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NATIONAL CONFERENCE
on
**Emerging Innovations in Agriculture,
Biotechnology and Health Sciences**
November 8-9, 2019



Editor-in-Chief
Dr. Pankaj Verma

Editor
Mr. Rishi Kr. Verma

Published By



ARCHIVE OF LIFE SCIENCE AND ENVIRONMENT
(An International Journal)

Organized by
Department of Biotechnology
B.N. College Of Engineering and Technology, Lucknow (UP)



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on
Emerging Innovations in Agriculture,
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Souvenir

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B.N. College of Engineering and Technology
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Shri Mahesh Singh Patel

**Founder Chairman
BNCET, Lucknow.**



MESSAGE

BNCET is going to organize a National Conference on “Emerging Innovations in Agriculture, Biotechnology and Health Sciences” on 8 & 9 Nov-2019. It will provide the opportunity to eminent scientists, students and faculties to present their cutting edge researches in the field of biotechnology and its applications in modern science. This conference will offer a best platform for listening and networking with the leading experts in finest platform where you can deliberate the prominence latest biotech research and learn about all the important developments in biotechnology and healthcare research.

The conference aim is to gather the researcher’s academicians and scientists from the field of biotechnology and healthcare community and to create an approach towards exchange of informations on technological advances, new scientific innovations, and can be proved effective for various regulatory programs towards biotechnology and healthcare. This conference will be an effort and a good beginning in that direction.

I wish them all the good luck for their endeavors.

(Mahesh Singh Patel)



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Prof. (Dr.) Raghuvir Kumar

**Director General
BNCET, Lucknow.**

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MESSAGE

I am indeed happy to learn that initiative taken by BNCET, Lucknow is organizing a National Conference on “Emerging Innovations in Agriculture, Biotechnology and Health Sciences” on 8th & 9th November, 2019. It is proven worth as academicians, industrialists, researchers, all stake holders and students are sharing to the best of their credibility and experiences.

We know that technological developments are taking fast and exploring newer fields of research and development. The theme of conference is very topical and suited to the present scenario. I feel that the conference presents an excellent platform to deliberate over some of the most crucial Agriculture, Biotech and Health Sciences concerns.

I convey my hearty greetings to the members of organizing committee and wish all the participants to gain fruitful knowledge during the scientific and technical sessions ensuring the relevance of the conference.

I extend my best wishes to the success of the conference.

(Prof. Raghuvir Kumar)



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Prof. (Dr.) Ashutosh Dwivedi

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MESSAGE

It gives me an immense pleasure to inform you all that Department of Biotechnology, B.N. College of Engineering and Technology, is organizing a National level Conference on “Emerging Innovations in Agriculture, Biotechnology and Health sciences” to be held on 8th and 9th Nov 2019, at BNCET Lucknow, UP India.

The current era belongs to innovations and research when it comes to agriculture, biotechnology and health sciences. Scientific community is striving hard to work for the up-liftment of society by regular innovations and discoveries. Keeping the challenges in mind, we have a planned a two day national conference to discuss the issues related to innovation and research in health sciences, biotechnology and agriculture.

I am extremely happy that researchers and professionals from different sectors and prestigious institutions are sharing the stage to discuss and address the issues and progress in the areas of agriculture, environment, and biotechnology and health science. All such efforts must be recognized and appreciated at each and every level as these give a broad idea to whole academic fraternity.

I wish the conference every success.

(Prof. Ashutosh Dwivedi)



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Dr. Abhishek Mishra

**Additional Director
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It gives me immense pleasure to note that, Department of Bio-Technology of our college B.N. College of Engineering & Technology is going to arrange a National Conference on “Emerging Innovations in Agriculture, Biotechnology and Health sciences”.

It is certainly heartening to note that the event has attracted academicians, research scholars, students and industry experts from almost every corner of the country. I am convinced that the discussions of this conference will contribute new dimensions in the field of Biotechnology and Agriculture.

I take this opportunity to congratulate the organizing team for the effort taken by each one of them to make this 1st National Conference a reality.

I wish them all a grand success. Good Luck!!!

(Dr. Abhishek Mishra)



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MESSAGE

It is my pleasure to invite all of the great scientists, academicians, young researchers and students from all over India to attend the National Conference on “Emerging Innovations in Agriculture, Biotechnology and Health Sciences” on 8-9 Nov-2019, in BNCET-Lucknow Campus.

This National conference shares an insight into the recent research and cutting edge technologies, which gains immense interest with the colossal and exuberant presence of adepts, young and brilliant researchers and talented student communities.

National Conference goal is to bring together, a multi-disciplinary group of scientists and engineers from all over the India to present and exchange break-through ideas relating to the physics. It promotes top level research and to globalize the quality research in general, thus making discussions, presentations more competitive and focusing attention on the recent outstanding achievements in the field of Biotechnology, and future trends and needs.

Since this conference covers many global aspects on Biotechnology from very fundamental issue to practical application, anyone interested in future progress of Biotechnology should not miss.

We’re looking forward to an excellent meeting with great scientists, emerging students from different parts of India and sharing new thoughts and ideas for new era of Biotechnology, and I wish all the very best to all team members and fraternity of BNCET for this great achievement.

Bhanu Pratap Singh

(BhanuPratap Singh)



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MESSAGE

It gives me immense pleasure to welcome you all at our National Conference on “Emerging Innovations in Agriculture, Biotechnology and Health Sciences (EIABH)-2019”. It is organized by Department of Biotechnology, B.N. College of Engineering and Technology (BNCET), Lucknow during November 8-9, 2019. I am grateful to my institute to take this initiative of organizing this grand event. I firmly believe that EIABH-2019 will be a scientifically vibrant program. Biotechnology holds the path for sustainable development in all aspects of Life sciences. All round advances in the fields of agriculture, health, and environment can be made possible with the sensible applications of Biotechnology.

The program would provide a platform to students, researchers and faculty members around the Nation together and share their ideas and innovations with each other in the various fields of Biotechnology. In addition, it would be an occasion to discourse the challenges facing in the inventions in the field. The thought inciting discussions will definitely ignite sparks in the minds of young researchers to carry out breakthrough research.

I wish EIABH-2019 a grand success.

(Dr Pankaj Verma)



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Er. Rishi Kumar Verma

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MESSAGE

I am pleased to welcome all the participants for National Conference on “Emerging Innovations in Agriculture, Biotechnology and Health Sciences (EIABH)-2019”. The conference envisages a forum to researchers around the Nation to explore and discuss on various aspects on recent advances in the field of Agriculture, Biotechnology and Health Sciences. These fields of research opened up the search to find the different dimensions of sustainable agricultural practices, along with environmental sector, medical sector, and health sector.

Any achievement of life is always a result of hard work put together by many sincere persons and well-wishers around us. I sincerely extend my gratitude to my colleagues, faculty members and students of the department for their support and enthusiasm. Moreover, this national conference would not have been possible without constant support from the Institute.

The conference represents a cooperative, technically motivating, and scientifically vibrant platform to all the researchers, students and faculty members. All talks are delivered by eminent scientist of high repute and one of the best of their field. The experience gained by all the participants during the conference will enhance their knowledge in the respective field. Last but not the least, I also sincerely acknowledge all the persons who are involved, directly or indirectly, in the organization of this event.

I wish all the participants a happy and pleasant conference.

Rishi

(Rishi Kumar Verma)

NATIONAL CONFERENCE

Emerging Innovations In Agriculture, Biotechnology And Health Sciences

November 8-9, 2019

INVITED LECTURES

**Memory Reversal in a Mathematical Model of Alzheimer's Disease
Progression**

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Peace cannot be built on empty stomach. We need to have sufficient food crop production to feed the population which grows in geometric progression. The origin and genesis of high - yield pest- resistant, seed varieties will be discussed to prepare stage for an elaborate discussion of modern day technologies which are vogue in agricultural practices; recombinant DNA, tissue – culture, etc. Both positive and negative aspects of genetically modified food will be covered. Nano-biotechnology has made significant contribution to the advancement of health sciences. The data generated through the human genome project has rendered the personalized medicine a possibility. Stem cell research has witnessed many breakthroughs in regenerative medicine. Opto-genetic engineering is now being used to repair the retina by replacing the damaged photoreceptors. My own experience in Alzheimer's disease research will be covered in detail.

Keywords: Alzheimer's disease, Stem cell research, Opto-genetic engineering

Sugarcane Biotechnology: The Advancements and Prospects

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Sugarcane is an industrial crop of unquestionable importance for tropical and sub-tropical regions of the world. Sugarcane accounts for >80% of the sugar produced worldwide, of which India contributes ~20%. In the year, 2017, at global level, sugarcane was grown on 25.97 Mha area, which led to a production of 1841.5 million tons of sugarcane. In India, annual production of sugarcane is ~370 MMT, and it is the second largest agro-based industry with >70% of the rural population associated with sugarcane agriculture/industry. Sugarcane plants are cost-effective renewable resource with their multifaceted use as food (sugar, Jaggery, syrup), feed (green top/leaves), and fertilizer (press mud). In recent years, the potential of residues from processing industry (bagasse, leaves and tips) was analyzed with a view to second-generation ethanol and cogeneration of electric power. This genus *Saccharum* consists of six species, of which two (*S. spontaneum* and *S. robustum*) are wild and four (*S. officinarum*, *S. barberi*, *S. sinense* and *S. edule*) are cultivated. Modern sugarcane cultivars (*Saccharum* spp. hybrids) are interspecific hybrids of *S. officinarum* ($2n = 80$), which has higher sucrose content, and *S. spontaneum* ($2n = 40-128$) which contributes beneficial agronomical traits including tolerance to biotic and abiotic stresses. Sugarcane cultivars have >100 chromosomes ($2n = 100-130$) distributed in about 12 homologous groups with a total genome size of ~10 Gb, and are considered a genetically complex polyploid and aneuploid crop. Sugarcane breeders often repeat many cycles of backcrossing either with *S. officinarum*, a process called “Nobilization”, or with superior commercial hybrids (recurrent selection for sugar, or RSS) to reach a reasonable high level of sucrose content in modern sugarcane cultivars with respects to many agronomical traits.

In general, the conventional sugarcane breeding process takes 10-12 years to develop a new commercial variety. Supplementing traditional breeding methods with genomic tools has the potential to address genetic bottlenecks, increase breeding efficiency and ultimately speed up the development of new improved cultivars. However, due to the complexity of sugarcane genome, genetic analysis of this crop has so far received little attention from plant scientists. In recent past, a number of cutting-edge genomic tools have been developed that have opened new

opportunities to improve our understanding of the genetic architecture of sugarcane and to explore its functional system. The integration of classical breeding with *Omic*s tools has become imperative to harness the full potential of such techniques leading to enhanced breeding efficiency. Sugarcane plants are auto- and allo-polyploid with a high level of aneuploidy, and with chromosome numbers varying among accessions from 100 to >125, dozens of copies for each homologous chromosome and an estimated map length of 17000 cM, it represents a formidable challenge to any genotyping technology.

The development of ubiquitous genetic marker technologies in conjunction with increased computational capability has provided abundant resources to develop genome-wide linkage map. Biotechnological approaches combined with bioinformatics analysis paved the way for identification of new genes, regulatory elements, promoters and expressed sequence tags (ESTs). Extensive EST data for sugarcane has been developed which consists of ~240000 ESTs from Brazilian initiatives under SUCEST and >25000 ESTs from Indian efforts; these have been a key genomic resources. Comparison of ESTs from sorghum with sugarcane, maize, and rice revealed mean sequence identities of 97%, 93%, and 83%, indicating a synteny between sugarcane and sorghum. Identification of genome-wide molecular markers derived from such resources has allowed the development of high density linkage maps of sugarcane genome. Such a variety of markers could also be useful in DNA fingerprinting, diversity analysis and marker-assisted breeding in sugarcane. With the advancements in high throughput sequencing technologies, SNP markers are now the best choice in sugarcane, which could help to study copy number of genes, allelic variations, variation in gene sequences, etc. Despite the importance of sugarcane, its whole genome sequencing is in the initial phase with the report of BAC based ‘monoploid genome’ sequence that aligned on the gene rich part of the sorghum genome. Recently, an allele-defined reference genome has also been published for *S.spontaneum*.

Sugarcane faces a lot of challenges from both biotic and abiotic stresses, which can lead to a considerable yield loss. Transcriptome studies involving, microarray, C-DNA AFLP, SAGE, etc. could be handy tools for analyzing crop response at gene level against such stresses. Recent release of transgenic sugarcane for drought tolerance in Indonesia, and for herbicide tolerance in Brazil are few examples that indicate power of gene technologies. Such developments could also be the start of new opportunities in the area of viral and fungal resistance, increased sugar content, lignin synthesis, sugar accumulation for researchers in India and abroad.

Recent Trends in Bioinformatics Driven Computer-Aided Drug Design

Dr. M.I. Siddiqi,

Principal Scientist, Molecular and Structural Biology Division, CSIR- CDRI, Lucknow

Computer-Aided Drug Design (CADD) or *in silico* drug design is a specialized discipline that uses computational methods to simulate drug-receptor interactions. CADD methods are heavily dependent on bioinformatics tools, applications and databases and as such, CADD and bioinformatics together have emerged as a powerful combination in drug research and development. *In silico* drug design is a process used in the biopharmaceutical industry to discover and develop new drug compounds. It uses a variety of computational methods to identify novel compounds, design compounds for selectivity, efficacy and safety, and develop compounds into clinical trial candidates. These methods fall into several natural categories – structure-based drug design, ligand-based drug design, *de novo* design and homology modeling *etc* – depending on how much information is available about drug targets and potential drug compounds.

Keywords: Computer-Aided Drug Design, *In silico* drug design, Homology modeling

Novel Process for Isolation of Cellulose from *Mentha* Distilled Biomass and Its Saccharification using *Trichoderma* Enzymes

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Natural *l*-menthol a flavour and fragrance bearing compound, which is obtained from the essential oil of Cornmint (*Mentha arvensis*). India produced more than 7 million tons of Cornmint biomass and after processing it generates about 6 million tons of distilled biomass. Menthol is one of the most important flavours and natural menthol production is more than 5000 tonnes per annum. India fulfills 60% of World's menthol need and it is a short duration cash crop for farmers of Uttar Pradesh, Bihar, Haryana and Punjab. The valuable essential oil is obtained by hydro-distillation and after distilled lignocellulosic biomass is treated as waste. A novel process was developed for isolation of cellulose (38%), hemicellulose (24%) and lignin (12%) using a fabricated 2 L double jacketed reactor. This isolated cellulose was enzymatically saccharified to glucose (500 mg/g) with 10 FPU/g loading of *Trichoderma reesei* (114 FPU/ml) at 36°C for 96 h. In biotransformation process, *Trichoderma* stains were used for glucose production in laboratory conditions and an estimated yield of glucose was upto 400 mg per g of isolated cellulose.

Keywords: *Mentha arvensis*, Cellulose, Glucose, *Trichoderma*, Enzyme

Indian Spice and Condiments: Potential Immunomodulators

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Development in clinical and experimental immunology strongly suggests that many infectious diseases and disorders arise because of stressful environmental conditions associated with suppression of immune system. The ability to modify the immune response in animals and humans evolved from a desire to confer greater protection against infectious agents through a more complete understanding of the functioning of the immune system, and of the ways in which nonspecific and specific immune mechanisms developed. Naturally occurring or synthetic compounds capable of altering those mechanisms offered further possibilities for modulating immune responses. Modulation of immune functions using medicinal plants and their products as a possible therapeutic measure has become an accepted therapeutic approach. Plants and minerals have been used since ancient times for the treatment of many ailments and diseases. It is now being recognized that immunomodulation of immune response could provide an alternative to conventional therapy for a variety of disease conditions, especially when the host's defense mechanism has to be activated under conditions of impaired immune responsiveness or when a selective immunosuppressant has to be induced in situation like autoimmune disorders and organ transplantation. A number of Indian medicinal plants and various 'Rasayana' have been claimed to possess immunomodulatory activity. Some of these plants are *Allium sativum*, *Curcuma longa*, *Terminalia arjuna*, *Withania somnifera*, *Tinospora cordifolia*, *Mangifera indica* etc. The use of various plant extracts and herbal feed additives in specific dose during the scheduled vaccination regimen may be helpful in obtaining higher protective antibody against different infections including production and development of more effective cell mediated immune response for protection against various bacterial, viral and other diseases. Herbal formulation may be therefore recommended for use as positive immunomodulator, because of their high efficacy, low cost and low toxicity.

Keywords: Immunomodulator, Rasayana, Medicinal plants

Xylanase produced from Alkalophilic *Bacillus Licheniformis* and its Pretreatment of Eucalyptus Kraft Pulp

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In the present study, the effect of enzymatic pre-treatment on pulp bleaching has been investigated using purified xylanase from alkalophilic *Bacillus licheniformis* strain Alk-1. The xylanase produced by isolate on wheat bran was purified homogeneity by 5.84-fold with ~15.97% recovery using anion exchange chromatography through Diethylaminoethyl cellulose (DEAE-cellulose). The molecular weight of the xylanase was ~46 kDa. The optimal pH and temperature of xylanase activity were pH 9.0 and 60°C, respectively. The enzyme showed good retention activity (80%) after 1h incubation at 60°C and pH 9.0. Enzyme activity was stimulated by Ca²⁺, Fe²⁺ and Mg²⁺ and inhibited by Cd²⁺, Hg²⁺ and Cu²⁺ at 2mM and 10mM conc. For xylan, the enzyme gave a K_m value of 5.26 mg/ml and V_{max} value of 433 μM/min/mg proteins when the reaction was carried out at 60°C and pH 9.0. Xylanase treated pulp showed reduction in kappa number by 19% after 2 h of treatment. Scanning Electron Microscope (SEM) and Fourier Transform Infrared Spectroscopy (FTIR) analysis revealed significant morphological and structural changes on pulp fibres. GC-MS analysis of both samples showed variation in the presence of different plant-derived organic compounds. The present work can help to make the paper production process cleaner and eco-friendly.

Keywords: *B. licheniformis*; Purified xylanase; SEM, FTIR.

**Functional Genomics and Systems Biology approach for Understanding Agro-
Ecosystems**

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Plant metabolism is affected by several biotic and abiotic factors of our environment that leads to low yield in crops. The integrative approach of functional genomics and systems biology is one of the most promising tools for understanding the agro-ecosystems. In this contest, we will discuss the role of functional genomics to study the effect of stress on plants. Various approaches and tools of systems biology will be also discussed to understand the alteration in biological networks, i.e., gene regulatory, protein-protein and metabolic networks, etc. Different tools available for studying the agro-ecosystems using omics and systems biology have been explored here in detail.

Keywords: Functional genomics, Metabolic networks, Omics

AGRICULTURE

Screening of Introgression Lines of *Brassica juncea* against *Alternaria brassicae* and Confirmation of Introgression using *Diplotaxis erucooides* Specific Molecular Marker

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The *Brassica* genus belongs to *Brassicaceae* family and consisting of 37 different species. *Brassicaceae* is having three diploid species and from these species three amphidiploids species were evolved during the evolution and *Brassica juncea* (2n=36) is one of the amphidiploids species derived from *Brassica rapa* (2n=20) and *Brassica nigra* (2n=16). Mustard (*Brassica juncea*) contributes as an important part to the total oilseed production in India. Development of brown leaf spot resistant mustard cultivars is a relevant objective in view of heavy crop losses caused by *Alternaria brassicae* pathogen. The native germplasm of *Brassica juncea* or its related species were lacking of having the resistance gene for this disease. So the already identified wild species (*Diplotaxis erucooides*) having resistance gene (s) were used for the development of introgression lines long year back at ICAR-NRCPB and now these IL's lines were used for the present study. In this study the screening were conducted against *Alternaria brassicae* isolates (AC7 and AC9) and inoculations were done on whole plants (*in vivo*) and on detached leaves(*in vitro*). In *in vivo* out of 317 plants screened against AC-7 isolate, 64 were showed highly resistant reaction (HR), and 315 plants screened against AC-9 isolates, 38 were showed highly resistant reaction (HR). The signify results were not obtained from *in vitro* experiment but this validate or support the *in vivo* screening in term of resistance. The introgression of gene (s) from wild species were confirmed in the IL's plants using *Diplotaxis erucooides* specific STS molecular markers and showed amplification in the pooled group of plants which represents the introgression of gene (s) in the IL's plants. Amplification represents that the introgression is present in the individual plants pooled under groups. So, for the trait which are not present in the same species and genera we have to go for the wild species for the introgression of particular trait of gene (s) for the improvement of crops.

Keywords: *Alternaria brassicae*, *Brassica juncea*, disease resistant, molecular marker, wild species

Phenotyping of Lentil (*Lens Culinaris*) Germplasm for Drought Tolerance at Seedling Stage

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Climate change mitigation and biodiversity conservation are among 16 sustainable developmental goals of United Nations. Climate forecasts predict the exaggeration of erratic rainfall patterns in future threatening the sustainability of crop production. Crop genetic resources conserved in genebanks are the reservoir of genetic variability for different traits and this variability need to be tapped for development of climate resilient varieties. Characterization, evaluation and identification of trait specific germplasm followed by its utilization in breeding program is required for sustainable crop production. Lentil (*Lens culinaris*) is an important cool season legume crop grown on post rainy residual moisture. Crop frequently faces water deficit during its life cycle, which leads to forced early maturity and reduced crop yield. So far, the Indian gene bank germplasm collections have been negligibly used in lentil breeding program. Implementation of a systematic phenotyping approach is required for evaluation of conserved lentil germplasm and identification of new donor lines for desirable traits. Keeping it in view, present study was undertaken to screen lentil germplasm for drought tolerance at seedling stage. A set of 200 diverse lentil accessions was screened for seedling stage drought tolerance using cigar roll method. Polyethylene glycol 6000 was used to impose drought stress and seedlings were harvested after two weeks of sowing. Germination percentage, biomass, root length, shoot length and root traits (root surface area, root volume, diameter, total root length and root length density) were recorded in all the lines under control and drought conditions. Significant variation among the studied lines was observed for all the traits. A total of 28 lines did not germinate under drought, while, 23 lines showed 100% germination. Promising accessions were selected based on germination percentage, seedling survival followed by biomass under drought condition. Under stress, root length and shoot length varied 7.05-9.48 cm and 3.88 – 6.18 cm respectively. Based on different parameters, accessions EC78414, IC268239, IC268243, IC321219, IC560051, IC560337, EC78424, IC346092, IC361296, IC385822 and IC559757 showed drought tolerance. Identified lines are being validated further for drought tolerance under field conditions for future use as donors in breeding program.

Keywords: Climate mitigation, Biodiversity conservation, Germplasm, Seed bank

Bioprospecting Microbial Glycosyl Hydrolases for Augmenting Saccharification of Agricultural By-Products

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Lignocellulosic biomasses are deliberated as most attractive sources for bioenergy production. They comprise of celluloses and hemicelluloses which can be effectively depolymerized and hydrolyzed to fermentable sugars using diverse microbial enzymes, for subsequent conversion to various value added products. Present study reports the isolation, screening and identification of various microorganisms producing glycoside hydrolases of industrial importance. In this study, indigenous cellulolytic and xylanolytic microorganisms were isolated from different waste samples at a range of temperature from 30-60°C. Amongst 294 morphologically different strains, 40 strains were further analyzed quantitatively using enriched media containing salts and nitrogen source supplemented with Whatman filter paper and corn cob for screening of cellulolytic and xylanolytic microbes, respectively. Four fungal xylanolytic isolates, were finally selected after several rounds of screening. They were identified as *Aspergillus sp.* based on ITS region sequencing. These isolates could effectively degrade agricultural residues with maximum xylanase activity within the range of 14.4 - 26.3 IU/ml when working as singlet. A consortium of these microbial sources is likely to enhance saccharification of agricultural wastes through maximal enzyme production.

Keywords: Glycoside hydrolases, lignocelluloses, *Aspergillus sp.*, microbial consortium

Biochemical Analysis of Onion (*Allium cepa* L.) and Garlic (*Allium sativum* L.) Extracts & their Antifungal Activity Analysis on *Alternaria alternata* and *Penecillium expansum*.

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Onion and garlic are among the premium members of Amaryllidaceae family expressing a tropical to warm temperate perennial bulbs. India stands third in the production of onion and garlic. The present study was undertaken keeping the biocidal activity of Amaryllidaceae members in mind and assessing their potential as antifungal agent against some storage fungi and also to study the diversity existing among various Amaryllidaceae varieties as this diversity may affect their antifungal nature. Bulbs of onion (categorized on morphological basis as dark red, purple, white and spring onion varieties) and garlic were used for the preparation of aqueous extracts and were subjected to a preliminary phytochemical analysis. Fungi were isolated from different varieties of fruits and vegetables and were identified. Once the pure cultures were obtained, inhibitory effect of these extracts was tested on these cultures using Poisoned Food Technique. All the extracts showed antifungal activity with the variation in their inhibition potential. The results obtained, points toward the antifungal nature of these extracts and provide an insight that these extracts can be exploited for developing an effective biocide which will be in harmony with nature.

Keywords- Antifungal activity, fungicidal, fungistatic, *Allium cepa*, *Allium sativum*, *Alternaria alternata*, *Penecillium expansum*, traditional herbal, Amaryllidaceae, Lilliaceae.

**Studies on Optimization of Cryopreservation Protocol for Beneficial
Microorganisms**

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Cryopreservation is a process where organelles, cell, tissues, extracellular matrix, organs are preserved by cooling to very low temperature – using -80°C using solid CO₂ or -196°C using liquid nitrogen. The aim of cryopreservation is to enable stocks of cell to be stored to prevent the need to have all cell lines in culture at all times. The cryoprotective additives used in the frozen storage of microorganism – virus, bacteria, fungi, algae and protozoa including a variety of chemical and simple compound. A factor affects the effectiveness of cryopreservation in microorganism for example- species, strains, cell size, form rate and their growth rate, pH, osmolarity, aeration, composition of cell, density at freezing etc. Viability assays should be performing on all cultures before and after cryopreservation to assure long term viability. Different type of microbes and the ways they reproduce were discussed. Some microbes are free living organism and other is parasite. Microorganism can be harmless, beneficial or pathogenic. In agriculture and gardening a beneficial organism is any organism that benefits the growing process including insects, arachnids and other animals. The aim of this study that, we have found the mode of cooling, composition of cryopreservation medium, original concentration of cell and storage temperature affects viability of microorganisms during low temperature preservation.

Keywords- Cryopreservation, microorganisms etc

**An Arabidopsis AP2-ERF Domain Protein Containing a Repressor EAR-Motif
Governs Multiple Growth Transitions in Arabidopsis**

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The AP2/ERF domain family is one of the largest plant specific transcription factor families regulating various aspects of plant development and stress responses. A small subset of the family that contains a C-terminal EAR motif functions as repressors of transcription. We had previously identified one EAR motif gene from tomato that when over-expressed affected flowering time and senescence in tobacco. To obtain an insight into the regulatory aspects of the EAR motif containing genes, we have chosen one of the EAR motifs containing gene *AtERF3* in Arabidopsis. Transgenic lines with over-expressed and reduced expression of *AtERF3* were generated in Arabidopsis. Over-expression lines of *AtERF3* showed early bolting and reduced leaf number at the time of flowering as compared to control plants. In contrast, reduced expression lines and EMS mutants of *AtERF3* show delayed bolting and an increase in leaf number at flowering as compared to control plants. Rosette diameter was markedly smaller in reduced expression lines and mutants of *AtERF3* than controls but larger in over-expressed lines. The results suggest that *AtERF3* may govern multiple growth transitions like germination and flowering in plants.

Keywords: Repressor, Transcription, Germination

Jasmonates: Defense Mediated Mechanism to Biotic and Abiotic Stress Tolerance

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Extensive research and advancements of molecular and biotechnological and techniques proved efficient tool to dissect the underlying mechanism in floral biology during growth and development. In this context, jasmonic acid a naturally occurring plant oxylipins, and its derivative methyl jasmonate, JA(jasmonic acid), and jasmonyl-isooleucin has been now considered as plant growth regulator by regulating every aspect of plant from very early stages of germination to late maturation stages under both optimal as well as stress condition, moreover being sessile in nature, plant are prone to various abiotic stress such as such as drought, salinity, thermal stress, light stress, heavy metals, flooding stress and more recently pesticides. These causes the excessive generation of reactive oxygen species (ROS), which denature the important biomolecules such as DNA, RNA, lipid and consequently leads to oxidative stress. The jasmonates and its compound maintain the osmotic balances and minimize the ROS detoxification by enhancing the antioxidant defense mechanisms comprises of both enzymatic and non-enzymatic component. Besides this, JA-activated MAPK (Mitogen Activated Kinases Protein) cascade significantly regulated salt and chilling stress responses and ethylene induced plant defense. They play a crucial role in plant defense. Recent findings on the role of JA in reproduction, flower nectar secretion, G-protein signaling, and cancerous diseases have opened new vistas for future research. However, much work is to be done in near future to find out the proper answers of the questions like action of JA metabolites, and identification of universal JA receptors etc. Complete signaling pathways involving MAPKs, CDPK and TFs are yet to be studied to understand the complete mechanism of action of JA. The most important aspect is that the extent of effectiveness of JAs like other hormones is plant species dependent.

Keywords: Jasmonic acid, Abiotic stress, ROS, MAPK, Transcription factors

Assessment of Government Schemes in agricultural sector in Uttar Pradesh, India

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In Indian context, agriculture sector plays a significant role. Approximately 70 percent of Indian population directly or indirectly depends on this sector. India's major labour force is engaged in agricultural and related activities. But this sector is underdeveloped and suffers from low productivity, poor infrastructure, lack of finances, etc. Several attempts have been made by the government of India to develop this sector. Various development schemes have been launched to ensure inclusive growth and development.

This study is an attempt to critically access one of the development scheme "Pradhan Mantri Fasal Bima Yojana (PMFBY)" introduced by the government of India in 2016. This scheme was launched with the aim to support agricultural activities and provide insurance coverage to farmers, including tenant farmer sowing notified crops in notified areas. In Uttar Pradesh this scheme is successfully working in 6 major districts.

The main objective of the study is to assess the impact of PMFBY on agricultural productivity. This study is based on secondary data collected from different government websites, articles, journals and magazines.

Keywords: Agricultural Productivity, Government schemes, PMFBY, Inclusive Growth

Comparative Analysis of Mushroom Yield from Different Agricultural Waste

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The objective of this study was to compare the effect of different agricultural waste used as mushroom substrates on growth, development and yield of mushroom. The substrates used are wheat straw, baggase. The moist substrates were sterilized, packed in heat resistance plastic bags, seeded with 2-4% spawn & incubated for 2-3 hours. Yield of each mushroom flush, marketable yield, diameter were measured and recorded. The wheat straw substrate gave the highest yield in respect to others.

Mushroom cultivation has enormous potential to improve food security & income generation, which in turn can help in boosting rural and peri-urban economic growth regularly. As we used different substrates for mushroom cultivation, so we have done steam pasteurization and sterilization. The medium is sterilized after in heat resistance glass bottles or polypropylene bags at 121°C & 15 lbs pressure. The medium is incubated at 25 °C & soon get impregnated with mushroom mycelium. Harvestable mushroom appear 18 to 21 days after caring.

Keywords: Mushroom cultivation, Harvest, Mycelium, Food security

Design and Implementation of IoT Based Smart Agriculture and Health-Care

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Internet of Things (IoT) is an environment of connected physical objects that are accessible through the internet. The ‘thing’ in IoT could be any object with build-in-sensors that have been assigned an IP address and have the ability to collect and transfer data over a network without manual assistance. IoT has various applications namely smart home, smart city, smart retail, smart healthcare, smart agriculture, energy engagement, poultry and farming, smart water management, industrial purpose. This paper overviews about two applications a). Healthcare becomes one of major economic and social problems around the world, especially in aging people, where it costs tremendous health expenses. In medical care the IoT is used to monitor physiological status of patients through sensors by gathering and analyzing their information and transfer that data through internet. This data is stored into database server which manages data and provides accessibility. User can view this data with the help of Android App. b) Agriculture plays important role in India which mostly depends upon natural resources and the weather conditions. Here, the user can monitor the agriculture environment from a remote location. The growth of the plant is measured by using sensor which is placed in the soil. The sensors will collect the input as measurements and transfer it to the controller through internet from where the farmers will get the intimation of plants growth. The intimation may be an application or a text message.

Keywords: Internet of Things, Healthcare, Agriculture, Sensor, Controller.

Biology: Inspirational Source for Innovation

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Undoubtedly, nature is collection of creations. The innovation is easily happened after minute level observation of natural creations. Most of the natural creation is in the forms of living organism. The estimated 8.7 million species on the earth out of which only 1.9 million species have been discovered. The observation of architecture of living organism provides opportunities of new type of designing for example the human skeleton system is a perfect architecture. The movement and weight balance management of skeleton is really amazing. The structure and function of airplane is similar to birds body organs in the same way the design of ship is similar to body structure of fish, organization of camera is similar to eye. The sonic boom problem of Shinkansen (Japan's high-speed bullet train) is solved by redesigning the Shinkansen like beak of Kingfishers. The specialised biopolymer nano-composites can be used for artificial muscles. The specialized biopolymer has close biological muscles such as excitability, contractility, elasticity and extensibility. The biopolymer provides good opportunity for replacement of plastics and to maintenance of safe and sustainable environment. The bio-robotics may used for artificial sensing of skin. The nanoparticles are used for targeted drug delivery, specialized used to kill cancer cells. The nanoparticles composite is also used for replacement of body organs. The artificial neural network (ANN) is inspired by the working of human brain. The artificial neural networks (ANNs) are made up of a large number of interconnected elements, each of which functions similar to biological nerve cell. Engineers are expected to perform innovations using knowledge of biology and to make 21st century as century of biology.

Keywords: Biopolymer, Nano particles, Artificial neural network

Signaling Mechanisms during Plant Biotic Stress

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A biotic stress is the stress that has been introduced into the host plant body due to the attack of various pathogens such as bacteria, fungi, nematodes, oomycetes etc. Whereas in reference to this in abiotic stress, the plant body has stress conditions due to the sudden climatic changes such as rise in temperature, cold, drought, flood etc. So in this article we will be discussing about the phenomenon that are involved in developing any kind of resistance by the plant body in order to cover the biotic stress and save the plant body from various infections and diseases and promote their growth and development. As per the studies and literature there are various signaling pathways that are introduced in plant body as per their developed immunity so they can involve signaling pathways such JA / ET signaling pathway, SA signaling etc. The aim behind all these signaling pathways is to provide a proper defense system so that a plant can develop its own resistance and can fight against any type of infection. Since the plant lacks an adaptive immune system so they are more prone to be get infected easily by the foreign invaders. This article has the informations about the activation of various defense mechanisms and how just like human, a plant body can save its own body from infections.

Keywords: Signaling, Abiotic stress, Plant Immunity

Multifarious Effects of Plant Growth Promoting Rhizobacteria on Growth and Promotion of Fruits

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ABSTRACT

Effects of plant growth promoting rhizobacteria (PGPR) [*Bacillus* OSU-142 (Nitrogen-fixation), *Bacillus* OSU-7 (Inhibits the production of ethylene), *Pseudomonas* BA-8 (Produce auxin and cytokinin)] on yields, fruit properties, plant morphological changes has been reported. In major cases, the plant treated with PGPR show immense increase in several aspects such as shoot length, shoot diameter, root length, fruit yield, leaf area, fruit set. The effects of PGPR on apple show increase in shoot length, in strawberry as high fruit yield while in orange increase in leaf area and fruit set. It was determined that OSU-7; OSU-142 and BA-8 in apple cause flower thinning when used in excessive doses.

Keywords: PGPR, Fruits, Apple

BIOINFORMATICS

Metagenomics: Biological Insight of Gut Microbiome

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Improvement and acceleration in sequencing technology and the discovery of metagenomic and bioinformatics concepts have opened up a few new gates to understand the microorganisms living in the human gut. The microbiome plays a crucial role in health and disease states of the human body are being found to extend beyond the gastrointestinal tract. The gut microbial community which are uncultivable plays a crucial role in defending the host against pathogenic microbes, modulating immunity, regulating metabolic processes and other micro-organisms. Modern metagenomics methods, - such as 16S rRNA amplicon sequencing and whole metagenomic shotgun sequencing are good enough to classify the microorganisms forming up the microbiome. Advanced NGS techniques provide a means of understanding the contribution of the human microbiome to health and its potential as a target in therapy and diagnosis. The modern era of NGS, specific pipelines for data analysis is required to contribute to and increase our understanding of the human microbiome with respect to health, immunity and disease. Advances in next-generation sequencing approaches have a huge impact on the analysis of microbial community diversity. 16S rRNA-based methods have been widely used to understand the whole set of bacteria present in an environment. As a result, several specific bioinformatics pipelines have been designed to manage and interpret these data. In this study, we briefly elaborate on the core of the metagenomics study is how to effectively and efficiently interpret the huge amount of metagenomics data using the bioinformatics tools to obtain several biological insights. Using this we able to make evolution that the particular type of bacteria is present which directly affect human health.

Keywords: Gut microbiome, Metagenomics, Bioinformatics

Ligand Based Virtual Screening for Identification of Inhibitor Compounds Against *Mycobacterium tuberculosis* Isocitrate lyase.

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Mycobacterium tuberculosis, causative agent of tuberculosis (TB), have infected approx. one third of world's population. Glyoxalate cycle enzyme Isocitrate lyase (MtbICL) is an attractive drug target for persistent or latent tuberculosis. Over the years, a number of compounds have been identified as ICL inhibitors and a set of 21 inhibitor molecules were collected from the literature. Ligand-based pharmacophore model was generated from reported inhibitor compounds. Pharmacophore model was used to screen Zinc database and 21,057 similar compound was found for building chemical library. Virtual screening of screened compounds against MtbICL protein have resulted compounds exhibiting lower binding energy as top hit compounds. Further, drug likeness property of top hit compounds were calculated followed by molecular docking study for identification MtbICL inhibitors compounds. Docking studies of top hit compounds have identified some terpenes as potential MtbICL inhibitors.

Keywords: Ligand, Inhibitor compound, Pharmacophore, Terpenes

**Drug Repurposing Approach To Identify Novel Inhibitors For Targeting DNA
Topoisomerase: Insights From Biophysical And Biochemical Studies**

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Owing to the rise in drug resistance in tuberculosis combined with the global spread of its causative pathogen, *Mycobacterium tuberculosis* (*Mtb*), innovative anti-mycobacterial agents are urgently needed. To address this problem, we have employed drug repurposing approach to discover novel FDA-approved drugs to inhibit *Mtb* growth. Here, we have used essential *Mtb* enzyme, topoisomerase II (DNA gyrase), promising and potential target for novel antituberculosis chemotherapeutics. High-throughput screening of compounds (using FDA compounds library) was done against the active site of *Mtb* DNA gyrase, the region of ATP binding (N-terminal domain) pocket on gyrase B subunit. Here, we identified total of four compounds (Echinacoside, Doxorubicin, Epirubicin, Idarubicin) tightly binds to ATPase binding pocket of N-terminal domain of gyrase B (*MtbGyrB47*). We investigated the binding activity of identified drugs using various biophysical techniques such as thermal denaturation (CD Spectroscopy), Fluorescence titration (Fluorescence Spectroscopy) and Surface Plasmon Spectroscopy (SPR) and calculated IC₅₀ values of these drugs (along with positive control, novobiocin) using ATPase assay. Among which, Echinacoside, a natural phenylethanoid glycoside (anti-inflammatory and neuroprotective agent), was found to be a potent inhibitor of *Mtb* DNA gyrase. Low- μ M inhibition of *Mtb* DNA gyrase was correlated with their low- μ M minimum inhibitory concentrations for all screened FDA-drugs. Echinacoside exhibited IC₅₀ value of $2.1 \pm 0.14 \mu\text{M}$ against *MtbGyrB47*, K_d values of $0.65 \pm 0.21 \mu\text{M}$ and MIC₉₀ values of $3.2 \pm 0.09 \mu\text{M}$. Our results strongly suggest that the screened compounds target mycobacterial DNA gyrase, inhibits gyrase catalytic cycle.

Potential of Phytochemicals like Curcumin and Rosmarinic acid for the Treatment of Breast Cancer and Inflammation- An In silico approach

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Traditionally, drugs were discovered by testing compounds synthesized in time consuming multi-step processes against a battery of in vivo biological screens. Promising compounds were then further studied in development, where their pharmacokinetic properties, metabolism and potential toxicity were investigated. Here we present a study on herbal lead compounds and their potential binding affinity to the effectors molecules of major disease like Breast Cancer and conditions like Inflammation. Clinical studies demonstrate a positive correlation between the extent of production of estrogen from androstenediol after menopause and breast cancer through the release of epidermal growth factor (EGF) and a positive correlation is also known between inflammation and cyclooxygenase. Therefore, identification of effective, well-tolerated aromatase and cyclooxygenase inhibitors represents a rational chemo preventive strategy. This study has investigated the effects of naturally occurring nonprotein compounds curcumin and rosmarinic acid that inhibits aromatase and cyclooxygenase. The compounds have been investigated as better inhibitors with respect to binding of various drugs available in market. Our results reveal that these compounds use less energy to bind to aromatase and cyclooxygenase thus inhibit its activity. Their high ligand binding affinity to aromatase and cyclooxygenase introduce the prospect for their use in chemopreventive applications, in addition they are freely available natural compounds that can be safely used to prevent breast cancer and inflammation.

Keywords: Pharmacokinetic, Chemopreventive, Breast cancer

An Insight into Anti-Arthritic Property of *Madhuca Indica* for Rheumatoid Arthritis Using Molecular Modelling Approach

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Rheumatoid Arthritis (RA) is an auto-immune disease affecting joints *Madhuca indica* has been used traditionally as an analgesic, anti-inflammatory, and anti-arthritic remedy. Reported molecules from inner bark and leaf of *Madhuca indica* were taken and their biological activity was then confirmed with the help of PASS Server. The chemical structures were then drawn with the help of ChemSketch. Reported RA proteins CHI3L1 and CHIT1 were targeted and their best ligands were selected from PDBSum. Docking of the ligands from *Madhuca indica* was done and comparison was made with already reported ligands on PDBSum. The ADMET analysis of the ligands was then done with the help of SwissADME to ascertain the best ligands against the RA proteins.

Keywords: Rheumatoid Arthritis, ChemSketch, PDBSum

Illustrating a significant protein involved in Parkinson's disease: An computational approach

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Parkinson's disease (PD) is a neurodegenerative disease characterized by the presence of Lewy bodies in neuronal cells of PD patients. The loss of dopamine producing neurons results in various symptoms including slowness in movement, muscle rigidity and tremor. The exact cause of PD still remains unknown. However, there are many genetic variations attributed to the development of the disease but these affect only a small group of individuals. Early development of PD is linked with mutations in genes for parkin, PINK1, LRRK2, DJ-1, and glucocerebrosidase, among others. Due to the absence of specific gene target, different approaches have been used to search and predict potential genetic targets. One approach uses DNA microarray that is extremely useful to study the differential expression of genes in diseased state. We analysed the microarray data from NCBI GEO datasets of induced pluripotent stem cells (iPSCs) which were differentiated to neuronal cells. The NCBI GEO dataset, GSE28367, was normalized to identify differentially expressed gene(s) in the iPSCs and differentiated neuronal cells with the GeneSpring Gx.12.0. Using gene expression profiling, a putative protein, CR064, was obtained that showed highly varied differential expression. We used various structure prediction tools to analyse the secondary structure of CR064. The data obtained using these tools will be compared with experimental data obtained using biophysical approaches such as electron paramagnetic resonance spectroscopy and NMR.

Keywords: Microarray, Neurodegeneration, Parkinson's Disease

**Identification and Validation of Potential Natural Compounds as Anti-Biofilm agents
against *Mycobacterium tuberculosis*: An *In Silico* Approach**

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Tuberculosis (TB) is a major cause of death across the globe and kills 1.5 million people per annum, thereby persisting as a challenge for the scientific community. Increasing information from current reports of drug-resistant mycobacterial strains poses a challenge worldwide. Drug-resistant strains often undergo mutations, adopt other pathways and express drug efflux pumps to reduce or block the entry of drugs. Besides these intrinsic resistance mechanisms, bacteria can evade drug doses by forming biofilms which are concerted growth of adherent microorganisms and can also be formed at the air-water interface. The growth of microorganisms is supported by self-produced extracellular polymer matrix. The current study is undertaken with this objective directed towards the identification of potential inhibitor i.e. an *in silico* approach for mycobacterial biofilm-related protein FabG4, an essential and functional gene for bacterial growth, survival and fatty acid synthesis. FabG4 has been recently shown to be important for mycobacterial survival in the presence of antibiotic stress and limited nutrients. FabG4 is also recently reported to be over-expressed in pellicle or biofilms, indicating its possible involvement in phenotypic resistance during latent infection. In the present study, 1250 secondary metabolites from ethnomedicinal plants reported against TB were compiled and subjected to *in silico* pharmacokinetic analysis so as to explore their properties in terms of absorption, distribution, excretion and toxicity (ADMET). Pharmacokinetic analyses revealed that 15 natural compounds satisfy all the ADMET criteria and also those of Lipinski's Rule of Five. Further studies are planned to perform the docking of FabG4 with these natural compounds, along with the first-line TB drugs (rifampicin, isoniazid, ethambutol, pyrazinamide and streptomycin) as controls, for comparison of the binding efficacy.

Keywords: ADMET, Tuberculosis, Pharmacokinetic

ENVIRONMENT

KOMAL Mature Bag (KMB)

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In this fast running scenario, we need every-thing portable an each to access, Like this- Table for study, safety for Bag that carries each-every device perfectly. So, I'm focusing a bag come Trolley that can easily store over documents and devices, it can use as portable Chair and Table and also provides a mini LED table lamp. This also contain a GPS tracker and an anti-theft lock a bag that can charge over devices like this- Mobile, tablet, Bluetooth speaker, Bluetooth earphone and have rain cover.

Keywords: Portability, GPS

**Potential Heavy Metal Interaction with Soil Pollution, and Its Direct Effect
on Plants (Model plant *Nicotiana tabacum*)**

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The present study was aimed to investigate soil pollution by the means of simulated heavy metal enhancement, and its response on the morpho-physiological and biochemical (phenolics, flavonoids and antioxidants) characteristics of *Nicotiana tabacum* (Tobacco plant). It was investigated in a plant growth chamber experiment. Various treatments, with combinations of different heavy metals were used viz. zinc, manganese, cadmium, cobalt, copper, chromium, nickel and lead. Each metal contributing in the mixture at 0 (control), 0.1, 0.5, 1.0, 2.0, 5.0, 10.0, 15.0, 20.0, 30.0, 40.0, 50.0 mg/kg of soil were applied, individually. It was found that the increase of soil extractable heavy metal concentrations reflecting high soil pollution. Metals like chromium, cobalt, cadmium and lead were found to be toxic to the plant starting at a minimum concentration of 5.0 mg/kg to maximum toxic at 50.0 mg/kg of salt. The results were found to be statistically significant on *Nicotiana tabacum* on various parameters studied. Two-way ANOVA also supported significant variation in different treatments (p- value < 0.05). The regression analysis also shows significant results with value of $-0.857x + 4.929$ on regression line. The parameters studied here, indicated effect on *Nicotiana tabacum* plant thus, leading to heavy metal toxicity. Therefore, it can be concluded that heavy metals impart toxicity to plants, thereby affecting its morpho-physiological and biochemical properties. Furthermore, it would recommend to investigate various other biochemical parameters on heavy metal toxicity and thereby its effect on possible genetic alterations.

Keywords: Biochemical, Morpho-physiological, *Nicotiana tabacum*, soil pollution, toxicity

**Protection of Neurotoxicity Produced By an Environmental Heavy Metal,
Cadmium**

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The term heavy metals have been used as a general term for those metals and semimetals which produce toxicity to the humans and animals as well. Examples are aluminum, antimony, arsenic, cadmium, mercury and lead. Small amount of some of these elements are necessary for health. Large amount of any of them may cause acute or chronic toxicity. Heavy metals environmental pollution is mainly produced from industrial activities. The toxicity of heavy metals depends on number of factors: The total dose absorbed, the exposure was acute or chronic, the age of the person can also influence toxicity. Cadmium toxicity can disturb brain chemistry leading to depression, anxiety and weakened immunity. Cadmium causes alteration in several organs including the lung, brain, testis, kidney, liver, and bone. It enhances the production of free radicals in the brain and interferes with the antioxidant defense system which in turn leads to a cadmium induced alterations in the structural integrity of lipids and secondarily affects the membrane bound enzymes. A growing number of experimental evidence has emerged, which support the concept that flavanoids with their strong antioxidant activities ameliorate oxidative stress. Naringenin is an effective antioxidant and free radical scavenger against oxidative stress. Naringenin belongs to the flavanones and is mainly found in fruits (grapefruit and oranges) and vegetables. Pharmacologically, it has anticancer, anti-mutagenic, anti-inflammatory, anti-oxidant, and anti-atherogenic activities. These properties of Naringenin may play the beneficial role in combating cadmium induced neurotoxicity.

Keywords: Environmental heavy metal, Cadmium, Flavanoids, Antioxidants

**Potential Heavy Metal Interaction with Soil Pollution, and Its Direct Effect
on Plants (Model Plant *Nicotiana tabacum*)**

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The present study was aimed to investigate soil pollution by the means of simulated heavy metal enhancement, and its response on the morpho-physiological and biochemical (phenolics, flavonoids and antioxidants) characteristics of *Nicotiana tabacum* (Tobacco plant). It was investigated in a plant growth chamber experiment. Various treatments, with combinations of different heavy metals were used viz. zinc, manganese, cadmium, cobalt, copper, chromium, nickel and lead. Each metal contributing in the mixture at 0 (control), 0.1, 0.5, 1.0, 2.0, 5.0, 10.0, 15.0, 20.0, 30.0, 40.0, 50.0 mg/kg of soil were applied, individually. It was found that the increase of soil extractable heavy metal concentrations reflecting high soil pollution. Metals like chromium, cobalt, cadmium and lead were found to be toxic to the plant starting at a minimum concentration of 5.0 mg/kg to maximum toxic at 50.0 mg/kg of salt. The results were found to be statistically significant on *Nicotiana tabacum* on various parameters studied. Two-way ANOVA also supported significant variation in different treatments (p- value < 0.05). The regression analysis also shows significant results with value of $-0.857x + 4.929$ on regression line. The parameters studied here, indicated effect on *Nicotiana tabacum* plant thus, leading to heavy metal toxicity. Therefore, it can be concluded that heavy metals impart toxicity to plants, thereby affecting its morpho-physiological and biochemical properties. Furthermore, it would recommend to investigate various other biochemical parameters on heavy metal toxicity and thereby its effect on possible genetic alterations.

Keywords: Biochemical, Morpho-physiological, *Nicotiana tabacum*, soil pollution, toxicity

**Oxidative Stress Biomarker in Fresh Water Teleost, *Channa punctatus*
Exposed to Triazophos**

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Pesticides contributed greatly to pest control and agricultural output whose remarkable proportion reaches to aquatic system by runoff. This results in contamination of water bodies and causes serious health problems to non-target organisms including fish. It also affects the human health by biomagnifications. Therefore, present study was carried out to investigate the sub-lethal intoxication with chlorpyrifos (organophosphate), cypermethrin (pyrethroid) and their combination to explore its impact on activities of anti-oxidant stress parameters as (Super Oxide Dismutase; SOD), (Catalase; CAT), (Glutathione-S-Transferase; GST), (Glutathione Reduced; GSH) and (Lipid peroxidation; LPO) in a fresh water catfish, *Heteropneustes fossilis*. Fishes were procured, acclimatised under laboratory conditions and were fed with commercially available fish pellets ad libitum. To study the effect of triazophos, fishes were exposed to 5% & 10% doses of LC50 of triazophos up to 96h. After exposure, the fishes were sacrificed and the tissues (brain, liver, kidney, gills and muscles) were collected. A significant dose-dependent increase ($p < 0.05$) in level of anti-oxidant stress parameters were observed in exposed group as compared to control. This preliminary study reflects the effect of triazophos on *C. punctatus* which serves as the potential biomarker of pesticide in water.

Keywords: Pesticides, Biomagnifications, SOD, CAT

Techno-Economic Analysis of Electric And Non-Electric Detonator In Tunnel Blast

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For hundreds of thousands of years, natural domain has been a principally two dimensional space: the surface of the ground. Urged by necessity, curiosity, or even by fear, we have tried to escape from the limitations of this space, either by creating new land at waterfronts, or by searching to utilize the third dimension, upwards or downwards. In every age, considerable use has been made of underground structures for mining and defensive purposes. However, the most rapid increase in the use of underground works only appeared in the 19th and particularly the 20th centuries, During these periods, there was a dramatic increase in underground space use, in mining, in the field of transportation with the development of roads, waterways, and railways, and in other fields such as the development of hydroelectric, LPG and other storage facilities. This leads to the drastic development in the excavation techniques. In explosive technology too significant progress has been made towards having safer explosives and accurate initiation systems that have increased overall control over blasting in terms of vibration, fragmentation, throw, fly rock and overall blast economics. Good results at any blasting operation can be achieved only when the initiating devices use to detonate explosive charges are of the highest possible quality, carefully chosen and properly used to meet the task at hand. Initiation devices have evolved into a variety of systems offering more flexibility and increased safety.

In order to choose the right initiation system for a blasting operation, certain considerations, ensuring safe and effective blasts, must be taken into consideration. Therefore this work has been taken up.

Keywords: Detonator, Effective Tunnel blast

**Testing of Different Extracts and Extract-Salt Solutions on Microbes
Present in a Sample of Tap Water**

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Water-borne diseases are very common and widespread. These diseases tend to be an epidemic, during the rainy season. Even on filtering the water we're not able to completely get rid of those pathogens. The water which appears clean enough to drink at the microscopic level is enriched with microorganisms. Those microorganisms may include disease causing pathogens also. Our nature is gifted with a number of plants which can treat various diseases. Many plants such as Rose, Basil, Neem etc. have medicinal value. Also a few studies have showed that vegetables like Tomatoes have antimicrobial properties. So we aimed to find out if certain things found in nature which are easily available has the ability to cure water-borne diseases. We also used salt solutions, which were kept at room temperature for a few days for testing. We tested rose hot water extract, basil hot water extract, tomato juice, tomato pulp hot water extract, tomato supernatant extract, basil hot water extract + $MnCl_2$ solution, basil hot water extract + $CuSO_4$ solution against microorganisms present in a sample of tap water. We first prepared the salt solutions and kept them at room temperature for a few days. Then, we did the 'antibiotic sensitivity test (AST) by well method. The results gave us the idea of what could be the probability of extracts and salt solutions tested against water-borne diseases.

Keywords: Extraction, Salt solutions, Water borne diseases

**Reduction of Carbon Dioxide Content Present in Polluted Air coming out
from Industrial Chimneys with the help of Algal Biomass**

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Algae have short life cycle and use a photosynthesis process similar to higher plant for their energy. The biomass doubling time for algae during exponential growth is found as short as 3.5 hours. Algae are a diverse group of aquatic organisms that have the ability to conduct photosynthesis. Algae appear photosynthetically more efficient than terrestrial plant and are more efficient CO₂ fixer than terrestrial plant. Once algae absorb CO₂, pH of water decreases. Photosynthesis takes place in the presence of sunlight and algae use to draw carbon dioxide from the water for its utilization during photosynthesis and promote cell growth. Removal of carbon dioxide from the water raises the pH level, as a result of the reduction in carbonate and bicarbonate level of water. Depletion of inorganic carbon from water by algae results in high pH level, as evidenced by the rise in pH level of natural water. The rise of water pH level also causes ionization of ammonia which is detrimental to aquatic life. Algae absorb carbon dioxide, so we can redirect carbon dioxide from the environment to some extent with its help. We can reduce carbon dioxide content present in the smoke that comes out from the industrial chimneys with the help of a pipe and can take it to the pond filled with grown algae. Algae will absorb carbon dioxide coming in the smoke and utilize in its growth, which will reduce CO₂ to a great extent as well as algae can be used as biomass for production of secondary products.

Keywords: Algal biomass, Biomass production

IOT Based Solar Induction Cooker

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One of the most threatening problems that we are to witness in future is the scarcity of cooking gas besides environmental issues, fossil fuel and wood from trees are being depleted at a fast rate. Solar power is available everywhere during day time in all countries. This solar induction cooker uses smart Induction heating system utilizes electricity for the generation of heat, where the present work is combining solar energy with induction heat. solar panel, which gives a variable dc supply to charge a battery. The dc supply from the battery is converted to a high frequency ac voltage by an inverter circuit. This inverter circuit supplies alternating current to a coil on a magnetic core where alternating flux is produced. This alternating flux produces in the magnetic core Eddy current and Hysteresis 'losses' inside the magnetic core. In this application, these losses will produce useful heat. A cooking pot placed on the magnetic core will be used for cooking.

Key words: IOT, Solar charger, Inverter, Induction cooker.

Impact of Treated Industrial Wastewaters on the Growth of *Cicer arietinum*: Integrating Wastewater as Non-Conventional Natural Resource for Ferti-Irrigation

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Water pollution due to developmental activities and water stress conditions due to climate change is common both at national and international level. Concerning to current industrial wastewater related pollution problem and crisis of water for irrigation as well as the nutrient recovery from the wastewater which may helpful for poor and marginal farmers, the effect of treated industrial wastewater from Poolpur and Naini on different seed germination and seedling growth parameters of Gram (*Cicer arietinum* variety Desi) were studied in laboratory conditions under different time interval (24, 42, 72 and 96 hours followed by 7, 14 and 21 days). The increase shoot length, root length and numbers of leaves were found in wastewater exposed seeds in comparison to control. The overall finding of the present study indicates the positive effect of wastewaters especially of IFFCO from Poolpur site, on the seedling growth than control.

Keywords: *Cicer arietinum*, Irrigation, seedling growth, Wastewater.

Plastic Waste Management

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India witnessed a substantial growth in the production of plastics and an increased consumption of plastic. In the absence of adequate waste collection and segregation process, the management of the waste created by discarded use plastics items, especially ones used for packaging applications has become a challenging task. This article provides an overview of the resources recovery from plastic waste with considerations of integrated waste management, to evaluate the best possible options tackling waste in the India circumstances. Plastic are the integral part of part of society have a varied applications. Plastic are composed of a network molecular monomers bounds together to from macromolecules. There are increasing concerns due to non-degradability and generation of toxic gases on combustion during incineration.

Keywords: Macromolecules, Toxicity, Degradation

Solid Waste Management

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In the modern world as the population increases the production of waste material per person increases, which creates challenge for the waste management. Due to improper waste management lot of problem occurring i.e. global warming, air, water, and soil pollution. In order to reduce these problems, we are developing automatic waste sorting machine. Automatic waste sorting machine makes the sorting of waste material, due to which we can easily handle the solid waste.

In the solid waste sorting system some smart sensor, microcontroller and to operate the complete process program is needed. In this system solid material are sorted through the various sensor (Inductive sensor (PNP type), glass sensor, capacitive sensor). Through this we can easily separate the metal, glass, plastic and organic in different container. Container materials are further used for the recycling process. So, sorting system is one step ahead to reduce to the burden of pollution on environment.

Keywords: - Automatic sorting system, Inductive sensor, Glass sensor, Capacitive sensor, microcontroller (Arduino UNO).

Soy Protein Air Filters

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Proteins are the biomolecules known by their number of functional groups present in their polypeptide chain. These functional groups present in the protein provide interaction with the air pollutants of different surface properties. However the practical exhibition and explanation of this technique has not been reported yet. In this technique, soy protein- the plant abundant protein is employed for the removal of air borne pollutants. For this, the soy protein is denatured to unfold the polypeptide chain and then manufactured or converted into nanofibres with the help of polyvinyl alcohol. It was found that these nanofibres developed from soy protein exhibit high filtration efficiency not only towards air borne particulates of larger size but also towards the toxic gaseous chemicals like formaldehyde and carbon monoxide. The study of soy protein in removing air pollutants reveals that the nanofibres of soy protein are much more promising for air filtration application. Particulate matter and toxic chemical pollutants are widely distributed into the air. Conventional air filters are not eco- friendly because they cause secondary environment pollution. To overcome this problem, the environmentally eco-friendly material is in need. Biomaterials as soy protein and bacterial cellulose offer a potential as air filter materials. Bacterial cellulose forms the 3D nanostructures which cause the physical capturing of particulate matter while the soy protein attract the particulate by electrostatic attractions. This technique can be use for the entrapment of air pollutants emitted by the industries and if it is possible to use soy protein air filter in cars and bikes, will help in reducing air pollution.

Keywords: Biomolecules, Polypeptide Chain, Nanofibres, Nanostructures

Urban Water Management at Allahabad City

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The rate in which India's population is increasing, it is said that India will surely replace China from its first position of most densely populated country of the world after 2030. Concerns about the sufficiency of freshwater supplies and the impact of water shortages have placed sustainable water management on the global agenda. Taking these concerns in mind this study examines the gap between the water demand and supply and also discusses water management of urban areas, using Allahabad city as a case study. As the growing trend for urbanisation is continuing, population and development are increasing and water droughts are exacerbating in already water scarce areas, the conventional urban water management approach needs to change in order to adapt to current and future sustainability issues. According to Allahabad Nagar Nigam the city is divided in eighty wards categorized into twenty sanitary wards which was taken up for this study for the purpose of data collection and analysis. Data was collected from the Jal- Sansthan and questionnaire survey was conducted on all sanitary wards. For this a questionnaire was prepared that comprehensively covered all major aspects of the water supply service quality. The collected data was then compiled and analysed using SPSS software. The results obtained provide the existing scenario along with the relation of different parameters. These parameters help in determining the water scarce areas of the city. Three scenarios are considered for proper pattern of water supply, rain water harvesting and implementation of new hand pumps in water scarce areas. In the case of Allahabad city, rain water harvesting seems to be the best possible way of coping up with the shortage by storing in the days of abundance and using it in the days of scarcity.

Keywords: Urban water management, Urbanisation, Sustainable exacerbation

**Development of Decision Support System for the Sanitation and Hygiene
for the slum areas of Allahabad city**

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Developing countries are experiencing the most unprecedented growth rates in their urban populations, arising from high natural births and rural-urban migration, causing overcrowding in cities without the corresponding capacity and resources to expand public provision of basic services such as water supply and sanitation and this, has led to tens of millions of households in informal settlements in Africa and Asia having access to only overused and poorly maintained sanitation facilities which, seriously compromises health. More than 1 million people live in areas without access to basic needs; adequate sanitation, improved water supply, durable housing, adequate living space and secure tenure. Lack of one of these basic conditions has direct consequences on the physical and psychological well-being of the urban population. For example, infection of diseases like diarrhoea, cholera, typhoid, malaria and other water borne diseases are major problems affecting slum dwellers. On the other hand, the economic circumstances of the slum dwellers render them unable to access health care services. This severely affects their safety and security.

Keywords: Sanitation, Hygiene, Slums

Benchmarking of Allahabad Water Supply Service

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Efficient service and customer satisfaction are urging utilities in the water industry to seek to improve their efficiency, performance, lowering costs and increasing the provided service level. Water supply services in urban India are essential functions of urban local bodies (ULBs) or municipalities. These services are mostly perceived as unsatisfactory across urban centres and the sector is widely concerned to be misgoverned with large number of municipalities making inefficiency in water supply services, which result in financial losses. However, this common perception of inefficient services has not much scientific basis as the efficiencies of these services are not measured, mostly based on qualitative factors. Basically, the solution to water supply problems in India has traditionally been related to increasing capacity and quality improvement, rather than minimizing the service inefficiencies in the existing services of water supply utilities. Internal efficiency measures may incorporate increasing the availability of water and reducing the operational expenditures, lowering staff levels and effecting savings for better maintenance and pay-backs of loans and so on. However, the urban water supply utilities have to be made creditworthy and efficient. In short, the performances of the sector need to be analysed to bring about improvements in the water supply service efficiencies. This thesis explores the inefficiencies prevalent in the Allahabad water supply utilities in the state of Uttar Pradesh and presents an evaluation of the potential of efficiency improvements that are possible in urban centres. The main research instruments used for data collection were document review and interviews with key informants in the water sector (utilities, government agencies, regulators, external support agencies and customers). The results are then discussed in the context of policy issues relevant from a developing country perspective. This thesis, therefore, attempts to evolve a framework for evaluating the relative inefficiencies of water supply services and applies a non-parametric approach, Data Envelopment Analysis (DEA), to urban centres in India, by applying DEA model. The results of the analysis indicate that there are significant inefficiencies amongst the various municipalities that supply water. In Model 1, the analysis within the services of Uttar Pradesh shows that efficiency score for Allahabad is 0.81325 and

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the services which acquired the 100% efficiency score are Banda, Balrampur, Sitapur and Jaunpur. On the other hand Allahabad water supply service scored efficiency value of 0.97846 when analyzed with Indian water supply services and the utilities which scored 100% are Ajmer, Bangalore, Mumbai, Vishakhapatnam and Warangal. However, in Model 2, the analysis of Allahabad with Uttar Pradesh and Indian utilities shows that the efficiency score for it is 0.45854 and 0.55381 respectively. This is due to the fact that both the PIs (namely coverage and per capita) are inefficiently contributing to the supply services of Allahabad. DEA results also show that significant savings with respect to coverage of water supply services, per-capita supply and non-revenue water are actually possible if best practices are adopted. The continuous growth in the demand for water supply services has posed decisionmakers with the challenge to discover new, and to adapt existing, institutions in order to fulfill the highly growing demands of the consumers.

Keywords: Water supply, Availability of water, Best practices

Water Treatment using *Moringa oleifera*

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Pure water is an essential requirement for the survival of human beings. Coagulation-flocculation is one of the chemical treatment processes commonly used for water treatment. Aluminum and iron salts are widely used as coagulants in the conventional coagulation-flocculation processes. The removal efficiency of the coagulation-flocculation process depends on the type and dosage of coagulants-flocculants, pH, mixing speed, etc. The purpose of the study is to enhancement of coagulation process of three different coagulants. These are aluminum sulphate, poly aluminum chloride and *Moringa oleifera*. Aluminum sulphate is also known as ‘Alum’ and is universally used as a conventional coagulant. Poly aluminum chloride is a chemically modified coagulant and *Moringa oleifera* is a natural coagulant which can be used as an alternative to other coagulants for treatment of turbidity water. The effectiveness of coagulation process of three different coagulants named aluminum sulfate, poly aluminum chloride and *Moringa oleifera* was evaluated at different pH values and coagulant dosage to find optimal operational conditions for low to high turbidity waters. For achieving this, a set of jar test experiments was conducted to find the optimal coagulant dosage, turbidity and pH. Results demonstrated that coagulation process can remove turbidity from low to medium turbid waters effectively with relatively low levels of coagulant dose.

Keywords: Water treatment, Coagulation, *Moringa oleifera*

Biosorption of Ni(II) onto immobilized yeast cells and rice husk ash

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Heavy metal pollution is assuming a dreadful dimension throughout the world with the expansion of industrial activities. Excessive release of toxic metals into the environment due to industrialization has created a great global concern. Monitoring and subsequent removal of toxic metals from the industrial effluents has, therefore, been made mandatory before their discharge into the environment. Heavy metals like chromium, mercury, cadmium, lead and nickel are toxic even in minute concentrations. Anthropogenic sources of chromium are industries viz., mining and metallurgy, stainless steel, aircraft industries, nickel electroplating, battery and manufacturing, pigments and ceramic industries, pesticides, herbicides and tannery industries. Nickel exists as Ni(II) in the environment as it is the most stable form as it forms various compounds with sulfide, sulfate, carbonate, hydroxide, carboxylates, and halides. Because of its high toxicity and potential carcinogenicity, Ni(II) is of special concern. Removal of Ni(II) is important for the safety of aqueous environment, it being carcinogenic and toxic to aquatic life. Various methods used for removal of Ni ions include chemical precipitation, ion exchangers, chemical oxidation/reduction, reverse osmosis, electro dialysis, ultra filtration etc. But, all these methods suffer from severe constraints, such as incomplete metal removal, high reagent or energy requirements, generation of toxic sludge or other waste products that require safe disposal, expensive setups, expertise required. Some of the treatment methods involve high operating and maintenance cost.

Keywords: Biosorption, Anthropogenic, Toxic metals, Exchangers

Assessment of Groundwater Quality Around Landfill Site In Allahabad

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Water is one of the primary needs for all biological species flourishing on the surface. Ground water is an important component of the water system for consumption like drinking, livestock, agriculture etc. Ground water is the water that is found in underground in cracks and spaces in soils, sands and rocks. In other words one can say that ground water is that portion of water beneath the surface water of earth that be collected with well, tunnels or drainage galleries or that flows naturally to the earth's surface via seeps or springs. The availability of water has always been of vital importance for life, both for animals and plants. It has always played a life sustaining role in growth and welfare of man-kind. The water resources of a country constitute one of the most important economic assets. Studies to protect life and other resources such as fresh water, air etc. have been initiated throughout the world. The anthropogenic activities have shaken the environment of this earth and we are facing the danger of degradation, destruction and elimination of the ecological infrastructure that is so essential for us now as much as it is for the future generation. Ground water pollution may be defined as the artificially induced degradation of natural groundwater quality. Pollution can impair the use of water and can create hazards to public health through toxicity or the spread of diseases. It is the fundamental right of every individual to get pollution free water but due to development of our society we are continuously polluting our ground water reservoir. The liquid containing innumerable organic and inorganic compounds is called 'leachate'. There are many approaches that can be used to assess the groundwater and surface water contamination. In the developing countries the municipal solid wastes (MSW) are mainly disposed to the open landfills.

Keywords: Groundwater, Contamination, Leachate, Decomposition

Evaluation and Selection of Sewage Treatment

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River Ganga is most polluted river in the world and there is no sign of pollution being stopped in river Ganga. River Ganga is polluted due to domestic and industrial liquid waste products discharge into river without treatment. There are 64 STPs installed under catchment of Ganga river in which many of them not working properly due to shortage of authentic information on quality & quantity of waste generation, mode of disposal, possibilities for recycling, development of community treatment plants and cost effective treatment technologies. Therefore, it is the most challenging issue for environmental engineers and decision makers to select and design appropriate wastewater treatment systems to meet the specific effluent quality. According to quantity diversity of industrial wastewater and local condition of effluent sources, it is impossible to use general criteria in treatment process selection. Multi criteria decision methods (MCDM) is used for choose best alternative from several alternatives. Some multi criteria decision methods such as analysis hierarchical process (AHP), TOPSIS Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) method, fuzzy analysis hierarchical process and fuzzy TOPSIS, Preference Ranking Organization Method for Enrichment Evaluation (PROMETHEE), Elimination and Choice Expressing Reality (ELECTRE) are used to choose best alternative from several alternatives.

Keywords: Sewage, Analytic Hierarchy Process (AHP), Waste water

Assessment of Groundwater Near Waste Dumping Yard

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Municipal Solid Waste dumping yard in Allahabad carry large area at many sites. There is no proper dumping yard site available and waste is dumped in a mixed form in an unscientific manner on open waste land or low lying areas even near the river Ganga and Yamuna at six different sites. Illegal dumping of the municipal solid waste is also very common in the city. Ground water samples were collected from five different locations near by the open dumping of municipal solid waste by me. These locations are Sulem Sarai, Taleirganj, Bai ka Bagh, Alopi Bagh and Bakshi Bandh. I collected two ground water samples from each location at two different points first one is nearest point from the dumping yard and second one is 100-150m far from dumping yard. Samples from nearest point are polluted in which Sulem Sarai and Alopi Bagh are highly polluted while samples from second point have also contamination which shows that due to open dumping of MSW contamination is spreading in ground water not only nearby dumping yard but it travel some distance from dumping yard also. Allahpur (AP) and Sohbatiya Bagh (SB) two more ground water samples I were tested which are not near the solid waste dumping yard only a single time. There was no pollution found in these two samples which shows the pollution in ground water samples is due to open dumping of municipal solid waste. After then I used Analyse-it software on results found after various testing of nearest points ground water samples because these samples are more polluted than second point samples. By using Analyse- it software I got the correlation between all the parameters of nearest point ground water samples. A commonly used a-level is 0.05. In future by using these equations we will get the value of parameters on knowing the other variables using in equations for the same location and point without laboratory testing.

Keywords: Ground water, Water sample,

HEALTH SCIENCES

A Palliative Aid for Detection of Chronic Kidney Disease

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Chronic kidney disease (CKD) characterized by gradual loss of kidney function.. As a secondary disorder, CKD has been constantly found in patients suffering from diabetes, high blood pressure and cardiovascular diseases. GFR can only confirm kidney malfunction if kidney has stopped functioning by 50, which may be fatal, hence the need for a more suitable method. If CKD is detected at an early stage Stage 1-2 mere modifications in diet and intake of ACE inhibitors may prevent the progression to end stage renal disease. Incidence of CKD is now as high as 200 cases per million per year in many countries. If CKD is detected at an early stage Stage 1-2 mere modifications in diet and intake of ACE inhibitors may prevent the progression to end stage renal disease. As per a recent survey one third population is already prone to CKD as they are hypertensive or diabetic or cardiac patients. Thus, to add to woes, the lack of availability of professional medical service, the patients get detected with CKD at very late stages. An ESRD patient needs 3 dialysis sessions per week, which means 156 sessions annually till the patient gets a transplant. The cost of each dialysis comes to Rs 1900-4500 depending on the healthcare settings available Approx 3 lacs/annum minimum. As per a snapshot by world bank group in 2012, 27 million 1 in every 5 Indian lie in the lower income group. Given their low income group, it becomes very difficult to manage the higher costs of dialysis and the travelling expenses. CysC, protein marker present in urine is specific and is released in urine with the onset of CKD. For CysC concentrations corresponding 6.6×10^{-5} ng/ μ l, 3.3×10^{-4} ng/ μ l, 6.6×10^{-4} ng/ μ l, 3.3×10^{-3} ng/ μ l, 6.6×10^{-3} ng/ μ l, 3.3×10^{-2} ng/ μ l and 6.6×10^{-3} ng/ μ l, consistent changes in the CV profile was observed, thus confirming the success of the designed template.

Keywords: Chronic kidney disease (CKD), Nanoplatfrom, Health care.

Point of Care Diagnostics for Periodontal Anomalies

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Periodontitis is the sixth most prevalent chronic non-communicable disease (NCD) of the peridontium and impacts almost 3.5 million years of population with disability. An approximate value of around 442 billion USD/year is invested for oral diseases. Periodontitis has a prevalence rate of 11.2 % and has increased by 57.3% in two decades (1990-2010). Preceded by gingivitis it progresses in stages I-IV demarcated by the changes in bone density and inflammatory responses of gingiva. Early detection followed by prognostic care might prevent the symptomatic progression to periodontitis. Hence, the requirement for assessing the severity of dental anomalies.

Here, we report a nanosensor for detection of early stage gingivitis. SPGE modified and immobilized with papain was designed as a working control electrode. Binding affinity of papain to gingivitis biomarker, on working electrode was measured through differential pulse voltammetry (DPV). Advantages of the label free electrochemical sensor was confirmed on comparison with other available techniques in terms of sensitivity and detection limit. Thus a non-invasive, rapid, low-cost and higher sensitivity analytical method may be virtually applied to various dental anomalies as point-of-care testing.

Keywords: Periodontal Anomalies, Biomarker, Nanosensor, Papain

Emulsion Based Gel: A Novel Topical Drug Delivery System

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Emulgel is a novel delivery system in which either o/w or w/o emulsion is incorporated in the gel. It has emerged as a novel topical semi solid preparation which provides better drug release for hydrophobic drugs over conventional gels. Incorporation of emulsion into the gel increases its stability and makes it a dual control release system. The lack of excess oily bases & insoluble excipients helps in providing a better drug release as compared to other topical drug delivery system. Emulgels are easily spreadable, have long shelf life, and have a pleasing appearance. The use of emulgels has recently been explored for the delivery of analgesics, anti-inflammatory, anti-fungal, anti-acne drugs and various cosmetic formulations. In our study, emulgel of a natural bioactive flavonoid was formulated and subjected to anti-inflammatory studies. The anti-inflammatory activity of the test emulgel was comparable with the standard dicofenac marketed emulgel.

Keywords: Emulgel, Analgesic, anti-inflammatory

**Biofilm Detection of *Acinetobacter sp.* Isolated from Clinical Samples
Obtained from ICU of Tertiary Care Hospital**

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The nosocomial infections are major medical problems in all areas of the world and they remain one of the main causes of morbidity and mortality in hospitalized patients. *Acinetobacter* bacteria has appeared over the last era as an important opportunistic pathogen responsible for nosocomial infections. This bacterium has established much attention in current years because of its increasing involvement in a number of severe infections and outbreaks occurring in clinical surroundings, and apparently associated to its ability to survive and persist in hospital environments. *Acinetobacter sp.* is famous for its ability to form biofilms both on inanimate as well as on animate objects. It has been isolated from various hospital environments and has been shown to colonize patients. Although it is commonly related with benign colonization of hospitalized patients. The present study is carried out to detect biofilm producing ability of *Acinetobacter sp.* from the different samples collected from Intensive care Unit of tertiary Care hospital. Isolation and identification was done for different samples by using different media. *Acinetobacter* isolates were initially identified according to the morphological characteristics on MacConkey agar and further identification is performed on the basis of Gram staining and biochemical characterization. A total of 18 isolates were identified as *Acinetobacter sp.* from various sources (pus, urine, sputum, blood) were collected from ICU of hospital unit. Biofilm detection was done by Microtiter plate method, the optical density of the stained bacterial film is determined spectro-photometrically. Out of 18 bacterial isolates, 8 (44%) isolates showed positive result of biofilm formation.

Keywords: *Acinetobacter sp.*, Biofilm detection, Nosocomial infection, ICU

Marine Anticancer Drugs: Emerging Pharmaceuticals from the Sea

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Cancer relays one of the chief health problem for public health care systems across the globe. The customary methods of cancer treatment are surgery, radiotherapy, chemotherapy and chemoprevention. Surgery and radiotherapy are predominantly specified for solid tumors whereas chemotherapy is a systemic drug-based treatment approach. Despite substantial availability of armory of anticancer drugs, they do not always accomplish the expected therapeutic goals, and many are associated with several side effects. Consequently, the seek for more discriminatory compounds with rarer side effects, bigger potency and a smaller resistance index is of supreme significance. Here, marine molecules, a recently found source with pharmaceutical prospects as anticancer drugs, will be discussed sumptuously. These marine anticancer drugs have substantially offered appreciated information and decisive understandings to encounter the most communal challenges in this endeavor. In this context, an outline of current status of marine anticancer drugs both at the level of research and clinical stages will be discoursed here exemplifying, Kahalide, cytarabine, trabectedin, eribulin and brentuximab vedotin. However, presently only few marine drugs have been reinforced towards anticancer research and yet many more need to be recognized in future.

Keywords: Anticancer Drugs, Marine pharmaceuticals, Seaweeds, Cytarabine, Trabectedin, Eribulin

Pedophilia: An Emotional Disorder

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Pedophilia as a conceptualized mental disorder and a category of sexual deviation characterized by a sexual interest toward children under 14 years as determined by the law. Pedophilia is a distinguished form of child sexual abuse as a legal category. Today pedophilia patients are stigmatized and excluded from society not only in general, but also in prisons and forensic units.

Early sexual abuse is considered to produce a neurodevelopmental abnormality in the temporal areas of the brain that mediate sexual arousal and erotic discrimination, in addition to the frontal areas that mediate cognitive aspects of sexual desire and behavioral inhibition. It is a serious emotional disorders from sexual abuse of children often lead to poor mental health conditions, like anorexia and desensitization. The proper identification of a pedophile can often be determined by phallometric tests, whereas electrophysiological and radiographic procedures may also be helpful in the future.

Keywords: Neurodevelopment, Electrophysiology, Radiography, Phallometric.

An Overview of Edible Vaccine and Immunization

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Edible vaccines is emerging as an alternative to the traditional vaccines because of its various advantages such as cost-effectiveness, easy handling, storage, transportation and its availability for large group of disease prone community where vaccination is required on large scale. Edible vaccines are boon for the developing countries where administration and storage of traditional vaccines is inadequate. Edible vaccines shows promising results in reducing incidence against various diseases like Diarrhea and Hepatitis. Developing countries generally having large population are prone to outbreak of epidemic of diseases so to combat such disaster vaccination is needed. Edible vaccines are made by the use of biotechnology by incorporating the desired gene in the plants or animal which is being bio-encapsulated. This gene in turn produce protein like antigen which triggers the immune response. Various plants can be used for incorporating the genes generally cereals like rice, wheat, rye etc or fruits like banana, orange, etc. or vegetables like potatoes, tomatoes etc. This vegetables or fruits when eaten by people can vaccinate them from various notorious viruses. Edible vaccines present good economical and technological benefits as more than 350 genetically engineered plants are in progress and is widely gaining global importance.

Keywords: Edible vaccine, Immunization, Molecular biology, Traditional vaccine

Strip Based Kit Detection of Maltodextrin in Milk

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Maltodextrin is a polysaccharide that is used as a food additive. Maltodextrin is a white , starchy powder that manufacturers add into many foods to improve their flavour, thickness, or shelf life . Maltodextrin for milk comes in a white or yellowish powder has a mellow and thick smell and the taste is soft and smooth. Side effects may include allergic reaction, weight gain, gas, flatulence and bloating. Maltodextrin may also cause a rash or skin irritation, asthma, cramping or difficulty breathing. The primary sources of maltodextrin will be corn, rice, and potato, but manufacturers may sometimes use wheat. We are making a strip based kit to detect maltodextrin in milk. One drop of milk is poured on to the strip, which will move towards the ligand of maltodextrin which is already immobilised on to the strip. The presence of maltodextrin in milk will show the different colour on the strip once bind with ligand. The absence of maltodextrin in milk will not show any colour on the strip. This strip based kit can easily detect maltodextrin in milk within few seconds so that we can avoid many diseases.

Keywords: Maltodextrin, Polysaccharides, Ligand

Synthesis of Different Salt Solutions from Rose Leaf Hot Water Extract, Characterization and Its Medicinal Activity

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Plants contain certain compounds which may exhibit some medicinal properties. There are also some plants which are believed to have the medicinal value. A few examples of such plants are – Basil (*Tulsi*), Neem, Rose etc. These plants are believed to have the ability of curing numerous diseases. There are a few metals which are believed to exhibit the antimicrobial properties and having the ability to cure various diseases. Some examples of those metals are – Silver (Ag), Gold (Au), Copper (Cu), Zinc (Zn), Iron (Fe) etc. These are believed to exhibit good antimicrobial properties at nanoscale. Developments of nano-medicines and nano-antibiotics have become a necessity now to overcome the problem of multi-drug resistance by the pathogens. We have chosen the rose leaves for our work because of easy availability around us. We prepared different salt solutions of rose leaf hot water extract and tested for its medicinal activities. We prepared a hot water extract of rose leaves, using Soxhlet in 1:10 ratio. Extract was obtained after 3 cycles of Soxhlet after that we prepared 0.1 M different salt solutions and kept them at room temperature for a few days followed by its characterization and testing of medicinal activities.

Keywords: Medicinal properties, Soxhlet, Nano medicines and Nano antibiotics

A Molecular Approach on The Protective Effects of Mangiferin against Diabetic Complications

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In the present study, the composition of mango peel powder (MPP) collected from the mango pulp industry was determined and the effect of MPP on ameliorating diabetes and its associated complications was studied. Mango peel is rich in polyphenol, carotenoids and dietary fiber. Peel extract contained various bioactive compounds and was found to be rich in soluble dietary fiber. Peel extract exhibited antioxidant properties and protected against DNA damage. Therefore, the effect of peel on ameliorating diabetes was investigated in a rat model of diabetes. A significant increase in urine sugar, urine volume, fasting blood glucose, total cholesterol, triglycerides and low density lipoprotein, and decrease in high density lipoprotein were observed in the rats; however, these parameters were ameliorated in diabetic rats fed with diet supplemented with mango peel at 5% and 10% levels in basal diet. Treatment of diabetic rats with MPP increased antioxidant enzyme activities and decreased lipid per oxidation in plasma, kidney and liver compared to untreated diabetic rats. Glomerular filtration rate and microalbuminuria levels were ameliorated in MPP treated diabetic group. Mango peel, a by-product, can be used as an ingredient in functional and therapeutic foods.

Keywords: Polyphenol, Carotenoids, Glomerular filtration, Bioactive compound

Response of Functional Food on Biochemical Composition of Type I and Type II Diabetic Respondents

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Diabetes is mainly classified in two type, type I diabetes that is insulin dependent diabetes and type II diabetes that is non-insulin dependent diabetes. There was so many other Biochemical test which were utilized as a secondary data assess the nutrition level of functional food users and nonusers. Such as body weight, body glucose level, Frequency of Urination, cholesterol level, Creatinine level peripheral neuropathy, Albumin excretion rat, proteinuria, Hemoglobin level etc. The present study was carried out to analyze the response of functional food on biochemical composition of Diabetes mellitus, type I and Type II .Biochemical test was performed with the help of glucometer and blood samples. The result of which represent the blood glucose level in the body of functional food users and nonusers and interpret the impact of functional food on biochemical composition of Diabetic patients. From obtained result It was found that majority of both group respondents said that the use of functional food reduced the body weight by 72% in Type I and 79% in Type II, Glucose level by 100% in Type I and 84 % in Type II, Cholesterol level by 93% in Type I and 71% in Type II, Frequency of Urination, by 83% in Type I and 43% in Type II. From these result it is obtained that the effect was more on type I diabetes group compared to type II diabetic group in relation to cholesterol level, and frequency of urination. However majority of both diabetic group respondents said that there was no functional food effect in relation to cretonne level peripheral neuropathy, albumin excretion rate, proteinuria, fatiguness and hemoglobin level.

Key words: Biochemical test, Functional food, Diabetes mellitus type I, Diabetes mellitus Type II

Alkalophiles and *Calatropis Gigantae* for Acid Burn

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Now days, so many industries are involved in acid (organic as well as inorganic) production. It is necessary for the employers to provide safe and healthy work place for their employees. Specially when someone is dealing with the compounds with very low pH. In addition with the other Personnel Protection Equipments (PPE) , the ointment can be used that resist the adverse effect of acids if spill accidentally on the skin. The ointment can be prepared using the alkaliphilic bacterial strains (that are found in pH range 8-12) along with the plant extract of *Calatropis gigantae*; pH found to be 7.2-8.1 (slightly alkaline) at temperature 25-45 degree celcius. The bacterial strains are used in the inactivated form so as to prevent the pathogenic attack on the skin. The bacterial strains along with the plant extract are used in ointment preparation. The plant extract would help the bacteria to maintain the alkaline environment. The subject working in acid manufacturing and other related industries can use this ointment as a part of PPE to protect the skin from acid burn. Consequently, the tissue damage would be less due to the alkaline environment on the skin neutralise the acid.

Keywords: Bacterial strains, Plant extract, Acid burn

An In Vitro Approach of Inhibiting Bacterial Biofilm by Essential Oil

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P. aeruginosa is an opportunistic pathogen having ability to form a thick layer of biofilm as one of its significant virulence factors that enables the bacteria to attach to abiotic or living surfaces, which contributes to drug resistance. This pathogen is responsible for causing various infections, particularly in hosts with compromised immune systems. Biofilm protects the bacterial population and decreases the availability of drugs to the target area helping in disease perseverance. Present study was performed to evaluate anti-biofilm activity of neem oil against the *Pseudomonas aeruginosa* biofilm at concentration 0.1, 0.5 and 1.0 μ l at 200 μ l final reaction volume. Neem oil showed 44% inhibition when compared to control at 1.0 μ l concentration. The result shows that neem oil is potentially effective and can be used as naturally effective alternative against *Pseudomonas aeruginosa* biofilm.

Keywords: Drug resistance, Biofilm, Essential oil, *Pseudomonas aeruginosa*, Bacterial pathogens.

Differential Expression Analysis of COL11A1 Gene in Tumor and Normal Adjacent Colonic Mucosa of Colorectal Cancer

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Colorectal cancer (CRC) is an important public health issue in developed as well as developing countries. It has emerged as an alarming health threat in terms of cancer related deaths throughout the world. Statistically, CRC is the third most common type of cancer in terms of incidence and second most dangerous cancer in terms of cancer related deaths. The present study has aimed towards the screening of biomarkers for better diagnosis and prognosis of colorectal cancer. Next generation sequencing analysis was performed on 4 tumor and match normal samples. Large number of genes have been found and screened for significant level ($P > 0.05$). Next, we selected top up-regulated and top down-regulated on the basis of fold changes and significant level. Finally, we select COL11A1 gene that was less reported in colorectal cancer and validated with real time PCR for differential analysis in tumor and matched normal samples. Fold change expression analysis revealed that COL11A1 gene is up-regulated in tumor samples with comparison to normal adjacent colonic mucosa. COL11A1 is necessary for normal skeleton development. Aberration in COL11A1 expression may lead to disruption of cellular integrity such as migration, cell shape, and apoptosis that ultimately results in spread of cancer.

Key words: CRC, COL11A1, Differential analysis

Identification of Potential Inhibitor Against Protein-Arginine Deiminase Type-4 For Preventing Neutrophil Extracellular Trap Formation

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Neutrophils are not only engaged in the antimicrobial process, instead they also participate in the acute inflammatory responses in the tissues. In addition to the phagocytosis and granule release neutrophil also responds to pathogens by generating neutrophil extracellular traps (NETs). The formation of NETs occurs as a consequence of the cell death process named as NETosis. NETosis is an active form of cell death which leads to the release of decondensed fibrous chromatin material outside the cell. These fibrous structures are termed as NETs; they are composed of DNA threads coated with histones as well as granular and cytoplasmic proteins. NETs are not only involved in antimicrobial processes but they also contribute to various inflammatory and autoimmune conditions. Protein-arginine deiminase type 4 (PAD4) enzyme causes citrullination of histones and plays an important role in the NET formation. PAD4 has emerged as an attractive therapeutic target for the exploration of NET inhibitors. This study was aimed to screen herbal compounds as potential inhibitors of PAD4. PAD4 protein structure was acquired from RCSB database. Herbal compounds from ZINC database were virtually screened against the active site of PAD4. Qualifying compounds were filtered on the parameters of Lipinski's rule and ADMET; further potential inhibitor compounds were selected by binding energy and stability studies by molecular dynamics simulation using GROMACS. Structures of PAD4-ligand complexes were analysed to have the insight of binding between inhibitors and target. Selected compounds are further needed to be tested for their activity using the cellular system.

Keywords: Neutrophils, Histones, Antimicrobial process

Mechanism of Inhibition of Colorectal Cancer Cell Line HCT116 Using Phytic Acid

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Colorectal cancer is the third largest cancer worldwide. According to the Globcan statistics 2018, 9.2% cases out of 18.1 million new cancer cases were diagnosed as colorectal cancer. Colorectal cancer is considered one of the clearest markers of epidemiological and nutritional transition. Herbal and dietary phytochemicals are among the most useful in cancer therapeutic applications. On treating the cells with phytic acid for 72 hours at the concentration of 500 $\mu\text{g}/\text{ml}$ showed cell death of 42% in the human colon cancer cell line HCT116. LDH release (%) from human colon cancer cell line HCT116 after 24h, 48h and 72h treatment was found to be 19.6%, 26.5% and 39.8 % respectively at a concentration of 500 $\mu\text{g}/\text{ml}$ of phytic acid. The flow cytometric analysis of treated samples showed that the rate of cell death of cancer cell line increases with the increase in the concentration of phytic acid. The rate of cell death was recorded up to 80% in the case of higher concentration of phytic acid after 72hrs of treatment. The findings of Real time PCR revealed that the target gene CDK1 (cell cycle regulators) was downregulated which support the flow cytometry results of cell cycle arrest, further target genes ATXN1 was upregulated and c-Myc & CTNNB1 were down-regulated. The results signified that the phytochemicals are potent anticancer compound. The proposed mechanism behind the anticancer activity of phytochemicals is cell cycle arrest and apoptosis. This study concludes that phytochemicals can be used for cancer prevention by using as dietary supplements or direct through phytochemical rich food products.

Keywords: Phytic acid, cytotoxicity, apoptosis, anticancer property, Real time PCR, Human Colon cancer cell line HCT116

Comparative Study of Renal Function and Oxidative Stress in Preeclamptic and Normal Pregnancies

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Preeclampsia is one of the major causes of mortality and morbidity during pregnancy all over the world. It is a multi-system disorder of pregnancy which is identifiable after 20 weeks of gestation by the presence of proteinuria and high blood pressure, though aetiology of this disorder is not completely known yet. Maternal body undergoes a series of endocrine, metabolic and vascular changes during pregnancy. Most of these changes are normal and necessary for supplying nutrients and energy to the fetus however in untoward condition such as preeclampsia, abnormalities take place which may prove extremely harmful and even fatal in severe cases to both mother and the fetus.

We have studied renal parameters including urea, creatinine, and blood urea nitrogen(BUN) along with assessment of oxidative stress and antioxidant status in both the groups, since kidney plays a very crucial role during pregnancy and oxidative stress is implicated for being one of the leading causes of this multi-system disorder. The data showed statistically significant increase in the levels of urea, creatinine, BUN, uric acid, and MDA while decrease in DPPH scavenging activity and FRAP in preeclamptic cases in comparison to normal pregnancy cases.

Keywords: Disorder of pregnancy, Preeclampsia , Proteinuria

NANOTECHNOLOGY

**An Original Approach for the Synthesis of Silver Nanoparticles from
Neolamarckia cadamba and their Antimicrobial and Antifungal Activity**

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The use of plant materials for the biosynthesis of nanoparticles is termed as green technology as it is a nontoxic and a ecofriendly method. The present investigation reports the biosynthesis of bark extracts of *Neolamarckia cadamba* for the production of silver nanoparticles without the use of any external reducing and capping agent. The appearance of dark brown color was an indicator of synthesized nanoparticles which was further validated by absorbance peak by UV spectroscopy. The morphology of synthesized nanoparticles was further studied by transmission electron microscope. The synthesized nanoparticle showed promising antimicrobial activity against gram positive and gram negative bacteria. The synthesized silver nanoparticle also showed antifungal activity against *Trichoderma viride*. Thus, these synthesized nanoparticles can be used as broad spectrum therapeutic agent against microorganism.

Keywords: Silver nanoparticles, Antifungal activity, Therapeutic agent

Modern application of Nanoscience and Nanotechnology

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Nanotechnology is helping to considerably improve many technology and industry sectors information technology, solar energy environmental science, medicine, food technology among many others. Its gives a brief description about nanotechnology and its application in various fields viz. medicine, food technology and solar cell. It also deals with the future perspectives of nanotechnology. Solar energy is one of the most popular forms of renewable energy. Solar power systems derive clean, pure energy from the sun.

Keywords: Nanoscience, Nanotechnology, Medicine food technology

**Biosynthesis and Activity of Inorganic Nanoparticles (Ag, Cu, Zn, Mn) by
using *Ocimum tenuiflorum* (Tulsi)**

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Tulsi is well known for its medicinal properties. It is already known for antimicrobial and antifungal activities. In this study, biological synthesis of Ag, Zn, Cu and Mn nanoparticles by Tulsi extract has been done and it was characterized by color change and measured with the help of UV Vis spectrophotometer. Particle morphology and size was determined by SEM and TEM. After that the studies of antifungal and antibacterial activity of these biologically synthesized silver nanoparticles have been performed over fungus that causes plant diseases known as *Alternaria*.

Keywords: Inorganic Nanoparticles, Anti-microbial, Spectrophotometer

**Myconanopesticides: Management Strategy against White Grub
(*Holotrichia sp.*) pest of Sugar cane**

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Silver nanoparticles (AgNPs) and zinc nanoparticles (ZnNPs) were prepared biologically using *Aspergillus niger* and *A. flavus* cell free extracts and their pesticidal activity was determined against white grubs (*Holotrichia sp.*), a potent pest of sugarcane. AgNPs and ZnNPs were characterized by UV-Vis spectroscopy, FT-IR spectroscopy, Energy Dispersive X-ray (EDX), Dynamic Light Scattering (DLS) and Scanning electron microscope (SEM). AgNPs and ZnNPs had a range of diameter of 18.7 to 96 nm and 21.4 to 102 nm respectively. The concentration of synthesized nanoparticles was determined by inductively coupled plasma mass spectrometry (ICPMS) and subsequent dilutions were prepared to establish the lethal dose (LD₅₀) against white grub larva. The LD₅₀ of AgNPs and ZnNPs for first and third instar larva was calculated to be 5.6 ppm and 12.3 ppm respectively.

Keywords: Nano-Biopesticides, *Aspergillus niger*, *Aspergillus flavus*, white grub, DLS, SEM, FTIR etc.

Antimicrobial Potential of Biologically Synthesized Nanoparticles against Wound Infection Pathogens

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Nanoparticles are widely used because of their unique characteristics features like surface to volume ratio as compared to their bulk counterparts. Green synthesized nanoparticles are prepared by using plant extracts. They are having great advantages in the biomedical field over the chemically synthesized nanoparticles because of their stability and less toxicity. The aim of this study is to evaluate antimicrobial activity of green synthesized nanoparticles by plant extracts of *Tephrosia purpurea* via sol-gel process. Leaves of *T. purpurea* were collected from the campus of Gurukula Kangri Vishwavidyalaya, Haridwar and shade dried. Extraction of the leaves were carried out using four different solvents i.e. petroleum ether, benzene, methanol and water using soxhlet apparatus. For the synthesis of TiO₂ nanoparticles TTIP (Titanium isopropoxide) was used as precursor. Titanium precursor and extracts were mixed in ratio 1:10 under vigorous stirring followed by purification by repeated centrifugation. Obtained nanoparticles were further calcinated at 500° C in muffle furnace. Synthesized composites of TiO₂ and plant extracts were further characterized by XRD (X-Ray diffraction) for their purity and crystallinity. Results revealed that average crystallite size of chemically synthesized TiO₂ nanoparticles ranges between 14-22 nm while TiO₂/petroleum ether extract, TiO₂/benzene extract, TiO₂/methanol extract and TiO₂/water extract composites were 10- 65 nm, 8- 17 nm, 9- 14 nm and 8- 10 nm respectively. TiO₂/petroleum composite exhibited most effective antimicrobial activity among all the composites by giving zone of inhibition (27.00±0.57) against *E. coli* followed by *Staphylococcus aureus* (17.00±0.57) whereas least activity was recorded for the TiO₂/benzene (8.33±0.33) against *Staphylococcus aureus*.

Key words: Titanium dioxide, nanoparticles, antimicrobial, *Tephrosia purpurea*.

Structural DNA Nanotechnology for Controlled Drug Delivery

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Structural DNA nanotechnology is based on the use of DNA motifs to built a lattice of specific shapes. The lattices are generated through reciprocal exchange of DNA strands. The strands are linked together via sticky ended cohesion involving covalent bond and hydrogen bond. The lattice formed has some cavities along with the molocular wires where the nanoparticles coated with the desired drug can be inserted. The nanoparticles are hold by the molecular wires that results in the formation of synapsis (Molecular Synapse). The entire set up can be used to develop nanochips. Natural Biopolymers (such as cellulose, xanthum gums, chitosan) can be used to synthesise the nanoparticles so as to overcome the toxic effects due to accumulation of nanoparticles. This kind of nanochips can be used to deliver the drug on the specified target and in limited amount that would be sufficient to cure the disease. These nanochips can be modified into personalised chips using DNA of the individual.

Keyword: Nanotechnology, Drug delivery, Natural biopolymers, Nanochips, Nanoparticles

Isolation and Characterization of Cellulose Nanocrystals from Coir Pith by Sulfuric Acid Hydrolysis

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The present study investigates on the isolation of cellulose nano crystals (CNC) from coir pith. Sodium Hydroxide pretreatment (NaOH), Hydrogen peroxide (H₂O₂) delignification and Sulfuric acid (H₂SO₄) acid hydrolysis were applied for the isolation of CNC from coir pith. The CNC suspension thus obtained was dialyzed, sonicated and lyophilized to get CNC powder. The lyophilized powder was examined to study the physiochemical properties of CNC using Fourier transform infrared spectroscopy (FTIR), Scanning electron microscopy (SEM), Field Emission Transmission Electron Microscopy (TEM) and X-ray diffraction (XRD). The molecular conformations of cellulose and absence of non-cellulosic content in CNC were confirmed by FTIR. From the SEM and TEM images, it was observed that the isolated CNC is in the form of fibrils or rod like structures with an average width of 12-20 nm and average length of 112-308 nm. The crystallinity index of the CNC was found to be 75.17 %. From the compositional analysis of coir pith, it is observed that the coir pith has high lignin content when compared to other agro waste materials. Hence it is suggested to carry out effective delignification process for the isolation of CNC. The morphological and structural characteristics of CNC obtained from coir pith proved that it could be used to produce nano-composite materials. It is concluded that the isolation of CNC from coir pith waste is a good value addition option.

Keywords: Coir Pith, cellulose, delignification, acid hydrolysis, cellulose nanocrystals

Dextran-Quercetin Nanoconjugate as a Drug Delivery Tool for Cancerous Site

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Quercetin, a naturally occurring potent antioxidant, is limited in therapeutic use, owing to its poor water solubility and stability. Herein, a method of conjugating quercetin to a functionalized dextran to yield a water soluble quercetin functionalized polymer is prepared. Quercetin is a versatile molecule with many pharmacological properties including antioxidant, neurological, antiviral, anticancer, cardiovascular, antimicrobial, anti-inflammatory, hepato protective, protective of the reproductive system and anti-obesity agent and structure of quercetin. The prepared conjugate is biocompatible and biodegradable biopolymer which is insoluble in water and most organic solvents but is hygroscopic and has high swelling capacity. It also possesses anti-inflammatory, anti-bacterial and anti-oxidant properties and has high value-added applications as food additive, in cosmetics and in medicine. In the present study, preparation of dextran-quercetin conjugate and quercetin by free radical grafting method. Drug loaded conjugate will also be prepared. Characterization of the conjugate (with or without drug loaded) by using FTIR analysis, SEM analysis and UV spectrophotometer analysis, cytotoxicity, antibacterial, swelling behavior. Drug loading efficiency and drug release profile of the conjugate will also be studied after the characterization.

Keywords: Dextran, Quercetin, Drug Delivery, conjugate



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UGC/ICMR/SLET



LIFE SCIENCE
ENVIRONMENTAL SCIENCE
AGRICULTURAL SCIENCE