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**YOUNG SCIENTISTS'
AWARD PROGRAMME**



INDIAN SCIENCE CONGRESS ASSOCIATION, KOLKATA

**PROCEEDING
OF THE
HUNDRED AND EIGHT SESSION OF
THE INDIAN SCIENCE CONGRESS
RTM NAGPUR UNIVERSITY, NAGPUR, 2023
YOUNG SCIENTISTS' AWARD PROGRAMME**

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**SECTION: AGRICULTURE AND FORESTRY
SCIENCES**

1. **Genetic Gain, Genetic Distances and Partitioning Index in Cassava under Water Deficit Stress**

President: Dr. Dipak Ranjan Biswas

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ABSTRACT

Cassava genotypes numbered 25 were evaluated for drought tolerance for three years 2017-18 to 2019-20 consecutively. It can be concluded from the experiment that growth, yield, dry matter content and starch yield were adversely effected by water-deficit stress. The genotypes were classified into five drought tolerant classes. The genotypes 8S501 and CR 43-7 were relatively the highly drought tolerant while CI-158, 8S501 and Sree Jaya were the stable genotypes. The selection of top 3 high yielding genotypes viz., 8S501, CR 43-7 and 9S127 under water-deficit stress conditions would result in a genetic gain of 0.53 kg/plant in tuber yield. Mahalanobis genetic distances indicated that highly drought tolerant genotype 8S501 was genetically distant. The distribution of spongy parenchyma tissue was not uniform in the pith region in susceptible genotypes. Tolerant genotypes had higher partitioning index at 3, 5 and 9 months after planting than susceptible genotypes. Early tuber bulking helps in drought tolerance of cassava. The effect of drought on dry matter

content and total carbohydrate content of leaf and pith was prominent in the later stages of stress than that of initial stages.

Keywords: *Drought, Cassava, Genetic gains, Genetic Distances, Carbohydrate partitioning*

2. PHOSPHORUS FRACTIONATION AND FERTILITY STATUS OF SOIL ORDERS IN INDIA

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ABSTRACT

The present study covered six soil orders in nine states in India to evaluate phosphorus fractionation and fertility status of N, P and K. Soils of these orders varied from acidic (Ultisols, Alfisols) to alkaline (Aridisols, Vertisols, Entisols, Inceptisols), mostly sandy clay loam in texture, non saline in nature with low to high organic carbon content. Among the inorganic P fractions, Ca-P was dominant except Ultisols and Alfisols which is dominated with Fe-P whereas, about 21% of Ca-P and 12% of Fe-P contributed towards total P in these soils. Study concluded that the S-P, Al-P, Fe-P, RS-P, OC-P and Ca-P increased as increasing soil depth while Organic-P, available-P and Total-P decreased with increase soil depth. The NI of nitrogen was low (1.1 to 1.6) except Ultisols (2.2), phosphorus was medium (1.8-2.3) and potassium was medium to high (2.1-3.0).

Key words: Soil order, Phosphorus fraction, Nutrient Index, Soil Characteristics

3. Harnessing the phosphorus-silicon interaction by co-application of rice straw and phosphorus solubilizers to mobilize native soil phosphorus and sustain wheat yield in Inceptisols

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ABSTRACT

To mobilize recalcitrant inorganic soil phosphorus (P), soils from humid and semi-arid agro-ecosystems were treated with P solubilizing microbes (PSMs) and graded doses of rice straw (RS) under varying hydrothermal scenarios. Soil application of 12 Mg RS ha⁻¹+ PSMs could solubilize ~2.96 to 3.26 % of inorganic P enhancing its availability by 3.35, and 4 times over control, respectively. It enhanced wheat yield by 12 to 22% over conventional fertilizers, while maintaining soil P status for next crop. Overall, annual 12 Mg RS ha⁻¹+PSMs application under varying moisture availability could sustain P availability in humid and semiarid Inceptisols of India.

4. Potential of hyperspectral AVIRIS-NG data for Plant Function traits of spectral separability and mapping in Shoolpaneshwar Wildlife Sanctuary

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ABSTRACT

In recent scenario prediction of environmental changes through plant, functional types can aid in simplification of ecosystem processes. The present study attempts to identify and map plant functional types (PFTs) in AVIRIS-NG campaign site namely Shoolpaneshwar Wildlife Sanctuary (site id 67) using AVIRIS-NG data combined with spectral mixture analysis that accounts for end member variability. Due to occurrence of heterogeneous vegetation in the selected AVIRIS-NG site,

the measured spectral signal for every pixel of surface reflectance data will be outcome of fractions in which various plant functional types and also the soil background exist. The interest of the present research lies in these fractions and hence spectral mixture analysis was applied. Ground truthing was carried out simultaneous to AVIRIS- NG flight pass. Six plant functional traits namely Diameter at breast height, (DBH), height, biomass, leaf chlorophyll content, Fraction of Photosynthetic Active Radiation (FPAR) and Leaf Area Index (LAI) were measured for twenty three tree species found in the study site which was further used for plant functional grouping by applying k-means clustering algorithm. Trait based cluster analysis classified the tree species into four plant functional types. End member selection from AVIRIS-NG image for these plant functional types was done using manual field observation based approach which was used as input in spectral mixture analysis. The final product of the analysis is a set of fractional abundance images for each plant functional type. Considerable accuracy was obtained on validating the fractional abundance image by in situ data. The study highlighted the potential of spectral mixture analysis classifier in the identifying and mapping different plant functional types using AVIRIS-NG data when performed using appropriate number of end members.

Keywords: Traits, spectral, mixture, hyperspectral, Remote Sensing

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SECTION: ANIMAL, VETERINARY AND
FISHERY SCIENCES**

President: Prof. Kamal Jaiswal

**1. Incidence of Demodicosis in Dogs and its Therapeutic Management
with Special Reference to Herbal Nano Formulation**

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ABSTRACT

Present investigation was conducted for incidence of demodicosis in dogs and its therapeutic management with special reference to herbal nano formulation. A total of 1200 dogs were screened for demodicosis and 35 cases were confirmed for demodicosis by skin scraping & PCR examination. Overall incidence of demodicosis was 2.91% (35/1200). Month wise incidence study revealed highest incidence in summer season (April-July) and lowest in the winter season (October-March). Dogs of 0-6 months and >3 years age group was found more susceptible to demodicosis during the study period. Sex wise incidence showed males were more susceptible to demodicosis. Breed wise incidence revealed crossbred dogs (34.28%) were more affected followed by American Pitbull (17.14%). The typical characteristics of *Demodex* spp. were confirmed in (20/35) 57.14% cases by skin scraping examination while PCR examination demonstrated (35/35) 100% by the amplification of an approximately 483bp. Sequencing of PCR products were analyzed by BLAST & the results indicated 99.7% identical to available sequences of *D. canis* MG372354 (1:99.7) and 98.8 identical with *D. canis* KU253790 (33:98.8) & MG372359 (1:96.8). The sequence of the PCR

product of positive samples was submitted to NCBI GenBank for accession number and MK177513 accession number was obtained for GenBank. Anaemia, Leucocytosis, Eosinophilia, Hypoalbuminemia significant ($p < 0.01$) increased in globulin, blood glucose, total protein were the characteristics haemato-biochemical changes in canine demodicosis. Among DLC, % of Lymphocyte were significantly ($p < 0.01$) decreased, whereas granulocyte count was significantly ($p < 0.01$) increased in *Demodex* infected dogs as compared to healthy dogs in the present study. Study of oxidant-antioxidant status of demodicosis, revealed a significant ($p < 0.01$) reduction in the mean values TA (0.76 ± 0.04 mM), GSH ($0.33 \pm 0.03 \mu\text{M}$), SOD ($3.41 \pm 0.20 \mu\text{/ml}$), LPO ($0.06 \pm 0.00\text{nmol}$) in *Demodex* infected dogs. The therapeutic evaluation of herbal formulation against demodicosis revealed all the parameters viz, haemato-biochemical changes and oxidant-antioxidant status was improved on day 21 post therapy onwards which was similar with standard therapy i.e. Amitraz. From the present study it seems that Herbo-Nano medicine can be an effective alternative of Amitraz in case of demodicosis.

Keywords: *Demodicosis, Dog, Molecular Technique, Haemato-Biochemical, Oxidant-Antioxidant, Herbo Nano Medicine.*

2. Identification and characterization of 18S rRNA gene of *Demodex canis* from the dog population of Mizoram, India

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ABSTRACT

Canine demodicosis is a common parasitic condition which involves dog skin. Demodicosis in dogs is due the prominent growth of *Demodex*. Out of various canine *Demodex* spp., *Demodex canis* is the most often involved species. Canine demodicosis can occur as either a localized or generalized form of demodicosis severely affect the dogs and in non-treated dogs may cause death. This study was planned with the aim to screen and characterize the 18S rRNA gene of isolated *Demodex canis*. A total of 1200 dogs were screened during this study period. The skin scrapings of all the suspected dogs were examined under a microscope at

100X magnification for the presence of *Demodex canis*. The skin scrapings positive for *Demodex canis* were examined using PCR for confirmation. A total of 35 dogs were confirmed a positive result for *D. canis* based on 18S rRNA gene amplification by PCR. Further, the 18S rRNA gene of isolated *Demodex canis* was cloned and sequenced for genome analysis. On the sequence analysis, it was found that isolated sequence (GenBank Accession No. MK177513) had close similarity (99.7%) to that of *D. canis* genotype of China (Accession No. MG372254).

Keywords: Canine demodicosis; *Demodex canis*; 18S rRNA gene; Genome analysis; Phylogenetic analysis.

3. Ameliorative Effects of Nano-formulated Naringenin on Aluminum Nanoparticles-induced Neurodegeneration in Mice

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ABSTRACT

Aluminum nanoparticle (Al-NPs) acts as neurotoxic substance, causes for memory loss and neurodegeneration. Researchers suggest that naringenin (NAR) have a strong antioxidant and anti-inflammatory properties. However, the detailed aspects of neuroprotective potential of nano-formulated naringenin (NAR-NP) against Al-NP-induced neurotoxicity and their mechanism of action is still unknown. Here, we studied the neuroprotective efficacy of NAR-NPs on Al-NPs-induced memory impairment and oxidative stress in mice with special emphasis on the histopathology of cortex, hippocampus, thalamus, and cerebellum of brain. Our result suggest that Al-NPs treatment significantly reduced the spatial learning and increased oxidative stress; whereas co-administration of NAR-NPs improved the memory function and lowered the oxidative stress.

Keywords: Aluminium nanoparticles, naringenin nanoparticles, neurodegeneration, learning memory, oxidative stress, neuronal behavior.

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**SECTION: ANTHROPOLOGICAL AND
BEHAVIORAL SCIENCES (INCLUDING
ARCHAEOLOGY, PSYCHOLOGY, EDUCATION
AND MILITARY SCIENCES)**

President: Dr. Manoj Kumar Singh

- 1. Sustaining Development by Increasing Organizational
Citizenship Behaviour**

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ABSTRACT

The present research studied the relationship of organizational climate, work engagement and psychological capital of employees (predictors) with their organizational citizenship behaviour (criterion). 458 participants (269 males and 189 females) filled the Organizational Climate Questionnaire, Utrecht Work Engagement Scale, Psychological Capital Questionnaire and Organizational Citizenship Behaviour-Checklist. Descriptive, correlation and regression analyses of data, along with SEM were carried out to test the relationships between the three predictor variables and one criterion variable. Results indicated all three predictor variables have significant relationships with the criterion variable. The relationship between organizational climate and OCB was mediated by work engagement and psychological capital.

Keywords: organizational citizenship behaviour, organizational climate, psychological capital, work engagement

2. Working Memory Load Modulates Prospective Judgment of Time Perception

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ABSTRACT

There is a close relationship between the performance of working memory tasks and the perception of time. The present study tested forty two participants in the prospective temporal paradigm by using reproduction method for time perception. A 2 x 3 repeated measure design was used. The ANOVA results showed that increasing the task load in working memory systematically reduced the subjective estimate of time perception. The estimation of time perception was better under low working memory task load conditions. In addition, underestimation of time was found higher with long task duration as compared to medium and short task time durations.

Key Words: Time Perception, Working Memory, Task Durations, Estimation

3. Concreteness Fading and Foundational Numeracy Development : A Step Towards Quality Education of Rural Children in West Bengal

Mousumi Sarkar

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ABSTRACT

Foundational numeracy is an integral part of quality education which is an utmost important factor in achieving sustainable development and transition to the knowledge economy. This study examined the effectiveness of concreteness fading, an instructional approach on the development of foundational numeracy of rural primary school going

children. Designed as an experimental classroom study (N = 28) findings of this research showed the superior effectiveness of concreteness fading in teaching fundamental concept of mathematics and suggests to use the techniques for functional and joyful learning of foundational numeracy of rural children.

Key words : Foundational numeracy, Concreteness fading, Rural children.

4. Guidance and Self-Esteem : A strategy for Empowering Women

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NET

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ABSTRACT

Guidance is the most important process to support a person to take good decisions in his/her life. This study has been conducted to know the role of guidance in the field of self-esteem for empowering unemployed women. 200 unemployed healthy women age group range of 25 to 30 were selected through simple random sampling method. They were guided on daily basis for 1 hour by a trained counselor for the period of 2 months and were applied self-esteem scale before and after 2 months of guidance. It has been revealed that the level of self-esteem enhanced after 2 months of guidance. It has been also found that unemployed women mostly belonging to unmarried class were highly motivated after guidance. Thus, it is coded that guidance is the helpful and most powerful strategy for empowering unemployed women.

Keywords- Guidance, self- esteem, women empowerment

5. Understanding word recognition through spatial attention

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ABSTRACT

The Present study explored the attentional utility during word reading through manipulation of the word frequency alongwith spatial attention through Posner's cueing paradigm to address the frequency-based hypothesis of automaticity in reading. A 2 (Frequency: High and Low) × 3 (Cue: Valid, Invalid, Neutral) repeated measure design was applied. Thirty participants with 18 to 22 yrs contributed to the study. ANOVA results revealed better correct detection rate under valid cue conditions ($p = 0.00$), incorrect detection rate was lowest for valid cue conditions ($p = 0.00$). Perceptual sensitivity and response criterion measures further supported the results. Findings have been explained in terms of activation- confusion model and mirror frequency effects.

Keywords: Reading, Spatial Attention, Word Frequency, Cue Validit.

6. Development and validation of the Hindi happiness scale among Indian adolescents

Mahendra Kumar

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ABSTRACT

This study included the development and validation of a tool for the assessment of happiness. The items for the preliminary happiness scale were drawn after focused group discussion, depth interview of 250 adolescents, consultation with a reference group and review from existing scales. Exploratory factor analysis revealed five factors (38-item scale) accounting for 59% of observed variance ($n=314$). Furthermore, Confirmatory factor analysis produced a sufficient Goodness of Fit Index >0.90 ($n=346$). Happiness scale was highly reliable and valid in terms of internal consistency (Cronbach's alpha 0.910) and criterion

validity. The Hindi happiness scale can be used as a reliable and valid tool for the measurement of happiness in the Indian adolescents.

Keywords: Hindi, Happiness scale, Development, Validity, Reliability

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SECTION: CHEMICAL SCIENCES

President: Prof. Ranjana Aggarwal

1. Hydromagnesite sheets impregnated with cobalt-ferrite magnetic nanoparticles mediated A³-coupling strategy for the synthesis of imidazo[1,2-*a*]pyridine scaffolds

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ABSTRACT

Present paper delineates an account of the A³-coupling strategy assisted by novel hydromagnesite sheets impregnated with cobalt-ferrite (CoFe₂O₄-HMS) magnetic nanoparticles (MNPs), as environmentally benign nanocomposite to synthesize imidazo[1,2-*a*]pyridine scaffolds under ultrasonic conditions. The high product yield (upto 94%) in miniature reaction time, modest catalyst loading and excellent recyclability of the catalyst and solvent without appreciable loss of its activity (upto five synthetic cycles), put this decorum under the umbrella of green chemistry. The synthesized nanocomposites were characterized by PXRD, FE-SEM, HR-TEM, FT-IR, Raman, TGA-DTA-DTG, VSM and BET analyses. The structures of synthesized compounds were also corroborated considering FT-IR, ¹H and ¹³C NMR, mass and elemental analyses data.

Keywords: Multi-component reactions (MCRs), Hydromagnesite sheets (HMS), Cobalt-ferrite magnetic nanoparticles (CoFe₂O₄ MNPs), Ultrasonic conditions, Imidazo[1,2-*a*]pyridine

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SECTION: EARTH SYSTEM SCIENCES**

President: Prof. Atul Kumar Varma

- 1. Illitization of kaolinite in the anthracites from the Sikkim Himalayan Fold-Thrust Belts of India**

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ABSTRACT

The present study pens down the illitization of the kaolinites in the Sikkim anthracite samples of India through the inorganic geochemical proxies. The ratio of the K_2O/Al_2O_3 in these samples (0.16 to 0.27) may imply the presence of illite mixed with kaolinite, which is supported by the index of chemical variation. Besides, the anthracite samples plot near the illite field in the A-CN-K diagram, which may imply the plausible influences of the potassium-metasomatism at post coalification stages. The illite–OH stretching in the Fourier transform infrared spectra of the anthracite samples substantiates the effect of the epigenetic potassium-metasomatism.

2. CO₂ sequestration and ECBM recovery: A new approach for mitigating the effect of global warming

Mohammad Asif

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ABSTRACT

In this paper, new approaches have been followed for implementing the CO₂-ECBM technology in the coal seams of Jharia Coalfield. Coal samples were ranked from low to medium volatile bituminous coal as per characteristics of coal. The fixed carbon and vitrinite reflectance belongs to 49.96 and 54.56% and 1.43 and 1.78% respectively. Coalbed gas content of the sample was found around ~10 m³/t using newly developed correlation. The stable isotope of collected gas was analyzed through an artificial neural network approach. MATLAB codes were also developed for the competitive adsorption and displacement calculation of methane through the injection of CO₂.

Keywords: ECBM, ANN, CO₂ sequestration, MATLAB etc.

3. Identifying peridotite versus pyroxenite mantle source lithology for Archean basalts: a case study from the Neoproterozoic schist belts of the Eastern Dharwar Craton

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ABSTRACT

Mafic lithologies such as pyroxenites are the most common form of lithological heterogeneity in the Earth's mantle which is otherwise peridotitic and contributes significantly to the genesis of oceanic basalts. However, whether pyroxenites were a dominant lithological heterogeneity in the hotter Archean upper mantle is unknown. Using a compilation of bulk-rock geochemical data on tholeiitic basalts from several Neoproterozoic schist belts of Dharwar Craton, it is proposed that pyroxenites were the most common form of lithological heterogeneity in the Archean upper mantle and played a key role in the genesis of basalts during the early history of the Earth.

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SECTION: ENVIRONMENTAL SCIENCES**

Prof. (Dr.) Amar Prakash Garg

- 1. Precision farming using nano-maghemite abates fluoride pollution in rice by refining physiomic, metabolomic, agronomic parameters and mineral-nutrition homeostasis**

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ABSTRACT

Nano-maghemite-priming stimulated photosynthetic activity in IR-64 by reducing fluoride bioaccumulation and mitigating oxidative injuries (characterized by low ROS, O₂⁻, H₂O₂, methylglyoxal level and NADPH oxidase activity) thus increasing grain productivity and yield. Enhanced proline, anthocyanins, flavonoids, phenolics accumulation and glutathione synthesis (determined from high GR, GST and GPX activity) and glyoxalase activity was observed. Efficient uptake of potassium, calcium, iron, zinc, copper, nickel, manganese, selenium and vanadium and reduced cobalt transport triggered overall growth and promoted SOD, CAT, APX and GPOX activity. Statistical modelling of data exemplified the potential of iron-nanotechnology in promoting safe rice cultivation even in fluoride-polluted environments.

Keywords: Nano- γ -Fe₂O₃, fluoride toxicity, rice, amelioration, metabolomics, mineral-nutrition, statistical modelling

2. First Report on Vertical Distribution of Radionuclides ²³⁸U, ²³²Th and ⁴⁰K in soil cores collected from Indian Sundarbans

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ABSTRACT

Deltaic Sundarbans is an ecologically important mangrove land. Baseline radiological mapping in Indian Sundarbans has been carried out by our group in last few years. Present report focuses on the first investigation on depth profiling of naturally occurring radionuclides in six different sites of Indian Sundarbans using gamma-spectrometry. It has been found that ²³⁸U, ²³²Th, ⁴⁰K are homogeneously distributed in different depths (0-100 cm), indicating their geogenic origin. Activities of these radionuclides in depth samples were slightly higher than the global averages. However, Indian Sundarbans is not radiologically threatened as can be observed from the various calculated radiological indices.

Keywords: Naturally occurring radionuclides; Vertical profiling; Gamma-spectrometry; Indian Sundarbans

3. Polycyclic Aromatic Hydrocarbons in Diverse Agricultural Soils of Central India: Occurrence, Sources, and Potential Risks

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ABSTRACT

Polycyclic aromatic hydrocarbons (PAHs) are a class of organic compounds found ubiquitously in the environment and pose serious threat to environment and humans due their carcinogenic characteristics. In this study, the 16 EPA priority PAHs were measured in agricultural surface soils (0-5 cm) from diverse agricultural land use systems in central India. \sum_{16} PAHs of different agricultural soil samples ranged from ND-122.52 $\mu\text{g}/\text{kg}$. In general, we observed that highest \sum_{16} PAHs concentrations in sewage irrigated agricultural soils. In addition, it was found that agricultural soils treated with fly ash and sewage irrigated soils have a higher carcinogenic potential based on B[a]Peq

TEQs. PAHs with higher carcinogenic potency in these contaminated soils indicate a higher level of health risk for humans.

Keywords: Polycyclic aromatic hydrocarbons, Agricultural soils, Toxicity equivalents, Diagnostic ratio, Soil organic carbon

4. Biological nutrient removal and properties of exopolymer recovered from granular sludge treating municipal wastewaters

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ABSTRACT

This study describes the biological nutrient removal and biopolymer recovery from aerobic granular sludge (AGS). Simultaneous removal of COD, nitrogen and phosphorus removal was achieved within 4 h in AGS reactor. Alginate-like exopolymer (ALE) was found to be the structural biopolymer of AGS. Extraction of ALE reduced the solids content by 54%. The recovered ALE formed beads *in-vitro* and showed gelation properties. Higher gel-forming capability of biopolymer recovered from AGS was related to the presence of higher content of GG-blocks. Biopolymer recovery is a way for safe handling, disposal of sludge and recovering part of revenue incurred in wastewater treatment.

Keywords: Activated sludge, Aerobic granules, Biopolymer, Sewage treatment, Sludge management, Resource recovery.

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**SECTION: INFORMATION AND
COMMUNICATION SCIENCE & TECHNOLOGY
(INCLUDING COMPUTER SCIENCES)**

President: Dr. Paras Nath Singh

**1. Innovative 2D Codes to Enhance Security and Storage
Capacity**

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ABSTRACT

With the increase in usage of two Dimensional (2D) codes for various applications like digital payments, e-commerce solutions to authentications of documents, limited data storage capacity and security & privacy of the data stored in the 2D codes are hindering the applicability of these codes for a wide range of applications. This research work overcomes these challenges innovatively by designing multiple schemes to render 2D codes having properties like the capability to store public and private data, enhanced data storage, and non-reproducibility. These newly designed properties can be leveraged to creatively use 2D codes in various applications including anti-counterfeiting solutions.

Keywords: 2D codes, enhanced data storage capacity, security and privacy

2. Simultaneous Joint and Individual Clustering of Multi-View Data for Disease Gene Identification

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ABSTRACT

Different data sources, represented as multiple views, have the potential to capture diverse properties of the data. In order to capture the heterogeneous information, depicted by different views, into a single unified view, a novel multi-view kernel learning approach is proposed. A low computational cost approach is put forward to approximate the eigenvectors of the learned kernel, which is constrained to have a low-rank such that it can be partitioned into k clusters. It aims to simultaneously approximate the joint and individual cluster structures and minimize their disagreement based on the assumption that individual views contain a similar inherent cluster structure but they do not have the complete information to depict it. The efficiency of the proposed algorithm, in curating potential disease genes, is shown using some cancer-related gene expression data and protein interaction network.

Keywords: Multi-view kernel learning, clustering, microarray data analysis, protein-protein interaction network.

3. Integrative Clustering of Multi-View Data on Adaptively Weighted Joint Eigenspace

Aparajita Khan

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ABSTRACT

A major challenge in graph-based multi-view clustering is to prevent the noise in individual graphs from being propagated into the unified graph during graph fusion. This paper presents an integrative clustering algorithm that approximates each graph using the most informative eigenpairs of its Laplacian which contain cluster information and then

extracts a low-rank joint clustering subspace from multiple graphs. The algorithm automatically estimates the graph weights such that informative views have higher impact on joint subspace compared to noisy ones. Experimental results on several benchmark datasets from various application domains demonstrate that the proposed algorithm significantly outperforms the state-of-the-art approaches.

Keywords: Multi-View Clustering, Graph Laplacian, Spectral Clustering, Eigenspace Approximation, Alternating Optimization.

4. “WEcare” Predicting Ductal Carcinoma in Situ (DCIS) in India by Machine Learning Algorithm

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ABSTRACT

The most frequent malignancy in women nowadays is breast cancer particularly in India. Less invasive therapy are possible with early breast cancer type identification. To detect DCIS(Ductal Carcinoma in Situ) a trained model “WEcare” machine learning algorithm has been used to classify the clinical characteristics, mammographic findings, and images features. The model takes 3 input datasets comparing to other methods to predict DCIS in early stage. Powerful tools of Python language like pandas and scikit-learn have been used to compare accuracy, precision, recall and F1 score. Finally 94.56% accuracy of the proposed model “WEcare” outperformed other existing models.

Keywords: Breast Cancer, Confusion Matrix, Ductal Carcinoma in Situ, Machine Learning, Mammographic, WEcare

**HUNDRED AND EIGHT SESSION OF
THE INDIAN SCIENCE CONGRESS
RTM NAGPUR UNIVERSITY, NAGPUR, 2023
YOUNG SCIENTISTS' AWARD PROGRAMME**

SECTION: MATERIALS SCIENCE

President: Prof. Guduru Prasad

**1. HYDROTHERMAL SYNTHESIS OF MoO₃ - ZnO
HETEROSTRUCTURE WITH HIGHLY ENHANCED PHOTOCATALYSIS
AND THEIR ENVIRONMENTAL INTEREST**

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ABSTRACT

A methodological approach has been made in the synthesis of the MoO₃/ZnO heterostructure *via.*, superficial hydrothermal route. The synthesized MoO₃/ZnO will act as an agent for the photocatalytic destruction of Eosin Blue (EB) in a single step with non-toxic molecular intermediates is attained. Simultaneously Chromium (Cr), Lead (Pb), Zinc (Zn), Copper (Cu), and Iron (Fe) heavy metal are removed under the influence of solar radiation. The excellent anti-bacterial activity of *Bacillus subtilis*, *Staphylococcus aureus*, and the biocompatibility studies of Human embryonic kidney (HEK-293) was systematically accomplished. Also, the synthesized heterostructure was used in the treatment of *Albino swiss* mice administrated with air pollutant (PM_{2.5}). Later enormous collagen fibers, thickening of elastic fibers and congested pulmonary vessels with collapsed alveoli was observed but in case of mice treated with particulate matter followed by MoO₃/ZnO showed very lite increase in the size of interalveolar walls, proving to be an excellent bio-medication. This work offers the opportunity of constructing efficient photocatalyst with admirable bio-compatibility for a safer environment. Among many other metal oxides tested during the experiment, pioneer

synthesis of MoO₃/ZnO heterostructure was a benchmark for various environmental therapies.

KEYWORDS: CYTOTOXICITY, EOSIN BLUE, HEAVY METALS, MOLECULAR INTERMEDIATES AND PHOTOCATALYTIC DEGRADATION

2. Synthesis of three-dimensional self-assembled carbon nanotube aerogel and its application as a high performance virus filter

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ABSTRACT

Carbon nanotube (CNT) aerogel, a self-assembled 3D structure of long CNTs, was synthesized by floating-catalyst chemical vapor deposition. Computational fluid dynamics was carried out and the parameters were optimized to obtain desired porosities and microstructure in the CNT aerogel. Raman spectroscopy depicted multi-walled CNTs with good crystallinity. A filter suitable for filtration of viruses was prepared for mask application. The electron microscopy revealed the trapped viruses in the random network of CNTs of average pore-size of 15 nm. The filtration efficiency of the CNT aerogel based mask was better compared to the N95 mask with P1 bacteriophage virus.

Keyword: Carbon nanotube aerogel, Electron microscopy, Raman spectroscopy, Virus, Filtration

3. Influence of Polymer Nanofibre Interleaving on the Inter-Laminar Shear Strength of Aramid-Epoxy Novolac Composites for Airforce Helmet Applications

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ABSTRACT

Herein, polyamide-6 (PA-6), polyvinylidene fluoride (PVDF) and acrylonitrile-butadiene-styrene (ABS) nanofibre interleaved aramid/epoxy

novolac composite laminates were prepared using compression molding method and their mechanical properties were investigated. An attempt was also made to modify the matrix using Lauric Acid surfactant so as to reduce its brittleness. The morphology of nanofibres were examined by SEM and thermal properties of nanofibres, matrix, reinforcement and composites were evaluated by TGA and DSC. Their viscoelastic properties and ILSS results reveal improved damping and shear strength which is attributed to the synergistic effect of matrix modification and nanofibre interleaving.

Keywords: Electrospinning, nanofibres, aramid composites, Epoxy Novolac, surfactant, damping, Inter-Laminar Shear Strength.

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SECTION: MATHEMATICAL SCIENCES
(INCLUDING STATISTICS)**

President: Prof. Shishir Gupta

**1. Mathematical analysis of surface wave transference in
imperfectly bonded viscoelastic- FGPM bedded structure**

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ABSTRACT

The present article is dedicated to analyse the propagation and attenuation behavior of Love-type waves in an imperfectly bonded viscoelastic-Functionally Graded Piezoelectric Material(FGPM) layered structure. The linear spring model is adopted to portray the interfacial imperfection. The wave solutions in the FGPM substrate are approximated using Wentzel–Kramers–Brillouin (WKB) approximation technique. Dispersion relation is obtained and found to be complex in nature, when traction-free and electrically short conditions are taken into account. Numerical example and computations have been presented to analyse the dispersion equation. The pronounced effects of different parameters like gradient coefficients, layer's width, interfacial imperfection and dissipation factor on the phase velocity as well as attenuation coefficient of the Love-type wave has been illustrated graphically. Obtained results may be utilised to achieve

better performance of Surface Acoustic Wave (SAW) devices and Love wave sensors.

Keywords: Imperfect interface, WKB approximation, SAW sensors, FGPM.

2. Mathematical study of plane wave reflection and transmission at the interface of two dissimilar rotating piezoelectric fiber-reinforced composite half-spaces

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ABSTRACT

The aim of this article is to mathematically analyze the influence of rotation on the reflection and transmission characteristics of plane waves in two dissimilar piezoelectric fiber-reinforced composite (PFRC) half-spaces. The PFRC structure is modeled employing the Strength of Materials technique (SM) with Rule of Mixtures (RM). Using suitable boundary conditions, the closed-form expressions of the energy ratios of all reflected & transmitted waves and the interaction energy are obtained considering the incidence of quasi-longitudinal wave that exhibit their dependence on the angle of incidence and the PFRC properties. The impacts of aforementioned parameters are comprehensively studied and graphically analyzed.

Keywords: Reflection; Transmission; Piezoelectric fiber-reinforced composite; Energy ratios; Rotation.

3. Effects of eccentricity of orbit of primaries on separatrices of Sun-Saturn ERTBP using PSS

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ABSTRACT

In this study, the autonomous ERTBP model is used to study the separatrices of f -family orbits in the Sun-Saturn system using the numerical technique of PSS. The effects of eccentricity of the orbit of the primaries and radiation pressure on various parameters of periodic orbits at separatrices are analyzed. Also, statistical method of regression analysis is used for obtaining the approximate value of energy constant at separatrix. The study of ANOVA for different models suggest that the model developed by considering the perturbation due to eccentricity of the orbit of the primaries and radiation pressure provides the best approximation.

Keywords: Elliptical Restricted Three Body Problem, Poincarè Surface of Sections, Separatrix, Regression analysis

4. Bipolar expected value based MCDM technique on wastewater management under trapezoidal bipolar fuzzy environment

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ABSTRACT

Kolkata is located western bank of the Hooghly river. Wastewater from the city is discharged into this river and pollutes the river water. It causes maximum negative effects than positive impacts. Many uncertainties and bipolarity occur for this reason. Through the bipolar fuzzy concept, we can easily handle this situation. A bipolar fuzzy set is an effective tool for illustrating uncertainty and fuzziness. Therefore, in this paper, we have invented the bipolar expected value of bipolar fuzzy

numbers. Using this bipolar expected value, we developed a novel MCDM technique, and it's employed for wastewater management problems in Kolkata city under a bipolar environment.

Keywords: Bipolar expected value; MCDM; Waste water management; Trapezoidal bipolar fuzzy.

5. Statistical Investigations on Camellia Sinensis Production Data of Green and Black Tea in Palm Valley of Himachal Pradesh

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ABSTRACT

The present study entitled “**Statistical Investigations on Camellia Sinensis**”

Production Data of Green and Black Tea in Palm Valley of Himachal Pradesh” was carried out at the main campus of Department of Tea Husbandry & Technology of Chaudhary Sarwan Kumar Himachal Pradesh Krishi Vishvavidyalaya, Palampur (HP). Secondary data on tea production for Green and Orthodox Black Tea for 10 years from 2011-2020 were considered for the variability analysis and different prediction methods were applied for the analysis of Green and Black tea.

Keywords: Tea Production, Green Tea, Black Tea, Linear & Non-Linear model(s), Time- Series analysis.

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YOUNG SCIENTISTS' AWARD PROGRAMME**

**SECTION: MEDICAL SCIENCES
(INCLUDING PHYSIOLOGY)**

President: Prof. (Dr.) Goutam Paul

**1. In vitro and In vivo Studies to Evaluate the Wound Healing
Property of *Parkia javanica* Chloroform Fraction**

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ABSTRACT

Parkia javanica chloroform fraction (PJCF) significantly stimulated healing process in *in vivo* mice model. *In vitro* study result showed significantly induced proliferation and migration of fibroblasts and keratinocytes at optimum dose of 20µg/ml. The increase in phosphorylation of FAK and Akt was detected after treatment of PJCF. The increased expression of NF-κB and cytokines like, IL-1β, IL-6, IL-8, TGF-β was also observed. GC-MS data revealed the presence of compounds, with known wound healing properties. The results convincingly showed the wound healing property of PJCF and the mechanistic study indicated that, the healing activity at least partly be mediated via FAK/PI3K/Akt/NF-κB pathway.

Keywords: *Parkia javanica*; Fibroblast, Keratinocyte; Wound healing; Interleukins; Signaling proteins.

2. COVID-19 FOOD PYRAMID- A NOVEL APPROACH

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ABSTRACT

COVID-19 is an infectious disease that is caused by SARS-CoV-2, affects the respiratory framework of the body. This disease is said to adversely affect the nutritional status of the people. Now, there has been a gradual growth in research on immunity boosting diets for COVID-19. However, there is no representative food pyramid that has been specifically designed yet. Therefore, this study aimed to develop a COVID-19 food pyramid to illustrate the dietary recommendations for maintaining health during this pandemic. Such visual representation of the nutritional guidelines will be comprehensible by laymen and easy to incorporate into their eating habits.

KEYWORDS: Covid-19, Nutrition, Food Pyramid, Nutrition Pyramid

3. A novel method for establishing oral submucous fibrosis: an in vivo study and literature review.

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ABSTRACT

Epidemiological data has proved the association of consumption of areca nut with causation of oral submucous fibrosis (OSMF). OSMF is a chronic inflammatory disease with potential for malignant transformation. Establishment of animal model makes it easier for the researchers to further focus on the therapeutic applications to combat this disease. Human trials for assessing advanced therapeutic applications are not seemingly probable, thus in vivo animal modelscan come close to being the second best. The present study explores a novel method for establishing animal model for OSMF research.

4. Fabrication and assessment of eugenol cream for mosquito repellent activity

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ABSTRACT

Mosquito-borne disease impact on public health and economic loss. Synthetic repellent, products viz., N,N-diethyl phenylacetamide, N,N-diethyl-3-methylbenzamide, and N,N-di ethyl benzamide, transfluthrin, allethrin etc., are problematic and might cause serious health issues and toxicity on regular use. A green mosquito repellent cream formulation has been developed. In silico study carried out to identify the best ligand to bind with mosquito odorant binding protein. Formulation optimization was done, selecting the ligand having best binding efficiency with OBP. %Assay for eugenol in the developed formulation (EMRC) was evaluated by GC-MS study. The thermal behaviour of the developed formulation was characterized by thermogravimetric analysis. Efficacy of EMRC was correlated with 10%N,N-diethyl benzamide following arm in cage bioassay. Complete protection time of EMRC was determined as 192 min and %assay of eugenol was found to be 90.56% respectively. This product might be helpful to minimize man-mosquito contact in outdoor conditions.

Key words: Eugenol, GC-MS, TGA, Mosquito, Cream, Arm-In-Cage bioassay

5. Rhodamine B inhibits the contractile activity of duodenal visceral smooth muscle *ex vivo* of rat by augmenting the nitric oxide mediated soluble guanylyl cyclase signaling pathway through smtnl 1 gene expression, downregulating the expression of BMP receptors, and promoting the oxidative stress induced degenerative alterations in smooth muscle architecture

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ABSTRACT

The aim of the study was to elucidate the efferent neurocrine mechanisms for impairment of the contractile activities of duodenal visceral smooth muscle (dVSM) by Rhodamine B, a non-permitted chemical often used in food industries, in albino rat model. A significant decrease in the amplitude and frequency of contraction of duodenum has been observed as recorded *ex vivo* with an isotonic transducer (IT-2245) coupled to RMS-Polyrite-D in a dose response manner in Rhodamine B exposed groups of rats. It is hypothesized from the result that Rhodamine B may inhibit the force of contraction of dVSM by modulating the activity of inhibitory (nitroergic) myenteric efferents and / or stimulatory (cholinergic) myenteric efferents. The activation of nitric oxide (NO) mediated signaling pathway in Rhodamine B induced inhibition of the force of contraction of dVSM has been examined by measuring the nitrite level in dVSM homogenate through Griess assay method in control and Rhodamine B exposed groups of rats. A dose dependent increase in nitrite level has been observed in RhB exposed smooth muscle homogenate compared to control smooth muscle homogenate. This result indicates that Rhodamine B inhibits the force of contraction of dVSM probably by augmenting the activities of nitroergic myenteric efferents innervating the smooth muscles found in muscularis externa of duodenal wall structure. The nitroergic (NANC, non adrenergic non cholinergic) neurocrine mechanisms have been elucidated by recording the contraction of duodenum *ex vivo* in single dose acute experiment in response to the application in combination of Rhodamine B and L-NAME (NO synthase function inhibitor) and Rhodamine B and methylene blue (sGC, soluble guanylyl cyclase, activity blocker). In this study, the Rhodamine B induced inhibition of the force of contraction of duodenum has been counteracted significantly in response to the application of Rhodamine B in L-NAME pre-incubated duodenum or Rhodamine B in methylene blue pre-incubated duodenum. These results

ascertain that Rhodamine B inhibits the contractile activities of dVSM by promoting the relaxation through NO mediated soluble guanylyl cyclase (sGC) signaling pathway. Rhodamine B may enhance the production of NO, the predominant relaxation inducing neurotransmitter for dVSM, by stimulating the enzymatic activity of NO synthase in nitrergic myenteric neurons and dVSM cells and / or increase the synthesis of cGMP, a second messenger molecule that promotes relaxation of smooth muscle, from GTP by stimulating the enzymatic activity of sGC in dVSM cells.

In order to examine the role of BMP (bone morphogenetic protein) in Rhodamine B induced augmentation of nitrergic signaling pathway, the viability of RAW 264.7 macrophages has been tested in presence of Rhodamine B. In this study, the viability of RAW 264.7 macrophages has been decreased significantly in presence of Rhodamine B. This result suggests that Rhodamine B augments the nitrergic signaling pathway probably by downregulating indirectly the expression of BMP receptors in NANC neurons and dVSM cells. This might be due to toxicity induced degeneration of intestinal macrophages responsible for production of BMP, and thus, production of lesser amount of BMP in intestinal milieu.

To examine the effect of RhB on proteins in visceral smooth muscle cells and / or genes in visceral smooth muscle cells involved in Rhodamine B induced intoxication in visceral intestinal smooth muscle by genomic studies, the effect of RhB on such regulatory smooth muscle protein (SMTNL 1) expression was investigated at genomic level. The SMTNL 1 protein, also known as CHASM (Calponin homology associated smooth muscle) protein, was identified as a protein phosphorylated due to activation of cyclic nucleotide dependent protein kinases (PKA and PKG) during calcium desensitization of gastrointestinal smooth muscle.

The level of MDA (malondialdehyde) and the activities of antioxidant enzymes in dVSM homogenate have been measured and the architectural changes of smooth muscle texture in duodenal wall has been studied to understand the role of Rhodamine B in oxidative stress induced damage of dVSM organization and structure. The activities of SOD (superoxide dismutase), CAT (catalase), GPx (glutathione peroxidase) and GR (glutathione reductase) antioxidant enzymes have been decreased and the level of MDA has been increased significantly in Rhodamine B exposed rats. Besides, significant anatomical and cellular architectural degenerative changes have been observed in circularly and longitudinally oriented muscle layers in muscularis externa of the duodenum. These findings reveal that Rhodamine B may also inhibit the contractile activity of dVSM probably by inducing the oxidative stress induced degenerations of dVSM cells.

In conclusion, Rhodamine B inhibits the force and frequency of contraction of visceral smooth muscle found in the wall structure of duodenum probably by augmenting the NO mediated sGC signaling pathway through *smtnl 1* gene expression, downregulating the expression of BMP receptors., and inducing the degenerative architectural alterations in smooth muscle through promotion of oxidative stress.

Keywords: Rhodamine B, duodenal visceral smooth muscle, nitrergic myenteric neurons, nitric oxide, guanylyl cyclase, macrophage, bone morphogenetic protein receptor, oxidative stress

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**SECTION: NEW BIOLOGY (INCLUDING
BIOCHEMISTRY, BIOPHYSICS & MOLECULAR
BIOLOGY AND BIOTECHNOLOGY)**

President: Dr. R. Kavyashree

1. **Cullin1-SKP1-FBXW8-Cullin7 complex controls G1/S cell cycle progression by restricting β -TrCP1 function**

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ABSTRACT

β -TrCP1 is known to control the expression levels of several proteins for faithful cell cycle progression. However, how the function of β -TrCP1 is controlled during cell cycle progression remains elusive. Here, we show that β -TrCP1 levels oscillate during cell cycle and downregulated at the G1 and S-phase by FBXW8. Interestingly, MAPK dependent proteasomal degradation of β -TrCP1 by FBXW8 is important for Cdc25A-mediated G1/S transition and S-phase progression. Further, we showed that Cullin1, Cullin7 and FBXW8 form a complex in a cooperative manner to promote β -TrCP1 degradation. In conclusion, β -TrCP1 levels are maintained by Cullin1-SKP1- FBXW8-Cullin7 complex during cell cycle progression.

Keywords: Cdc25A/ Cooperative association / G1 to S phase transition/ MAPK pathway/ Sphase progression

2. The metagenomic D-allulose 3-epimerase, DaeM, expressed in *Bacillus subtilis* exhibits high thermostability along with a high turnover number for the biosynthesis of the functional sugar, D-allulose

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ABSTRACT

A novel D-allulose 3-epimerase (*daeM*) from a thermal spring metagenome was expressed in *Bacillus subtilis*. The protein (DaeM) was extracted and purified. DaeM exhibited substantial epimerization activity in the temperature range of 75°C to 90°C and 5.0 to 10.0pH range. The enzyme displayed excessive thermal tolerance at 60°C and 80°C, with a half-life of 13,860 and 150 min, respectively. Interestingly, DaeM showed a superior turnover number (376s⁻¹), unlike the protein expressed in *E. coli* with N-terminal Nus-tag. The treatment of 700 mg mL⁻¹ D-fructose by DaeM yielded about 217 mg mL⁻¹ D-allulose under optimal assay conditions.

Keywords: D-allulose, D-allulose 3-epimerase, *Bacillus subtilis*, Thermostable, Turnover number

3. An Aggregation Induced Emission based Turn-on Sensor for Heparin that works in 100 % Serum Matrix

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ABSTRACT

Designing efficient fluorescent probes with Aggregation Induced Emission feature, especially for sensing biologically important analytes, is an intensive and rewarding area of investigation. Heparin is a well-known blood anticoagulant, and is routinely used as a very important medication in clinical/hospital setups. In this work, we have utilized a tetraphenylethylene derived AIEgen named tetra-allylpyridinium-

tetraphenylethylene (AlPy-TPE) for sensing Heparin. AlPy-TPE carries four positive charges and forms aggregates upon treatment with negatively charged Heparin to form highly emissive aggregates of AlPy-TPE. The stronger interaction between Heparin and AlPy-TPE has proved to be advantageous in terms of improved sensitivity, higher fluorescence enhancement, and applications in 100% human serum samples. Overall, the photophysical investigation for the detection of Heparin is a successful attempt for facilitating Heparin related biosensing and biomedical research.

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SECTION: PHYSICAL SCIENCES

President: Prof. (Dr.) Suresh Chandra

Low-power Two-photon Excitation of Neurons with Light and Sound

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ABSTRACT

In this paper, it is shown that co-expression of mechano-sensitive and photo-sensitive proteins enables low-power two-photon excitation of neurons with infra-red light and ultrasound. Accurate theoretical models of sonogenetic excitation of neurons with ultrasound-mediated current in MscL(I92L) and two-photon optogenetic excitation of photocurrent in CoChR have been formulated. Under optimized conditions, CoChR can drive high-fidelity spikes upto 50 Hz, and at 10 Hz the irradiance for two-photon excitation of CoChR can be reduced drastically by 70 % in the presence of low-power ultrasound pulses. The study is important for low-power two-photon deep excitation of neurons and for multimodal neuroprosthetic devices.

Keywords: Neurophotonics, Two-photon Excitation, Optogenetics, Sonogenetics.

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SECTION OF PLANT SCIENCES**

President: Prof. Sunil Kumar Chaturvedi

- 1. Taxonomic assessment of genus *Saussurea*(Asteraceae) from India by using morphological and molecular data**

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ABSTRACT

Saussurea is one of the largest genera in the tribe Cardueae and economically important due to its high medicinal value. The evolutionary history of the genus was reconstructed based on nrDNA and cpDNA sequence data of 124 taxa, representing all the six genera of sub tribe Saussureinae. The resulting phylogeny was used to analyze the distribution of morphological characteristics. Four major monophyletic groups were recognized, which are incongruent with the infrageneric classification available for the group. Morphological synapomorphies were detected and morphological variations correlated with molecular phylogeny. Based on detailed systematic analysis, *Saussurea* is represented by 54 species in India.

Keywords: Cardueae, DNA, endemic, India, taxonomy

2. Mitigation of salt stress in Aila affected rice seedlings of Sundarban by plant growth promoting halophilic bacteria

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ABSTRACT

The nature's fury cyclone 'Aila' had struck in West Bengal in 2009, inundated agricultural fields with saltwater. Halotolerant PGP bacteria isolated from Sundarban, characterized by 16S rRNA sequencing. Present study aimed to explore rhizospheric bacterial role in alleviation of salinity stressed rice plant. Effect of bacterial biopriming (*Bacillus* sp. strain Pn D) on Amal-Mana variety of rice seed on germination and seedling growth behaviors under control (non-primed) and saline (1% NaCl for 24 h) conditions were studied. Biopriming improves photosynthetic pigment, protein, nitrogen, carbohydrate content during salt stress. Microscopy revealed root colonization of bacteria and histological characteristics of leaf tissue distortion for salinity.

Keywords: salt stress, halotolerant PGP bacteria, biopriming, plant-bacteria interaction.

3. Transcriptomic analysis signifies the necessity of nano-SiO₂-priming to overcome fluoride stress in *Oryza sativa* by improving molecular physiology, grain yield and promoting nutrient biofortification

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ABSTRACT

Fluoride toxicity triggered massive physiological aberrations in IR-64 by triggering the co-translocation of heavy metals like lead and cobalt. RNA-Seq analysis revealed fluoride-mediated induction of silicon transporters which signified the necessity of silicon nutrition. Nano-silicon-priming stimulated photosynthesis by reducing xenobiotic bioaccumulation and mitigating oxidative injuries and cellular necrosis. Grain yield along with

uptake of silicon, potassium, sulphur, iron, copper, selenium, manganese, vanadium, zinc and nickel was increased. Enhanced biosynthesis of antioxidants, osmolytes and increased catalysis by glyoxalases and detoxifying enzymes promoted systemic survival. The overall potential of silicon-nanofertilization to safely cultivate rice in fluoride-polluted soils was thus established.

Keywords: RNA-Seq, nanoparticles, stress, rice, amelioration, physiology, antioxidants

4. Unveiling the role of SOG1, a NAC domain transcription factor, in recombination mediated DNA damage repair and chromatin modification under salinity stress in *Arabidopsis*

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ABSTRACT

Homologous recombination (HR) is a key process for maintaining genome integrity in plants. In this present study we have revealed that SOG1, a NAC domain transcription factor, is associated with the activation of HR pathway by directly upregulating the expression of *MRE11*, *NBS1*, *RAD50* and *RAD51* genes for repairing salinity induced double-strand breaks (DSBs) in *Arabidopsis*. Furthermore, we have provided important clues regarding the possible involvement of SOG1 in various chromatin modifications including histone methylation (H3K9me3 and H3K27me3) and acetylation (H4K5ac) under salinity stress conditions by positively regulating the expression of various chromosome remodelers and histone modifiers.

Keywords: SOG1, Salinity induced DSBs, Homologous recombination, Chromatin modifications, histone methylation