects of Ganga River, in Varanasi

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River Ganga is one of the prime sacred National Rivers of India and is closely associated with the economic, social and cultural heritage of Indian people, has been subjected to immense degradation and pollution due to receiving huge amount of domestic and industrial wastewater as well as religious ritual activities and surface runoff. The present study aimed to study spatial and temporal variation in pre-monsoon, monsoon and post-monsoon season by the analysis of physico-chemical parameters to assess the suitability of water for drinking, irrigation purposes and other human uses at eight sampling sites in Varanasi for one year, from January 2017 to December 2017. The study also identifies the critical pollutants affecting the river water quality during its course through the city. Dissolved oxygen, Biological oxygen demand, chemical oxygen demand and pH were found to be critical parameters in all season for the stretch. It was observed that the main cause of deterioration in water quality was due to the lack of proper sanitation, unprotected river sites and high anthropogenic activities.

The impact of industrialization and urbanization on surface water quality of River Ganga vis-à-vis its sustainability studies

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The quality of inland fresh water ecosystem are getting deteriorated rapidly with the changing human life style i.e., massive industrialization and urbanization for developmental purposes. These developmental activities generate large quantities of concentrated effluents. Beside these, the rapid industrialization and urbanization poses high pressure on surface water resources which result their depletion and contamination. Therefore, it is necessary to monitor and evaluate water quality on regular basis.

Present study seeks to evaluate problems caused by urbanization and industrialization on surface water of Ganga River and also concentrates on the sustenance studies of this water body. The study was performed at the twenty two selected sites, along a 22-km-long stretch of Ganga River in Varanasi for one year, from January 2017 to December 2017 and analyzed to evaluate the impact of urban and industrial discharges on the surface water quality.

The results showed that most of the samples not meet the prescribed standard value of As, sulphate, chloride, nitrate, phosphate, DO, BOD and COD set by BIS and WHO. This study revealed that Ganga River was highly polluted and that it is tending, fast towards "Eutrophysim". Thus, urban and industrial discharge had profoundly affected the water quality of Ganga River in a negative way. Hence, extraction of water from Ganga River for domestic and agricultural purposes requires a regular monitoring because it reduces the flow in the water body thus lowering its self-purification capacity. Inflow of industrial

and domestic effluent discharge into this water body should be reduced for appropriate of water quality of Ganga River.

Hyper Accumulation of Chromium in Salanum nigrum L. and their effects on phytochemical and Antioxidant Enzymatic Activities

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In the Pot. experiment Solanum nigrum L. Treated with Different concentration of Cr showed high accumulation of Cr in Plant. Growth of Plant was not significantly affected upto < 50 ppm cr treated plant. The trends of Cr accumulation in plant were leaf > Shoot > root with increasing concentration of Cr. and DAS. Plant accumulation 298, 92 and 58 ppm of Cr after 60 DAS in leaf > shoot > root respectively at 50 ppm cr treatment. Solasodine and proline content was increased at < 40 to 50 ppm cr treated plant, while APX and CAT activity showed the survivability against Cr toxicity upto < 60 pm of Cr. qualitative phytochemical analysis viz. Alkaloids, tannins and selavonoids were dominant at early days and unaffected upto < 30 ppm cr treated plant. BF and TF for was > 1.0 for Cr in Solanum nigrum L. hence the Cr accumulation capacity of the Solanum nigrum L. could make it useful for phyoremediation of the metal.

Habitat distruction and biodiversity loss of some medicinal plant species of family Ephorbiaceae

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Present piece of work is a part of about seven years exhaustive observations on annual variation phytosociological parameters of herbaceous weed plants of medicinal importance. Anpara, a region of district Sonebhadra which has acquired a noteworthy place on national level as an electricity producer. Here various Thermal Power plants are running. The thermal power plants utilize a heavy amount of powdered coal and produce hazardous fly-ash as Coal Combustion Resedue (CCR) that is poured in huge ash dams ans used as filling matter in low-lands.

Present paper deals with the effect of such deeds on biodiversity. A continuous observation had been made since 2010 on the phytosociological aspects of some medicinal plants. The data has been collected from the low lands of the study area and that has been compiled in two sets – before land filling and afterwards.

The paper depicts the annual variation in Relative Frequency, Relative Density, Relative Dominance and the Importance Value Index (IVI) of four medicinal plants of the family Euphorbiaceae, *viz. Euphorbia hirta, Euphorbia thymaefolia, Phyllanthus fratternus, and Phyllanthus debile* which have been reported to continuous degradation till the level of almost disappearance from the area (Region of land-fills by fly-ash) where were proliferating before land filling.

Key Words **:** Fly-ash, Low lands, biodiversity loss, Medicinal plants, Euphorbiaceae, IVI.

Effect of different doses of Sodium benzoate on intestiinal mycoflora, *E. coli*

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The use of food preservation for food products by a manufacturer is of very common use now a days . This may be natural or man-made substance. Among these ,sodium benzoate is a food preservative , used to preserve various food products as jam , fruit juice etc. Food containing this, when comes in contact with intestinal microflora may affect it. The present study is based on the evaluation of effect of different doses of sodium benzoate on intestinal bacterium,*E.coli.*

Damaging and Regulatory role of Tropospheric Ozone on Primary and secondary metabolites on Medicinal Plants

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Medicinal plants are widely distributed throughout the globe and are used in treatments of various diseases since ancient time. In India plants have been traditionally used for human and veterinary health care needs. This reflects that medicinal plant and their products have taken an increasing demand. Herbs are staging a comeback and herbal 'renaissance' is happening all over the globe. The herbal products today symbolize safety in contrast to the synthetics, that are generally regarded as unsafe to human and environment.

Abiotic stresses such as tropospheric ozone (O_3) is a major secondary air pollutant and greenhouse gas, affecting carbon dynamics, ecological interactions and agricultural productivity and quality at the global level. Elevated O_3 has been well documented in tropical region. However, the effects of elevated O_3 on medicinal

plants have not been comprehensively studied. The current literature review suggests differences in growth, biomass, physiology and leaf secondary metabolites and membrane lipids are significant due to O_3, however reports on secondary metabolites including phenolics and terpenoids are not well known. Variations in different medicinal plants were distinct and responses to O_3 vary among different plant parts. Based on the current evidences it is foremost to study the negative effects of ozone on different medicinal plants and different medicinal compounds obtained from them.

Impact of elevated UV-B radiation on growth, physiology, biochemistry and secondary metabolites of selected medicinal plants

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In recent years stratospheric ozone depletion has been largely attributed to rapidly changing climatic conditions, altered land use pattern and newly discovered ozone depleting substances and is directly responsible for increased penetration of biologically active UV-B radiation reaching to Earth surface. Global climatic change factors including UV-B is one of the major problem of all the developing countries. Plant responses depend largely on UV-B dose and other environmental variables such as quality and quantity of visible and UV-B light, presence of gaseous pollutants and availability of soil nutrients. In general, the effects of elevated UV-B radiation are negative for biological life. Plants display reductions in growth, photosynthesis, and increase of antoxidative defense enzymes and secondary metabolites against exposure to eUV-B. Despite, a rich history and economic importance, potential of medicinal plants has not been fully explored. Therefore, a comprehensive study of selected medicinal plant responses against eUV-B is reviewed. Variations in various physiological, biochemical and medicinal compounds were identified in relation to eUV-B stress. eUV-B become a critical issue for herbal community, affecting cultivation and properties of medicinal plants. The current limitation of new drugs has fostered interest in plant based drug discovery. Despite progress in synthetic

chemistry, plants still constitute an important source of pharmaceuticals and other compounds of economic importance. UV-B radiation is one of the important environmental factors for many plants with remarkable influence on defense related secondary metabolite biosynthesis that can be beneficially exploited for production of medicinally important compounds.

Keywords: Ozone (O_3). Chlorofluorocarbon (CFC). Elevated UV-B radiation (eUV-B) . Medicinal plants . Secondary metabolites.

Alleviation of ground level ozone induced phytotoxicity by adopting different agronomic practices

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Tropospheric ozone (O_3) phytotoxicity is a global threat to agricultural sectors and consequently the food security. Although, several developed countries such as United States and several European countries exhibit a declining trend in O_3 level compared to Asian countries including India and China where a significant rise in O_3 pollution is distinct; but the prevailing concentrations are still high enough to affect the plant growth and productivity globally. Here, we have mainly emphasized on the effectiveness of suitable agronomic practices that are applicable against O_3 induced phytotoxicity. Adaptation to various agronomic practices against O_3 includes soil amendments, proper plantation strategies, shifting crop calendar, crop protection measures, weed management, and seed treatments. Soil amendment practices such as application of 1.5 times the recommended NPK dose, addition of organic manures and utilization of proper plant protectant compounds such as fungicides, growth regulators, natural antioxidants and ethylene diurea could find their importance in alleviating the O_3 induced injuries in crops. Shifting crop calendar to avoid O_3 peaking seasonal condition during critical growth stages of the crop and proper weed management in field can be useful practice to reduce O_3 induced yield losses. Adaptation of plantation strategies of low biogenic volatile organic compounds

emitters should be assured in vicinity of agricultural areas. Proper management of other abiotic stresses such as drought and salinity must be taken under consideration to avoid the combined stress induced modulation in plant response which may sometimes be synergistic or additive. Beside this, breeding of O_3 resistant/tolerant species or cultivars by manipulation of stress regulatory genes, components of signalling pathways, stomatal regulation or antioxidative defence system can be useful to minimize the yield losses. Further investigations and studies are urgently needed in this direction and potential cost effective analysis of these practices should be identified to minimise ozone induced crop losses.

Keywords: Agronomic practices, Ozone, Mitigation, Protectants, Phytotoxicity