

International Conference on
ROLE OF SCIENCE AND TECHNOLOGY IN
SUSTAINABLE DEVELOPMENT

October 10-11, 2022

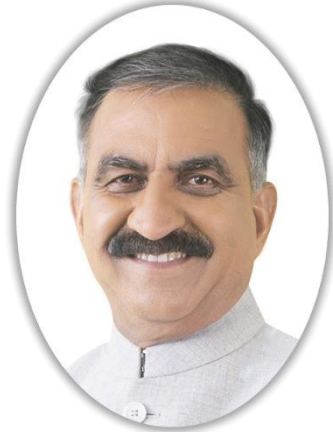


Organized by
HIM SCIENCE CONGRESS ASSOCIATION
at
HOTEL MOONGLADE, BANIKHET
DALHOUSIE, HIMACHAL PRADESH

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PROCEEDINGS
of
THE 10th HSCA
INTERNATIONAL CONFERENCE
on
ROLE OF SCIENCE AND TECHNOLOGY IN SUSTAINABLE
DEVELOPMENT
AT HOTEL MOONGLADE, BANIKHET DALHOUSIE
HIMACHAL PRADESH
ON OCTOBER 13-14, 2023



सुखविंदर सिंह सुखू
SUKHVINDER SINGH SUKHU



मुख्य मंत्री
हिमाचल प्रदेश
CHIEF MINISTER
HIMACHAL PRADESH

Message

I am delighted to know that Him Science Congress Association, Sardar Patel University Mandi, Himachal Pradesh is hosting its 10th International Conference on 'Role of Science and Technology in Sustainable Development' on 13th and 14 October, 2023 at Banikhet, district Chamba .

Over the past decade, the Him Science Congress Association has made significant contributions to promote excellence in science. The Association has gathered pioneers of various scientific fields to enlighten and motivate the young scholars of the region.

I am confident that the Conference will provide an excellent platform for the delegates to exchange new research ideas, applications, share research experiences and establish global partnerships for future collaborations.

I wish the conference a grand success.


(Sukhvinder Singh Sukhu)

ASIAN POLYMER ASSOCIATION



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Dated: 02.10.2023

Bhuvanesh Gupta
President (APA)



Message from the President, Asian Polymer Association

Scientific conferences are very dynamic platforms to spread knowledge to the world by encouraging intense discussion among the scientific fraternity and I am highly enthused to see that HSCA is organizing an International Conference on the “ROLE OF SCIENCE AND TECHNOLOGY IN SUSTAINABLE DEVELOPMENT ” in Dalhousie on October 13-14, 2023. The importance of this event is reflected in terms of the discussion that will be held as the agglomeration of scientists from different domains of science and engineering subjects. I am sure that this conference would provide a well-knitted structure for the collaborations among the scientists from different domains. I wish this conference a grand success and visualize a knowledgeable outcome of the two-day event.

Bhuvanesh Gupta
Chief Patron

HIM SCIENCE CONGRESS ASSOCIATION



Prof. (Dr.) Deepak Pathania
President, HSCA

c/o Department of Environmental Sciences

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Message from the President

On behalf of the Him Science Congress Association, I am truly honored and delighted to take this opportunity to welcome you all to this International Conference on the “**Role of Science and Technology in Sustainable Development**” in Banikhet, Dalhousie, Chamba, on October 13-14, 2023. The conference is committed to make legitimate and reliable contributions to the scientific community in sustainable way. The Conference will be the perfect platform for global networking as it brings together renowned speakers and scientists across the globe.

The two-day conference focuses on a broad range of issues and challenges in the field of sciences which will be weaved through the Keynotes Speakers, Plenary Speakers, Oral and Poster presentations and discussions. This conference will surely create a vibrant platform for idea exchange, networking, and potential collaborations in future research. I believe that the success of the conference depends heavily on the people who have worked hard in planning and organizing the conference. I want to congratulate them for their hard work and meticulous arrangements.

Looking forward to your enthusiastic participation.

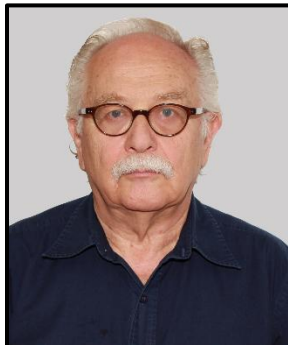
With best wishes

Deepak Pathania

PLANARY SESSIONS

**THE 10th HSCA
INTERNATIONAL CONFERENCE
on
ROLE OF SCIENCE AND TECHNOLOGY IN SUSTAINABLE
DEVELOPMENT
AT HOTEL MOONGLADE, BANIKHET DALHOUSIE
HIMACHAL PRADESH
ON OCTOBER 13-14, 2023**

KEYNOTES SPEAKERS
ABSTRACT NO - IT -01



**Ion-conducting Polymer Membranes for Electrochemical Energy
Conversion Technologies prepared by Radiation Grafting**

Günther G. Scherer^{1,2}

¹Former Head Electrochemistry Laboratory, Paul Scherrer Institut, 5232 Villigen, Switzerland

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Abstract

Electrochemical energy conversion technologies show advantages compared to thermal conversion technologies, because they are not Carnot-limited. Electrochemical cells, which are based on the *solid polymer electrolyte* concept, utilize ion-conducting polymer membranes in the *plate and frame* configuration as electrolyte, separator, and gasket. Dense commodity fluoropolymer films can be modified in different ways to become ion-conducting polymer membranes. The essential idea behind this modification is that outstanding properties of fluoropolymer films, e.g., thermal, mechanical, and chemical stability, are retained and additional functionalities are introduced after modification. Modification by radiation-grafting a desired copolymer component onto the base polymer film and its subsequent sulfonation, phosphonation, etc. to introduce acid groups is one efficient way to introduce these groups chemically bound to the polymer network, otherwise not or difficult to be accessible by chemical means. An overview of the principle of radiation grafting and its various practical implications will be discussed and results of the development of proton-conducting membranes for H₂/O₂ fuel cell applications will be presented.

INVITED TALK
ABSTRACT NO - IT -02



Natural Backbone Based Ecofriendly Materials– Prospective Applications

Balbir Singh Kaith

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Abstract

Population explosion all over the world has become a big threat. India possesses only 2.4% of the total geographical area of the world. Whereas, it hosts about 18% of the total population of the world. This has limited the per capita available resources for the use of mankind. Moreover, there are uncertainties in rain pattern which has resulted in soil desertification and decrease of food grain production. Under such circumstances polymer materials play very important in bringing the Second Green Revolution i.e. Evergreen Revolution, without any adverse impact on the eco-system. Polymeric materials have generated a lot of interest among the agriculture Scientists all over the world because of their biodegradability and environment friendliness. Researchers over the globe are working on such materials taking into consideration their innovative features. This has created enormous interest among the scientific community and new generation materials in biomedical, pharmaceuticals and other industrially important products have come up in the market. But the specific application oriented materials need to be designed and developed. In the present paper, designing of multifunctional polymeric materials of natural origin and their applications in agriculture sectors and other fields have been highlighted.

INVITED TALK
ABSTRACT NO - IT -03



**Nano-additives with Phase change materials for energy storage applications:
Challenges and Progressive Trends**

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School of Energy Management, Shri Mata Vaishno Devi University, Katra, 182320, (J&K), India Email:

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Abstract

Role of sustainable technologies for development in energy storage is a step towards clean environment. Phase change materials (PCMs) are the potential candidates for energy storage due to their high latent heat values. The thermal energy storage (TES) potential of PCMs has been deeply explored for a wide range of applications, but not limited to solar/electrothermal energy storage, waste heat recovery, energy savings in building, and thermal regulations. Furthermore, use of nano-additives to distress in PCMs providing a new insight in energy storage applications. Applications of nano-additives for novel-composite PCMs provides a platform for improvement in thermo-physical properties and eco-friendly human comfort appliances are the upcoming research sector. In this present study, applications of nano-material in coupling with PCMs for energy storage sector is discussed with challenges and progressive trends.

INVITED TALK
ABSTRACT NO - IT -04



**Genetically Modified Crops: Their Development, Potential Uses and
Associated Risks**

Raju Shankarayan

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Abstract

Genetically modified crops, often referred to as GMOs (genetically modified organisms), are plants whose genetic material has been altered in a way that does not occur naturally through mating or natural recombination. This modification is typically done to impart specific desirable traits or characteristics to the crops. We have different reasons for doing genetic modifications in plants which are increased crop yield, pest resistance, herbicide tolerance, disease resistance and improved Nutritional Content. In terms of increased crop yield Genetically modified crops can often yield more produce per acre, potentially helping to address food security and reduce pressure on natural ecosystems. Genetic modification of crops involves the insertion or modification of specific genes to achieve desired traits. This can be done through various techniques, such as gene splicing and recombinant DNA Technology, genetic engineering etc.

Among the various GMP crops developed the most well-known genetically modified crops include Roundup Ready Soybeans, Bt Cotton and Bt Corn, Golden Rice, Papaya, Canola etc.

Genetically modified crops (GMOs) have been a topic of debate and concern for several reasons. While they have the potential to offer benefits such as increased crop yields, resistance to pests, and improved nutritional content, there are also concerns about their potential harmful effects. Genetically modified crops have been the subject of considerable debate and controversy. Critics

raise concerns about potential risks to human health, environmental impacts, and the concentration of seed ownership in the hands of a few large corporations. Supporters argue that GMOs can contribute to increased agricultural productivity, reduced pesticide use, and improved food security. The safety of GMOs is a key consideration. Before GMO crops are approved for cultivation and consumption, they typically undergo extensive testing and evaluation to assess their safety for both human consumption and the environment. However, concerns remain about long-term effects and the potential for unintended consequences.

INVITED TALK

ABSTRACT NO - IT -05



Understanding adaptation of *Artemisia brevifolia* at high altitudes

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Abstract

With increase in altitude lots of environmental features changes making the conditions harsh for the survival of organism at extremely high altitudes. The plants adapted to such extremely high altitudes might be due to its ability to tolerate the harsh climatic conditions. *Artemisia brevifolia* is an important high altitude medicinal and aromatic plant belonging to the family Asteraceae. It is native to Western Himalayan region especially Ladakh and grows wildly and widely in various parts of Ladakh region between the altitude range of 2800-4500masl. Given its medicinal importance and range of distribution, *A. brevifolia* can act as a good model system to understand the impact of altitude on the adaptation. The plant produces large quantity of volatile compounds which might be one of the adaptive strategies towards the herbivores and surrounding

competitive plants. VOCs play crucial role in interacting with the surrounding environment of the plant. Phenolic compounds such as phenols and flavonoids are synthesized as the defense compounds against biotic and abiotic stresses under harsh environmental conditions. In this study we investigated the impact of altitude on the VOCs and phenolic compounds of *A. brevifolia* across altitudinal gradient of Ladakh. VOCs were collected using solid phase extraction (SPE) method. A total of 23 volatile organic compounds were present in the plants. Camphor, eucalyptol and thujones were the major compounds present in most of the samples from different altitude. α & β thujones were present in as major VOC in high altitude Khardungla samples only, whereas the concentration of eucalyptol and camphor are high in samples from low altitude indicating the presence of thujone chemotype at high altitude and eucalyptol-camphor chemotype from low altitude. It was interesting to observe that the number of phenolics remains unaffected with altitude however, the concentration of most of phenolics present decreases with altitude, which might an adaptive strategy of *A. brevifolia* at high altitude to conserve nutrients and resource available in limited amount.

INVITED TALK

ABSTRACT NO - IT -06



Green approach using natural materials for biological synthesis of reduced-graphene oxide (brGO) and potential applications.

Tariq Maqbool

Laboratory of Nanotherapeutics and Regenerative Medicine, Department of Nanotechnology, University of Kashmir, Srinagar - India

Abstract

Graphene oxide (GO) and its reduced form (rGO) possess good electrical conductivity, mechanical stability and intrinsic biocompatibility and are, therefore, useful in biomedicine and other applications. However, the conventional method of rGO synthesis usually involves the use of toxic reducing agents which are harmful to human health and to the environment. Thus, there is a need for greener approaches for the effective reduction of GO suitable for its various biocompatible applications. Natural materials can act as reducing agents in the synthesis of biologically reduced Graphene Oxide (brGO) in order to replace the toxic chemicals otherwise used. Our preliminary results indicate that the greener approach and protocols developed are quite effective for obtaining biologically reduced graphene oxide (brGO). As-prepared brGO samples exhibit superior biocompatibility with HEK-293T cells even at a relatively high concentration of 100 $\mu\text{g/ml}$, when compared to GO. This observation suggests that properly fabricated biologically reduced Graphene Oxide holds promise as a potential scaffold material in the field of tissue engineering.

The 10th HSCA-International conference on Role of Science and Technology in Sustainable Development [RSTSD-2023]” on 13 -14 October, 2023

Paper ID	Authors	Institute	Title	Oral/Poster	Subject
3	Dr Ravi Datt, Dr Mangal Singh Bisht and Dr Sita Ram		Utilization of Taguchi method for optimization of geometric and flow parameters of circular heat exchanger tube with combined solid ring and square wing twisted tape inserts.	Oral	Math
4	Chetna Verma	IIT Delhi	Functional Designing of Polypropylene by Plasma Processing For Biomedical Applications	Oral	CH
7	Dr Geetanjali Sahni		Karyotypic studies of mitotic and meiotic chromosomes of an arctiid moth <i>Amsacta lactinea</i> Cram. (Lepidoptera, Arctiidae) revealing female heterogamety	Oral	BS
9	Vipula Sethi, Chetna Verma, Bhuvanesh Gupta, Samrat Mukhopadhyay and Amlan Gupta	Indian Institute of Technology, Delhi	Plasma Induced graft polymerization of Itaconic acid onto PP mesh	Poster	CH
10	Dharani Elangovan, Sandeep Sharma, Neha Anand, Tarun Kumar, Adhip Das, Ranjith Kumar Ellur, Sanjay Kalia and Renu Pandey	ICAR-Indian Agricultural Research Institute, New Delhi	Identification of haplotypes in rice accessions for NRT1.1 regulating nitrate uptake under low nitrogen stress	Oral	AS
12	Rashmi Dhawan	S.A.Jain College, Ambala City	Kinetics and thermodynamics of adsorption of Isopropylacetate vapors by modified activated carbons	Oral	CH
13	Mahika Gulati, Chetna Verma, B.S. Kaith and Bhuvanesh Gupta	Dr B R Ambedkar National Institute of Technology, Jalandhar	Surface Modification of Polypropylene by Carbon Dioxide (CO ₂) Plasma	poster	CH
14	Nishika, Chetna Verma, B.S. Kaith and Bhuvanesh Gupta	Dr B R Ambedkar National Institute Of Technology, Jalandhar	κ -Carrageenan-Polyethylene Glycol based Hydrogel for Antimicrobial Applications	poster	CH

15	Lavanya Singh Malik, Chetna Verma, B.S. Kaith and Bhuvanesh Gupta	Dr B R Ambedkar National Institute of Technology, Jalandhar	Development of CG-PEG/ Vitamin E based Hydrogels for Scar Prevention	poster	CH
18	Pradip Kumar Ghosh and Aloke Kumar Sarkar	Jadavpur University	Concept of Dark Matter from Casimir Effect and Cosmological Constant Following Standard Model of Cosmology	Poster	PH
19	Anil Kumar, Suman Lal and Girish Kumar	DAV College, Dasuya (Pb.)	Information Theoretic Concepts of PT-Symmetric Potential	Poster	PH
20	Sandeep Sharma, Raviteja Dh, Tarun Kumar and Renu Pandey	Indian Agriculture Research Institute New Delhi	Pup1 QTL-introgressed rice lines mitigate the effects of elevated CO ₂ and low P stress on yield, biomass accumulation, and C:N:P stoichiometry	Oral	BS
21	Sarvjeet Kaur and Ashutosh S. Singh	MMDU Mollana	Mutual induced-fit controlled effective confinement in hydrogen bonded capsule	Oral	CH
22	Harpreet Kaur and Arush Sharma	Baddi university of emerging sciences and technology	Adsorption mechanism of metformine from water system using Vachellianilotica plant	oral	CH
23	L. N. Aggarwal	Geological Survey of India	Geodiversity: New Avenues in Tourism	Oral	EVS
25	Akshay Thakur and Ashish Kumar	Sardar Patel University, Mandi	Photocatalytic Water Splitting vs Hydrogen Evolution: Key Differences and Scalability Aspects	poster	CH
26	Chetan Chauhan	Sardar Patel University, Mandi	"Breathing Trouble in Paradise: A Review of Surface Ozone Trends, Causes, and Environmental Impacts in Kullu Valley, Himachal Pradesh	Oral	CH
27	Priya Mehra, Simran Arora and Bhag Chand Chauhan	Central University of Himachal Pradesh	Active-Sterile Neutrino Schemes and Neutrinoless Double Beta Decay	oral	PH
31	Rishu Verma, Prof. Bhag Chand Chauhan and Nalin Dhiman	Dr Y S Parmar, UHF, Nauli, Solan, HP	A Fluidic Nature of Unseen Matter in Galaxies	Poster	PH
32	Tikkam Singh and Veena Agrawal	Department of Botany, University of Delhi, Delhi-07	Bioassay guided isolation, characterization, and elicitation of potent cancer inhibitors in the callus culture of Cullen corylifolium (L.) Medik.	Oral	BS

33	Rajnish Kumar, Dharmesh Gupta and Anupam Barh	Dr Y S Parmar, UHF, Nauni, Solan, HP	Evaluation of various substrates for cultivation and spawn preparation of <i>Flammulina velutipes</i> strains	Oral	AS
34	Kushal Thakur, Hishani Kumari, Bhavna Brar and Rakesh Kumar	Department of Animal Sciences, Central University of Himachal Pradesh	Length Weight relationships of some Freshwater fish species from Beas River	Poster	BS
35	Danish Mahajan, Hishani Kumari, Bhavna Brar and Rakesh Kumar		Environmental Impact Assessment: Fish Diversity and Habitat Ecology in the Mining-impacted Upper Ravi River Basin, Himachal	Poster	BS
36	Simran Arora and Bhag Chand Chauhan	Central University of Himachal Pradesh	Neutrino Mass and Muon (μ -2 μ) from a μ -4 μ Scotogenic Model	ORAL	PH
37	Rahul Verma and Chetan Chauhan	Sardar Patel University, Mandi, Himachal Pradesh	Extraction and Characterization of Essential Oils from Leaves and Rhizomes: A Comprehensive Study on <i>Zingiber officinale</i> the Aromatic Plant Resource.	Poster	CH
38	Nisha Singh, Sandeep Sharma, Monu Kumar, Rajesh Kumar Sharma, Vandana Rai, Rashmi Yadav and Renu Pandey	Institute of Science, Banaras Hindu University (BHU)	Exploring Physiological Mechanism for Drought Tolerance in Sesame: A Trait-Based Selection Approach for Elite Accessions	Oral	BS
40	Shareshtha Devi and Mahesh Kulharia	Central University of Himachal Pradesh	Curing the Ageing Process :Targeting Klotho and FGF23 complex by Phytochemicals	Poster	BS
41	Zaheer Ud Din Sheikh, Anita Singh and Deepak Pathania	Central University of Jammu	Adaptive Evolution of <i>Candida shehatae</i> with Inhibitor Tolerance for Production of Lignocellulosic Ethanol	Oral	BS
42	Priya Mehra, Simran Arora and Bhag Chand Chauhan	Central University of Himachal Pradesh	Neutrino-less Double Beta Decay in Different Active-Sterile Neutrino schemes	ORAL	PH
44	Shivani Attri and Saroj Arora	GNDU, Amritsar	Apoptotic inducing and anti-inflammatory potential of Bakuchiol isolated from <i>Psoralea corylifolia</i> against epidermoid (A431) cell line for the treatment of psoriasis	ORAL	BS

47	Palak Ahir and Sunil Kumar	HPU, Shimla	Green Synthesis, Characterization and Photocatalytic activity of R. Arboreum petal mediated ZnO Nanoparticles	Oral	CH
48	Sanya Chauhan and Sushila Devi	Himachal Pradesh University	Seabuckthorn associated Plant Growth-Promoting Rhizobacteria (PGPR): A Symbiotic Relationship for Sustainable Agriculture.	ORAL	BS
50	Swaran Lata and Rishabh Sharma	ICFRE-Himalayan Forest Research Institute, Shimla, H.P.	Population Assessment of Pinus gerardiana Wall. ex. D. Don in North Western Himalaya, India	POSTER	BS
54	Anita Kumari and Swadeep Sood	IEC University Baddi Solan	Congo red dye removal by adsorption using biochar-based lanthanum ferrite nanocomposite	Oral	CH
56	Parveen Kumar and Sunil Kumar	Himachal Pradesh University	Investigation of molecular interactions of the drug Aspirin in water by volumetric and UV-vis spectroscopic methods	POSTER	CH
58	Bikesh Kumar Singh and Narendra Kuber Bodhey		Breast cancer risk assessment system in women using machine learning techniques for accessible and sustainable healthcare	Oral	BS
59	Manish Sharma and Rajesh Manhas	Chandigarh University	Therapeutic application of Salvianolic acid B generated by Streptomyces sp. M4 to combat microorganisms with medication resistance	Oral	CH
60	Deepak Pathania	Central University of Jammu	Algal mediated synthesized Ag-ZnO Nanomaterials for Photocatalytic degradation of Monocrotophos and Antimicrobial activity	oral	EVS
61	Shubhanjali Choudhary	Dr B R Ambedkar National Institute of Technology, Jalandhar	Transition metal-free approaches for arylation of heteroarenes	Poster	CH
62	Shilpa Chauhan, Mahesh Kulharia and Shailender Kumar Verma	Central University of Himachal Pradesh	The study of role of ATOX1 and MEMO1 copper-binding proteins in Cancer Biology	Poster	BS
63	Keshav Jain and Dr. Geetanjali Sahni	Department of Zoology, Arya PG College, Panipat, 132103, Haryana, India	Enhancing milky mushroom (Calocybe indica) yield through precision substrate formulation in controlled environment cultivation: data- driven insights for optimal growth	Oral	BS

64	Tishali Mehta	Punjab Agricultural University	Avian Species in Relation to Apiaries: A Perspective	Oral	BS
66	Neha Bhandari and Negi DS	Himachal Pradesh University	Study on herbal formulations for the treatment of "leishmaniasis	Poster	BS
68	Manjinder Kaur and Nisha Vashishat	Punjab Agricultural University Ludhiana Punjab	Prevalence of Wild boar (<i>Sus scrofa</i> L.) in agricultural crop fields adjacent to Sutlej canal, Ludhiana, Punjab	Poster	BS
69	Payal Arora, Neena Singla, Ruchika Thukral and Diptiman Choudhury	Punjab Agricultural University	Evaluation of papaya seed chloroform extract-based nanoparticles for toxic effects against lesser bandicoot rat, <i>Bandicota bengalensis</i>	Oral	BS
71	Pratibha Sharma, Gurkirat Singh Sekhon and Tejdeep Kaur Kler	Punjab Agricultural University	Effects of anthropogenic noise on avian diversity and breeding biology in Punjab and Haryana	Oral	BS
72	Rishabh and Uma Shanker	Dr. B. R. Ambedkar National Institute of Technology Jalandhar	Sunlight assisted highly efficient photocatalytic remediation of organic pollutants by green biosynthesized ZnO@WO ₃ nanocomposite	Oral	CH
75	Vijayendra Gurjar	KLS Gogte Institute of Technology, Affiliated to VTU, Belagavi	Vanadium removal from industrial residue leachates using hybrid ion exchange resin	Oral	CH
76	Jagriti Thakur, Ranu Pathania, Yourmila Kumari, Garima and Mohit	CSK Himachal Pradesh Agriculture University	Mineral Nutrition for alleviating abiotic stresses in agricultural crops under Changing Climate Scenario	Oral	AS
77	Neha Pathania	Shoolini University	Eradicating antibiotics from industrial wastewater using <i>Moringa oleifera</i> seeds as a natural coagulant	Oral	BS
79	Sunil Kumar and Dr Pankaj Thakur	Career Point University Hamirpur Himachal Pradesh	Comparative Elasto-Plastic Analysis in a Rotating Disk Made of Polymer Material with Variable Density Parameter	Oral	Maths
80	Manvi Sharma, Chandresh Kumari and Saurabh Kulshrestha		Exploring the biological properties of <i>Jasminum mesnyi</i> : A comprehensive investigation of different extracts for Bioprospecting Applications	Poster	BS

81	Sakshi Raturi and Swati Kumari	Dept. of Biotechnology, Shoolini University, Solan	Phytochemical evaluation and antioxidant analysis of different extract of <i>Rhododendron arboreum</i> sm.	Poster	BS
82	Garima Sharma, Yourmila Kumari, Seema Sharma and Neena Kumari	Dr YS Parmar University of Horticulture and Forestry, College of Horticulture and Forestry Thunag Mandi HP	<i>Prunus cerasoides</i> : a Himalayan endemic winter blooming cherry tree for the upliftment of rural economy	Oral	AS
83	Yourmila Kumari, Garima Sharma, Seema Sharma and Neena Kumari	Dr YS Parmar, University of horticulture and forestry, College of Horticulture and Forestry, Thunag Mandi, HP	Empowering livelihoods through Lingad (<i>Diplazium esculentum</i> (Rtez.) Sw.): an endemic & economically important fern of Himachal Pradesh, North Western Himalayas	Poster	AS
85	Aakash Rathour	Sardar Patel University, Mandi	Microplastic invasion and its effect on fish biology	Oral	BS
86	Indica Mohan, Deepak Pathania	Central University of Jammu	Assessment of groundwater quality of Chatha region of Jammu and Kashmir, India	Oral	EVS
90	Nikhil Jaswal Kanika Raj, Rohit Jasrotia	Shoolini University	Green Hydrogen Production Promoted by Cobalt-Nickel Magnetic Nanomaterials	ORAL	PH
91	Neha Kotwal, Deepak Pathania, Anita Singh	Central University of Jammu	Zero-valent iron nanomaterial-Immobilised Cellulase for Efficient Cellulose Hydrolysis	Oral	EVS
93	Krishma Kumari	Central University of Jammu	Implementation of constructed wetland for sustainable wastewater phytoremediation: a review	Poster	EVS
94	Rajni Bala	Department of Mathematics, Punjabi University, Patiala	A note on Hg-paracompactness in Hereditary Spaces	Oral	Math
95	Susheel Kalia	Indian Military Academy	A Sustainable Technology Assessment for Converting Municipal Solid Waste to Energy in the Himalayan Region	Oral	CH
96	Preeti Verma	Central University of Jammu	Assessment of Water Quality of River Ujh, Udhampur District (J&K)	Oral	BS

97	Kajol Gorla	Central University of Jammu	Future of algae as biofuels feedstock: A sustainable way towards circular bioeconomy	oral	EVS
98	Mohit, RK Rana, Pankaj Chopra, Ashita Bisht, Shabnam Katoch and Radhika Negi	CSKHPKV	Bearing Fruit from Barren Lands: Significance of Seabuckthorn Cultivation in Lahaul - Spiti, Himachal Pradesh	Oral	AS
99	SUCHI SHARMA	MMDU MULLANA	Revolution of Biodiesel Catalyst Manufacturing	Poster	CH
100	Rubia Kouser	Central University of Jammu	Sustainable Fuel Pellet Production from Agro-Residuals and Animal Waste Densification: A Review of the Indian Scenario	Poster	BS
101	Dr. Arti Thakur	Department of Botany, Shoolini Institute of Life Sciences and Business Management, Solan (H.P)	Nutritional compositions, Phytochemicals, Antioxidant and Antibacterial study of some wild edible plants consumed as food by Gaddis: a tribal community of Western Himalaya	Oral	BS
102	Arti Devi	Central University of Jammu	Valorization of rice straw for xylanase production from Fusarium sp. under submerged fermentation	Oral	BS
103	GAGANDEEP KOUR	Central University of Jammu	A biomonitoring of Plankton in the polluted stretch of Tawi river, Jammu City, Northwest Himalayas	Oral	BS
105	Parul Sharma, Sushil Chaudhary, Palika, Pooja Sharma	Bahra University	Reflection and Transmission of plane SH-Wave at an Interface between Monoclinic Elastic Solid Half Space and Monoclinic Elastic Solid Half-Space	poster	PH
106	Dr. Kranti Thakur and Dr. Jagdeep Verma	SILB, Solan, Sardar Patel University, Mandi	Distribution Pattern of Over-Storey Vegetation in Shilli Wildlife Sanctuary, Solan, Northwest Himalaya	Oral	BS
107	Parul Sharma, Medhavi Thakur, Parul Thakur, Amrit Kaur, Preeti Verma, Shilpa Kumari	Bahra University	Comparative study of magnetic susceptibility of different materials at room temperature	Oral	PH
108	Parul Sharma, Nikhil Sharma, Gaurav Kapoor, Surag Tangraik, Akshita Sharma, Rohit Kumar	Bahra University	A Graphical study of magnetic susceptibility of different magnetic materials as a function of temperature	Oral	PH

109	Shubham Raina	Central University of Jammu	Use of Biochar and Nano-biochar for Wastewater Treatment: An Approach Towards Sustainability	Oral	BS
110	Shafia Choudhary	Central university Jammu	Assessment of the Water Quality of the Spring Water of Rajouri District of Jammu	Oral	EVS
112	Aditi, Dr. Manjula Sharma	Department of Chemistry, SPU Mandi	Biosynthesis, Antimicrobial and photocatalytic activity of Ag-ZnO nanocomposite.	poster	CH
114	Rakesh Kumar Sharma	Department of History, Sardar Patel University, Mandi (Himachal Pradesh)	HISTORY OF BIOSCIENCES IN INDIA	Oral	BS
116	Navdeep and Dr. Geetanjali Sahni	Department of Zoology, Arya PG College, Panipat, 132103, Haryana, India	An Ethical Dilemma of Three Parent Baby	Oral	BS
117	Varsha Sharma, Dr. Geetanjali Sahni, Shiwani Rani, Neha Dhiman, Neha, Sikha and Neha	Department of Zoology, Arya PG College, Panipat, 132103, Haryana, India	Avifaunal Biodiversity Status and Abundance around Panipat and Jind Districts of Haryana, India	Poster	BS
118	Dr. Geetanjali Sahni, Vanshika, Jyoti, Swati Pal, Monika, Akanksha, Shradha and Dipti	Department of Zoology, Arya PG College, Panipat, 132103, Haryana, India	Diversity of Some Insect Fauna in Industrial and Non-industrial Areas of Handloom City Panipat, Haryana, India	Poster	BS
119	Shruti Sharma, Sneha, Sweety, Preeti, Ritu, Himanshi, Teena, Dr. Geetanjali Sahni, Navdeep and Tannu	Department of Zoology, Arya PG College, Panipat, 132103, Haryana, India	Importance of Biotechnology in Human Life and Ethical Issues: Review	Poster	BS
120	Parmita Saini, Dr. Geetanjali Sahni, Sonam, Priyanka, Priya, Ritu, Ridhanye Dhawan, Upasana, Sheetal, Sunidhi and Priya	Department of Zoology, Arya PG College, Panipat, 132103, Haryana, India	In-vitro Studies on the Protective Effects of Curcuma longa Extract against Organo-Phosphate Monocrotophos Insecticides Induced Toxicity in Goat (Capra Hircus) Testes	Poster	BS

122	Khushboo Aggarwal, Shiwani, Neetu, Sharly, Takshika, Arvind, Tamanna, Mansi and Dr. Geetanjali Sahni	Department of Zoology, Arya PG College, Panipat, 132103, Haryana, India	Physico-Chemical Parameters of Different Water Bodies and Soil Samples from Industrial Town of Panipat, Haryana	Poster	BS
123	Dr. Geetanjali Sahni, Divyansh, Keshav Jain, Kritika, Anjali, Ritika, Mahak, Aman and Anjali	Department of Zoology, Arya PG College, Panipat, 132103, Haryana, India	Rural Ponds of Panipat Refinery showing Grave Peril of Migratory Avifauna	Poster	BS
126	Ajay Kumar	Department of Chemistry, Maharaja Agrasen University, Baddi, Himachal Pradesh 174103, India	Fabrication of CMC-PVP based RGO modified magnetic hydrogel for the adsorption and photo-reduction of hexavalent chromium from simulated waste water	ORAL	CH
127	Dr. Sahil Billawria, Dr. Shallu Sharma	University of Jammu	A Generalized Form of Topological Vector Spaces	ORAL	Math
128	Ms.Tsering Landol	School of Sciences, Cluster University of Jammu.	Irresolute Topological Rings with Inherent Properties (Oral Presentation)	ORAL	Math
130	Ravinesh Mishra	Baddi University of Emerging Sciences & Technology, Baddi, Himachal Pradesh	Design, Synthesis, In-vitro Anti-cancer Activity, ADMET Profile and Molecular Docking of Novel Pyridazine Analogues	ORAL	CH
131	SHALLU SHARMA,, IQBAL KOUR	Department of Mathematics, University of Jammu, Jammu, India,	Different Classes of Continuity in Cone Metric Spaces	ORAL	MS

132	SHALLU SHARMA, POOJA SAPROO	Department of Mathematics, University of Jammu, Jammu, India	Fixed Point Theorems in Cone Metric Spaces via C-Distance over Topological Module	ORAL	MS
133	AKASH DEEP SHARMA	Govt. College, Chowari, Dist. Chamba	Role of destructive energy for constructive means	ORAL	PH
134	ANKUSH BHARTI	Dept. of App. Sci. and Humanities, Govt. Polytechnic, Banikhet	---	Participation	PH
135	SWADEEP SOOD	Govt. College, Dhaliara, Kangra	Biopolymer as starting material for nano-techniques	ORAL	CH
136	RAKESH SHARMA	Dept. of History, Sardar Patel University, Mandi	History of Bio Sciences in India	ORAL	BS
137	DR. MANISH KUMAR	Dept. of Chem. CUHP	---	Participation	CH
138	DR SACHIN UPMANYU	Dept. of Botany CUHP	---	Participation	BS
YOUNG SCIENTIST PARTICIPANTS					
1	RADHIKA THAKUR	Sri Sai University, Palampur	Statistical investigation on tea production of green and black tea in Palampur valley of Himachal Pradesh	ORAL	MS
2	JATIN CHADHA	Dept. of Microbiology, Panjab University, Chandigarh	Rupturing albendazole as a potent inhibitor of quorum sensing regulated virulence in <i>Pseudomonas aeruginosa</i> : Nobel prospectus of a classical drug	ORAL	BS

Biological Sciences (BS) BS-7

Karyotypic studies of mitotic and meiotic chromosomes of an arctiid moth *Amsacta lactinea* Cram. (Lepidoptera, Arctiidae) revealing female heterogamety

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Abstract

Larvae of *Amsacta lactinea* Cram. belonging to family Arctiidae of a large order Lepidoptera are an insect pest of economically important sunflower plant *Helianthus annuus*. Motion of typical arctiid larva approaches that of the true looping geometrid caterpillars; hence being called semiloopers. Besides the morphological and ecological similarities, the constancy in the haploid chromosome numbers ($n=31$) and the sex chromosomes (ZW:ZZ) reveal the basic pattern of evolution of sex mechanism in this large super family Noctuoidea of moths. Fifth instar larvae of *Amsacta lactinea* feeding on leaves of the sunflower plant *Helianthus annuus*, were captured from Jalandhar, Punjab (India). Modified technique of *in vitro* colchicine treatment was applied to somatic and meiotic chromosomes obtained from male and female pre-pupal stages. It was aimed to procure elongated karyotypable elements. Subsequent Buffered - Giemsa staining procedure was followed for air-dried slides which were 7 days old. Sex mechanism of ZW:ZZ with female heterogamety was revealed by idiograms and karyograms prepared on the basis of detailed morphometric data of somatic karyotypes of *Amsacta lactinea* along with photomicrography of whole stages of spermatogenesis. Sex chromatin obtained in female somatic interphase nuclei is also a cytogenetic tool used to rapidly assess the W chromosome presence in Lepidoptera. In addition to this all the 62 elements of spermatogonial metaphases clearly showed splitting of chromatids under the effect of colchicine indicating position of primary constrictions thereby revealing monokinetically organised lepidopteran chromosomes. Present cytogenetic studies may be a phylogenetic peculiarity of the arctiid species suggesting that the karyotype of this group of moths closely resemble my recent study of geometrid moths and is evolutionarily rather more conservative.

Keywords: Monokinetically, Sex chromatin, Somatic karyotypes, Female heterogamety, Lepidoptera

BS-34

Length Weight relationships of some Freshwater fish species from Beas River

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Abstract

The length-weight relationship of six freshwater species from the Beas River was estimated. Fish specimens were obtained from multiple locations along the Beas River, employing gill nets and cast nets of varying mesh sizes, selected based on the geomorphological characteristics of the study area. The predicted b values of the LWRs range from 2.8 to 3.1. The present study offers fundamental data on the length-weight relationships (LWRs) of six freshwater fish species found in the Beas River. These LWRs provide essential biological insights to biologists, aiding in the conservation and sustainable management efforts of these fish species within the Beas River ecosystem.

Keywords: length-weight relationship, Beas River, conservation and sustainable management

BS-35

Environmental Impact Assessment: Fish Diversity and Habitat Ecology in the Mining-impacted Upper Ravi River Basin, Himachal Pradesh

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Abstract

The purpose of this research was to evaluate the diversity of fish in a particular section of the Ravi River in India, in connection to the environmental conditions that exist there. Kharamukh, Sultanpur, Saru village, and Samleu were chosen as the locations for the intended study. These four zones were designated as Zone A, Zone B, Zone C, and Zone D respectively. Zone A was an area that was not mined and was therefore referred to as the reference zone. The remaining zones were places that had river bed mining carried out in them. The environmental parameters were sampled once a month, while the fish species were sampled twice a month. In total, sixteen different aspects of the environment were investigated. Both the Shannon–Wiener diversity index and the total number of individuals were used in the analysis of the data, which consisted of a total of 524 individuals connected to 8 families and collected in total. In addition, the results of a canonical correspondence analysis demonstrated that a number of environmental factors, including water velocity, water temperature, water depth, boulders, sand, gravel, turbidity, and dissolved oxygen, had significant correlations with the fish assemblage. The findings indicated that there were a greater number of fish in the areas that had not been touched by mining in comparison to those areas that had been impacted by mining. On the other hand, it was discovered that mining river bed materials messed with the environmental factors, which in turn had an effect on the fish population.

Keywords: River bed mining, Environmental parameter, CCA, Ravi River Diversity index.

BS-44

Apoptotic inducing and anti-inflammatory potential of Bakuchiol isolated from *Psoralea corylifolia* against epidermoid (A431) cell line for the treatment of psoriasis

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Abstract

Psoriasis is a chronic, recurrent, inflammatory skin disease that affects 2-3% of the population worldwide and causes significant morbidity and mortality. The cause of psoriasis is incompletely understood, but the disease is characterized by sharply demarcated, erythematous scaly skin plaques resulting from epidermal keratinocyte hyperproliferation, aberrant differentiation, parakeratosis, immune cell infiltration, and angiogenesis. Although conventional therapies are available to treat psoriasis but linked with side effects. Therefore, need for research to explore the novel, effective and safer natural constituents to treat various disorders. The present study is about to isolate a natural compound (Bakuchiol) from the traditionally used medicinal plant *Psoralea corylifolia* and characterized by using different spectroscopic techniques NMR, FTIR, HRMS and HPLC. Moreover, the potency of Bakuchiol was further checked against proliferating skin epidermoid (A431) cell line using different microscopes, flow cytometric studies and expression levels of RNA and protein was analyzed using RT-qPCR and Western Blotting. A critical analysis of results showed that Bakuchiol has been proven to employ better results in inhibiting the proliferation of cells. The microscopic and flow cytometric studies reveal the apoptotic-inducing activity of the compound. Moreover, RT-qPCR and Western blot analysis indicated the downregulation of inflammatory markers after treatment with bakuchiol. Overall, the study points out that Bakuchiol has efficacy in treating psoriasis via reducing the proliferation of epidermoid cells. The study highlights the potential of isolated constituent as therapeutic agent to cure psoriasis by ameliorating inflammatory markers. Therefore, it can prove to be a novel therapeutic phytoconstituent in future drug research to cure psoriasis.

BS 64

AVIAN SPECIES IN RELATION TO APIARIES: A PERSPECTIVE

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Abstract

The diversity of birds serves a critical role in maintaining ecological harmony and the health of ecosystems, making them an essential component of global biodiversity. The distribution of bird species varies with the types of habitat and food available. A systematic review of literature revealed that diversity of bird species present around the apiaries plays a significant role both directly as well as indirectly in the growth, development and maintenance of the bee colonies. Bee-eaters (*Merops apiaster*, *M. orientalis*), swifts (*Cypselus spp.*, *Apus spp.*), drongos (*Dicurus spp.*), shrikes (*Lanius spp.*), and woodpeckers (*Picus spp.*) are among the different birds that have been identified as honey bee predators. 24 species of bee-eaters are identified through different studies which are known to feed primarily on honey bees (*Apis mellifera*). Literature reported queen bee mating success ranged from 18% - 92% depending upon various factors, mainly predation by birds. Queen bees were lost during mating flights. Identification and management of these harmful bird species will proved economical to the apiculturists. Different strategies like scarecrows, reflective ribbons, visual deterrents and acoustic deterrents can be tested and evaluated for the management of these harmful bird species. On the other side of the coin, birds such as babblers (*Argya spp.*) are also regarded advantageous to apiaries as they aid in the cleaning of the surrounding of the colonies by acting as scavengers and feeding on dead bees. Detailed studies involving the identification of avian species in relation to apiaries and providing ecological services i.e. useful and harmful aspects of these species, will provide a baseline data for future studies.

Keywords: Bee-eaters, birds, apiaries, management, harmful, beneficial

BS -68

Prevalence of Wild boar (*Sus scrofa* L.) in agricultural crop fields adjacent to Sutlej canal, Ludhiana, Punjab

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Abstract

The aim of present study was to generate information on existence of Wild boar (*Sus scrofa* L.) in agricultural crop fields adjacent to Sutlej canal, Ludhiana, Punjab. The Indian wild boar is a member of Phylum- Chordata, Class- Mammalia, Order- Artiodactyla, Family- Suidae, Genus-

Sus and species- *S scrofa*. They are omnivore and live mostly nearby human habitat due to diverse food availability. Indian wild boar habitat preferences and interactions with its environment were studied to develop various management measures. Line transect and point count methods were used to study the population density of Indian wild boar through direct observations. In this survey, questionnaire based information was collected from farmers of villages *Ladhowal* and *Kasabad* in order to observe the pest problem of wild boar. During the study period i.e. July-August 2023, the presence of wild boar was confirmed by farmers through pug marks in paddy and maize crops.

Keywords – Wild boar, Sutlej canal and Pug marks

BS 69

Evaluation of papaya seed chloroform extract-based nanoparticles for toxic effects against lesser bandicoot rat, *Bandicota bengalensis*

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Abstract

For the first time, papaya seed chloroform extract-based solid lipid nanoparticles (PSCEN) were formulated and investigated for the toxic effects in the lesser bandicoot rat, *Bandicota bengalensis*. Nanoparticles fabricated were spherical in shape with size varying from 300 to 600nm. Two groups of mature male rats were fed on WSO bait (cracked wheat, powdered sugar and groundnut oil mixed in an 88:10:2 ratio) containing two different concentrations of PSCEN (5% and 10%) in a bi-choice condition over a 15-day period with one group serving as vehicle control. The mean total active ingredient ingestion by rats of treated groups ranged from 21.30-58.70 g/kg body weight. The treatment did not produce a significant impact on the levels of LDH, ACP, ALP, AST and ALT in the liver and plasma, however, a significant increase in level of SOD, CAT, GPx and LPO and decrease in level of GR in plasma of treated rats was observed. Mild histopathological changes were observed in liver of rats of both the treated groups as compared to vehicle control group indicating no or low toxicity of PSCEN. Overall, no significant difference was observed in these enzymes of control and treated rats among different days after treatment withdrawal indicating no significant toxicity upto 105 days of treatment withdrawal.

Keywords: Toxic effects, Chloroform extract, Enzymes, Histology, Solid lipid nanoparticles, Papaya seed

BS 71

Effects of anthropogenic noise on avian diversity and breeding biology in Punjab and Haryana

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Abstract

Birds are one of the most diversified and successful evolutionary groups on the planet and they can be found in practically every agro ecosystem. Study was conducted on the impact of aircraft and road traffic noise on avian diversity and breeding biology from March 2022 to February 2023, in Ludhiana (locations- Halwara and Aitiana), Punjab and Sirsa (locations- Ahmadpur and Mirpur), Haryana. Two fields, one each near airfield and one near roadside were selected at each location. Line/point transect method was followed (Verner 1985). Artificial nests were installed to record the breeding biology of birds in selected locations. A total of 29 species (9 orders and 23 families) and 32 species (10 orders and 21 families) were recorded from Haryana and Punjab respectively. Passeriformes was dominant and constituted 52% and 41% of total species richness in Punjab and Haryana respectively. Fifteen nesting sites were found in selected locations in Sirsa (Haryana) and Ludhiana (Punjab) out of which seven nesting sites belonged to purely insectivorous birds, four nesting sites belonged to partially insectivorous birds and four nesting sites belonged to granivorous birds. Fourteen out of fifteen nesting sites were observed near airfield areas which might be due to less predation pressure and human disturbances. House Sparrow (*Passer domesticus*) were seen actively adopting artificial nests at selected locations of Sirsa. While such observation was lacking in selected locations of Punjab which might be due to a lesser number of House Sparrows. In-depth research is needed to understand the impact of anthropogenic noise on bird composition, breeding potential, population abundance, and to protect wildlife in areas having distinct anthropogenic noise levels.

Keywords: Anthropogenic noise, artificial nests, breeding biology, population abundance, species diversity

BS -85

Microplastic Invasion and its Effects on Fish Biology

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Abstract

In this study, the effects of microplastics (MPs) invasion on fish biology have been reported. Plastic is used in our daily life which in turn pollutes the environment. It has been reported that plastic on exposure to UV radiation photo-oxidizes and cause brittleness. In water system plastic together with wind, wave action, and abrasion, it is converted to microplastic. Recently, during

Covid 19 the use of plastic increased many folds in the materials such as PPE kit and Masks like N95. During Covid the countries stopped the recycling process which also led to increase in microplastics in the environment. Moreover, there was spike in use of single use of plastic. Due to this heavy contamination of microplastic in water cause its exposure to fishes. It enters into fishes actively by feeding and breathing processes due to which majority microplastic are found in gills and gastrointestinal tract. Silver carp's digestive tract is capable of processing microplastics, but causes oxidative stress in body of fish and also accounts for bioaccumulation. Pulse rate and survival are negatively impacted by exposure to a succession of microplastic concentrations in zebrafish. Fish that have been exposed to MPs experiences neurotoxicity, growth slowdown, and aberrant behaviour. Due to these microparticles' tiny size, they are readily transported along the food chain. It is reported that 49% of the sampled fish have ingested the microplastic and fresh water fishes have reported to ingest more microplastic than marine. Fish that fed by swallowing took in more pellets than fish that fed by filtering or sucking. The presence of microplastics in their digestive systems of fishes with an average of 2.3 pieces and up to 15 pieces per fish were reported. In comparison to smaller fish, larger fish had a greater microplastic burden.

Keywords: Microplastic, Fishes, Biology, Toxicity

BS 101

Nutritional composition, Phytochemicals, Antioxidant and Antibacterial study of some wild edible plants consumed as food by Gaddis: a tribal community of Western Himalaya

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Abstract

The present study investigated the nutritional content, phytochemicals, antioxidant analysis, and antibacterial activity of traditionally, underutilized wild edible plants viz. *Polygonum polystachyum* Wall. ex Meisn., *Polygonum hydropiper* L., *Thymus serpyllum* Linn., *Fagopyrum esculentum* Moench, *Prunus persica* (L.) and *Juglans regia* Linn. eaten as food by the tribal community of Bharmour District Chamba. The nutritional composition of these plants were carbohydrate, protein, sodium, potassium, crude fibre and crude fats. Higher nutritional composition occurred in leaves of *Polygonum hydropiper* as compared to other studied species. Phytochemicals factors such as ascorbic acid, phenol, flavonoids, tannins, terpenoids, carotenoids, tocopherols, alkaloid and phytate content. Leaves of *F. esculentum* exhibited highest amount of ascorbic acid, phenol, flavonoids and tannins. Phytochemical analysis showed the leaves of *F. esculentum* exhibited more phytoconstituents. Evaluation of antioxidant capacity of these species by DPPH radical scavenging behavior and ABTS radical scavenging ability.

Highest radical scavenging activity was found also in *F. esculentum*. Antibacterial activity of these wild plants towards *E. coli* and *S. aureus*. Methanolic extract of *F. esculentum* had the highest antimicrobial potency towards *E. coli* and *S. aureus* comparison to other studied species. The results of present study found that collected plants have rich nutritional source, phytochemical, antioxidant and antibacterial that can contribute enormously to diet, food safety, health and remedial benefits.

Keywords: Wild edible plants, nutritional, phytochemicals, antioxidant, antibacterial

BS 106

DISTRIBUTION PATTERN OF OVER-STOREY VEGETATION IN SHILLI WILDLIFE SANCTUARY, SOLAN, NORTHWEST HIMALAYA

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Abstract

The over-storey vegetation pattern in Shilli Wildlife Sanctuary (WLS) of Solan district in Himachal Pradesh was investigated. This WLS is located between 30°55'02"-30°54'13" North latitude and 77°07'13"-77°07'32" East longitude. It has a geographical expanse of 1.49 km² and experiences huge variation concerning an average elevation of 1550m. The average annual precipitation is 1250mm and the temperature revolves between 1 °C to 32°C. Being situated in the temperate region of the Himalayas, Shilli Wildlife Sanctuary exhibits greenery of luxuriant vegetation as it supports the growth of some evergreen trees and many constituent plants of undergrowth due to the presence of plenty of moisture and suitable temperature. The plant species data was analyzed for density, frequency and basal area from April 2022 to March 2023. A total of 59 tree species under 22 families were recorded. The IVI ranged between 170.29 and 23.50. Species like *Quercus leucotrichophora*, *Rhododendron arboreum* and *Pinus roxburghii* were recorded with maximum importance value. The species with lowest IVI were *Bauhinia variegata*, *Erythrina suberosa* and *Bombax ceiba*. Results of the average value of IVI showed that the species of maximum occurrence or dominance was *Quercus leucotrichophora* (32.50) followed by *Prunus puddum* (27.40) and *Ficus palmata* (19.66). The lowest average IVI recorded was 3.54 for *Salix tetrasperma*. Moreover, the per cent area cover value present was between 10.2 % to 5.8%. The maximum area was covered by *Quercus leucotrichophora*, *Pinus roxburghii* and *Pistacia integerrima*.

BS 114

HISTORY OF BIOSCIENCES IN INDIA

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India is very rich in scientific researches since the time immemorial, and their references occur in many Sanskrit classics. Biology teaching was initially a part of the medical education in the country. Ayurveda is perhaps the oldest documented health care system in the world, with Caraka Samhita, Susrut Samhita and Ashtang Hridaya Samhita, its foundation pillars. The wider knowledge about various herbal plants and their medicinal uses in India is later acquired by travelers and visitors. It is then passed on to Europe and other parts of the world, contributing significantly to the modern medicine and pharmaceutical industry. Similarly, the Sushruta Samhita is an ancient Indian classic on medicine and surgery. Present paper deals with various scholars of ancient India and their rich contributions in the field of biosciences.

BS 117

Avifaunal Biodiversity Status and Abundance around Panipat and Jind Districts of Haryana, India

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BS 118

Diversity of Some Insect Fauna in Industrial and Non-industrial Areas of Handloom City Panipat, Haryana, India

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BS 120

In-vitro Studies on the Protective Effects of Curcuma longa Extract against Organo-Phosphate Monocrotophos Insecticides Induced Toxicity in Goat (Capra Hircus) Testes

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BS 123

Rural Ponds of Panipat Refinery showing Grave Peril of Migratory Avifauna

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BS 129

Morphological and anatomical study of grasses *Triticum aestivum* L. and *Phalaris minor* Retz. a quick tool for assessing the impact of road side pollution

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Abstract

Plants grown close by roadside areas are exposed to variety of pollutants. Air pollution has an adverse effect on plants. Most air pollution comes from Automobiles. Automobiles have increased in number in tandem with population growth, as has pollution from automotive emissions. The first targets of these vehicular pollutants are roadside plants and roadway vegetation. Vehicle emissions contain a variety of contaminants that contribute to the worst types of pollution in the environment. Various contaminants from automobiles changed the properties of the vegetation that are exposed. One of the most obvious roadside plants is grass. This experiment shows how automobile emissions affect grasses anatomy and morphology. Experiments were conducted to investigate morphological as well as anatomical changes in leaves and culms of roadside grasses *Triticum aestivum* L. and *Phalaris minor* Retz.

To carry out the experiment, samples (Fresh leaves and Culms) were collected from polluted sites and non-polluted site acting as a control. For anatomical study leaves and stems were cut into sections and epidermal peeling was performed in the laboratory and changes were identified under the light microscopy. SEM analysis was also done. Results revealed the major anatomical and morphometric variations observed in both *Triticum aestivum* mL. and *Phalaris minor* Retz. growing in polluted and non-polluted study sites. Reduction in morphometric parameters for both the specimens growing in polluted study sites indicated a negative effect of pollutants on the growth of these pooidae members. Not only that changes in the anatomy of the polluted site specimens, both in the culm and leaf anatomy was found. SEM images of the abaxial and adaxial surface of the leaves showed micro-morphological changes, with stomatal size and number showing a reduction in case of *Triticum aestivum* L. for the polluted site specimens while the size of stomata showed an increase in the case of *Phalaris minor* Retz. growing in polluted study sites. These results highlighted the importance of anatomical and morphological data to determine the responsiveness of roadside grasses to various environmental pollutants.

Keywords: Anatomy; Grasses; Morphology; Pollution

Agriculture & Allied Sciences (AS) AS 10

Identification of haplotypes in rice accessions for *NRT1.1* regulating nitrate uptake under low nitrogen stress

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Abstract

Nitrogen (N) play vital roles in growth and development of plants rendering it indispensable. In the present study, an attempt was made to find the haplotypes of nitrate transporter, *NRT1.1*, that can be used as a "donor" for haplotype-based breeding. Twenty-five days old seedlings of 272 rice accessions derived from 3K RG panel were phenotyped under low and sufficient N. Principal component analysis was carried out using 14 traits to identify the most contributing traits governing genotypic variability in response to low N treatment. Based on the relative

values of these traits, hierarchical cluster analysis was done which resulted in three clusters namely, efficient, inefficient, and intermediate. An in-built tool of SNP seek database was employed for haplotype analysis for *OsNRT1.1* isoforms. The rice accessions were classified into two haplogroups for the *OsNRT1.1A*, three for *OsNRT1.1B*, and five for *OsNRT1.1C*. The haplo-pheno association exhibited a significant increase in total biomass (>26%) under low N in efficient accessions, while it was reduced by >50% in inefficient accessions as compared to control. The haplo-pheno association reveals that five accessions (ARC7091, ADT12, ARC11571, Simul-khuri, and ARC12920) as N efficient, while three accessions (BK26, ARC13591, and Karahani) were N inefficient, that were common in all three *NRT1.1* efficient and inefficient haplotypes of isoforms. These contrasting accessions may be used in rice breeding programs to develop rice cultivars efficient in nitrate uptake.

Keywords: Haplotype, N stress, phenotyping, rice

AS 20

Pup1 QTL-introgressed rice lines mitigate the effects of elevated CO₂ and low P stress on yield, biomass accumulation, and C:N:P stoichiometry

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Abstract

The continuously rising atmospheric CO₂ concentration potentially increase plant growth through stimulating carbon (C) metabolism, which leads to an alteration in the C, N, and P stoichiometric ratio. However, plant C, N, and P stoichiometric ratios in response to elevated CO₂ (eCO₂) combined with low P stress remain largely unknown. Here we investigated the impacts of eCO₂ on growth, yield, nutrient remobilization, and C:N:P stoichiometry in relation to growth under low P stress conditions in three rice genotypes, i.e., IR64, Kasalath, and IR64-Pup1. Results showed that eCO₂ positively affects the C accumulation in all plant components such as leaf, stem, sheath, and grain; however, the P and N concentrations were reduced under eCO₂, and larger reduction was noted under low P. Under eCO₂ with low P, all plant components had significant increases in both the C:N and C:P ratios, while the N:P ratio decreased under eCO₂ but increased under low P. The N and P remobilization efficiencies were significantly reduced by low P with eCO₂ as compared to control. The combined effect of eCO₂ and low P was more obvious in IR64-Pup1 and produced higher biomass and grain yield as compared to IR64 under eCO₂ with low P. However, as compared to IR64, IR64-Pup1 exhibited a lower N but higher P concentration, indicating that the *Pup1* QTL had significant effect on improved P

uptake but no effect on plant N uptake. Thus, our study suggests that P limitation with increasing atmospheric CO₂ would alter the C:N:P stoichiometry ratios due to their differential partitioning in various tissue thereby affecting growth and yield of plants. However, such adverse effects can be overcome by breeding approaches for improved P uptake, for example, *Pup1* QTL introgressed in rice.

Keywords: elevated CO₂, C:N:P stoichiometry, low P stress, *pup1* QTL, rice

AS 23

GEODIVERSITY: NEW AVENUES IN TOURISM

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Abstract

Geodiversity parks highlight and conserve unique geological features, rocks, minerals and fossils, and are designed to promote education, research and sustainable development, while preserving the earth's geological heritage. So far there is no Geodiversity park in India. The paper outlines for the first time the idea of developing a Geodiversity park. The site proposed by the author for development of the said park is at Bhagsu Nag 10 kilometres north of Dharamshala, district Kangra, Himachal Pradesh. This park will provide opportunities for visitors, tourists, students, research scholars and locals to learn about geological processes and earth history. The proposal has been well received and approved by the Department of Tourism, Himachal Pradesh under whose aegis the park is being developed. At the proposed location there are interesting geological features like Folding in limestones, (250 to 300m years in age), Faulting, Main Central Thrust (MCT)/Chail Thrust, Bedded and Fractured Shale (belonging to Cambrian Period) and old slate quarry (slates belonging to Chail series around 1400 ± 150 million years in age). Probable occurrence of Stromatolites in limestone is also observed, besides other natural heritage features such as fresh water springs, water fall and natural water rivulet/khad. The various types of rock fragments, pebbles, cobbles, boulders brought by water from the Himalayan slopes make the site of the geodiversity park an alfresco natural geological museum and provide an opportunity for students of geology to have a first hand experience and application of their theoretical knowledge.

Himachal Pradesh is a treasure trove of geological wonders with various geo-heritage sites like stalagmites, stalactites, natural caves and hot-spring, which when preserved will open the doors for the present and the next generation to understand geological complexities.

Keywords: Geodiversity park, Bhagsunag, Folding, MCT, Slate, Quarry

AS 32

Bioassay guided isolation, characterization, and elicitation of potent cancer inhibitors in the callus culture of *Cullen corylifolium* (L.) Medik.

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Abstract

Cullen corylifolium (L.) Medik. has been used both in Indian and Chinese pharmacopeia as anticancer, antibacterial, anti-inflammatory, hepatoprotective, antidiabetic, and antioxidant agent. It is also effective against several diseases such as, leucoderma, leprosy, psoriasis, vitiligo, hypertension, and dermatitis due to the occurrence of isoflavonoids and furanocoumarins. Psoralen, is one of the important furanocoumarins abundantly synthesized in the different plant parts and widely employed as an anticancerous agent. The current study aimed to evaluate the anticancer potential of green seed extract of *C. corylifolium* and isolated fractions against cervical cancer cells (HeLa) and elicitation of psoralen in cotyledon callus. Green seed extract had a strong anti-cancerous activity against HeLa cells; its IC₅₀ was 5.98±0.054, 3.97±0.055 and 1.06±0.078 µg/mL for 24, 48 and 72 h, respectively. A total of ten fractions (F1-F10) were obtained through column chromatography after pooling down the fractions having similar R_f values on TLC plates using gradient of toluene: ethyl acetate (7.5: 2.5 v/v) as mobile phase. Whereas, IC₅₀ values of isolated fractions; F3, F5 and F2 were 62.99±0.05, 67.98±0.09 and 93.99±0.08 µg/mL, respectively for 24 h against HeLa cells. Further, F2, F3 and F5 were characterized and identified through NMR as daidzein, psoralen and genistein respectively. In addition, tremendous enhancement in psoralen synthesis was achieved with 5 µM salicylic acid where psoralen content enhanced upto 1484.39% followed by 50 mg/L chitosan and 50 mg/L proline increased psoralen content upto 723.79% and 391.39%, respectively compared to control. These results support that *C. corylifolium* seed extract possess strong anticancer activity against HeLa cells which may be due to synergistic actions of psoralen, daidzein, genistein and other available bioactive compounds. *In vitro* elicitation is an alternative, sustainable and eco-friendly tool for the production of active biomolecules using salicylic acid, chitosan and proline as elicitors.

AS 33

Evaluation of various substrates for cultivation and spawn preparation of *Flammulina velutipes* strains

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Abstract

Mushroom plays an important role to improve the strengths and livelihood of rural people through economic, nutritional and medicinal contributions. Mushrooms are high protein low fat fungi of great economic value. *Flammulina velutipes* (Curtis) Singer is a well-known edible mushroom cultivated all over the world. *Flammulina velutipes* is one of the 6th most popular cultivated edible mushrooms in the world. *Flammulina velutipes* is long and thin white mushroom used in the cuisine of Japan and China. It is commonly served in soups, stir-fries, salads and other dishes. It has flavorfull taste and slightly crisp. *Flammulina velutipes* were also used in making healthful beverages in Japan. Mushroom chitosan prepared using *Flammulina velutipes* as the raw material has been reported to exhibit a wide range of functions in the body. Among different grains (wheat, bajra, jowar, maize,) tested, wheat grain and bajra grain was found very effective for the preparation of spawn in *Flammulina velutipes*. Among four different substrates (saw dust+wheat bran, wheat straw+wheat bran+corn cobs, saw dust+corn cobs and wheat straw+wheat bran) evaluated, wheat straw+wheat bran was found to be the most suitable substrate for the cultivation of *Flammulina velutipes*. Out of seven different strains of *Flammulina velutipes* evaluated, three strains were found to be most effective on the basis of yield and biological efficiency on different substrates. Three best strains were further cultivated on best substrate (wheat straw+wheat bran) and gave good yield with biological efficiency of more than 50 per cent in each strains.

Keywords: *Flammulina velutipes*; Substrates; Grains; Spawn.

AS 38

Exploring Physiological Mechanism for Drought Tolerance in Sesame: A Trait-Based Selection Approach for Elite Accessions

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Abstract

Sesame (*Sesamum indicum* L.) is a drought tolerant oilseed crop; however, it is also vulnerable to drought during the germination and reproductive stages. To understand the physiological basis of tolerance to drought stress in sesame, a diverse set of 100 accessions were evaluated consecutively for two years (2020 and 2021) in a rain out shelter, followed by their validation under controlled conditions in a glass house. The drought stress was imposed on plants at the flowering stage, and all physiological parameters, such as relative water content (RWC), membrane stability index (MSI), chlorophyll, canopy temperature depression (CTD), yield traits, and root traits were recorded when plants showed drought symptoms (leaf wilting). The principal component analysis revealed that most contributing traits to drought tolerance were found to be RWC, MSI, biomass, and root traits such as root length, average diameter, volume. The hierarchical clustering based on Ward's method revealed that EC346321, EC335004, IC511116, IC430460, IC3125565 were drought tolerant while EC347031, EC34703, EC346122, EC370700, IC205658 were drought sensitive. The most contributing traits for drought stress showed less than 20% reduction in tolerant accessions while sensitive accessions showed more than 20% reduction. Accessions with tolerance to drought stress can be either used as 'donors' in breeding program or cultivated in areas with low water availability.

Keywords: Drought stress, membrane stability index, principal component analysis, relative water content, sesame

AS 40

Curing the Ageing Process :Targeting Klotho and FGF23 complex by Phytochemicals

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Abstract

Physiological functions gradually decline as we age, making us more susceptible to diseases and impairments. This process of ageing is proportional to the time-dependent and stress-related processes. A cell must possess the biochemical capacity to endure for all time, given sufficient sustenance and protection from outside threats. But the gradual loss of some proteins' activity—whether as a result of lower expression, post-translational modification—leads to a decline in peoples' mental abilities. The protein Klotho is one of these elements. The most important protein acting as a receptor for klotho protein is FGF23. The main role of Klotho is to act as a co-receptor for FGF (Fibroblast Growth Factor) signaling. FGF23 signalling requires an interaction between Klotho and FGF23 to function properly. Various metabolic diseases can result from

disruptions in the FGF23-Klotho relationship. As people age, klotho expression levels and its circulating level decline. Mice lacking in A Klotho also exhibit elevated levels of FGF23. It is mysterious and unexplored how the alpha klotho protein interacts with its interaction partner FGF proteins. This study is to understand the influence of phytochemicals compounds on protein-protein interaction and identify mechanisms to upregulate Klotho protein.

AS 48

Seabuckthorn associated Plant Growth-Promoting Rhizobacteria (PGPR): A Symbiotic Relationship for Sustainable Agriculture.

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Abstract

Plant growth- promoting rhizobacteria (PGPR) are defined as bacteria that colonize the roots of plants helping the plant in its development and growth by various direct as well as indirect mechanisms. The use of chemical fertilizer is an alarming condition due to its negative effect on nature. Therefore, the need of the hour is to find an alternative for these chemical fertilizers to increase the health system of the environment which can be done by exploiting the microorganism. The advantages could be further enhanced by harnessing the unique capabilities of PGPR isolated from harsh environments with which we can achieve more resilient crops, reduced input dependency, improved soil quality, and enhanced ecosystem diversity, ultimately fostering a more environmentally friendly and food-secure future. *Hippophae rhamnoids* commonly known as Seabuckthorn a unique, hardy shrub that thrives in challenging environments, such as arid and mountainous regions possesses a hidden treasure beneath its roots - PGPR. Seabuckthorn has exceptional nutritional and medicinal properties and are also known for their ability to fix atmospheric nitrogen and adapt to harsh conditions, making them promising candidates for sustainable agriculture. They promote growth and enhance stress tolerance through mechanisms such as nutrient solubilization, hormone production and disease suppression. Harnessing Seabuckthorn-Associated PGPR means higher crop yields and improved quality, all while minimizing the detrimental impacts of conventional farming practices. In conclusion, the synergy between Seabuckthorn and its associated PGPR offers a promising path toward sustainable agriculture. As we confront the challenges of the 21st century, embracing innovative solutions like this one is imperative to ensure the health of our planet and its inhabitants.

Keywords: Plant growth promoting rhizobacteria (PGPR), Seabuckthorn, nutrient solubilization, hormone production

AS 50

Population Assessment of *Pinus gerardiana* Wall. ex. D. Don in North Western Himalaya, India

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Abstract

Pinus gerardiana (Chilgoza) is only conifer of India which provides edible nuts. It is very slow growing tree with average life span 150-200 years. It is one of the most significant plants for tribal economy, and the edible seeds are quite nutritious and costly and also used in several traditional healthcare practices. In India major indigenous supply (approx. 80-100 tons) comes from Kinnaur and approximate value of its annual produce is Rs. 18 crores. But, increasing anthropogenic pressure resulted in habitat loss and population depletion in its distribution area. Therefore, the present study was conducted in the to assess the natural populations of chilgoza pine by standard ecological methods. Sixty-three natural populations, representing 4 major habitats and 8 aspects were sampled. A total of 103 species of vascular plants (Trees: 9; Shrubs: 23 and Herbs: 71) were recorded. The total trees density was ranged from 340-780 Ind ha⁻¹; shrubs, 710-1450 Ind ha⁻¹; herbs, 12.46-40.73 Ind m⁻². The density of Chilgoza was ranged from 310-690 Ind ha⁻¹. Currently destructive harvesting practices of Chilgoza is major problem of the region which affecting natural regeneration and cone/crop production. In addition, intensive grazing, conversion to Chilgoza forest into orchards, construction of hydropower projects and other developmental activities also affecting its natural habitats and populations. In view of its dwindling population, it is also listed in the “Near Threatened” category as per IUCN threat category. Considering these there is an immediate need to protect this species through frequent monitoring of populations, development of ecological niche model, awareness programmes and development of sustainable harvesting methods.

Keywords: Himalaya, Population Ecology, Biodiversity, Regeneration, Species diversity and Species density

AS 59

Therapeutic application of Salvianolic acid B generated by *Streptomyces* sp. M4 to combat microorganisms with medication resistance

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Abstract

Superbugs known as MDR bacteria (Multidrug resistance bacteria) are now a major global problem that causes deadly illnesses and a high mortality rate. In the hunt for innovative antimicrobial medicines, natural resources have been regarded as a powerful source of bioactive chemicals for combating infectious illnesses. The health of humans has been positively impacted by microorganisms, particularly actinobacteria, which can also produce strong chemicals with a variety of bioactivities. In the current study, EtOAc extract and salvianolic acid B from *Streptomyces* sp. M4 demonstrated antibacterial activity against *B. subtilis*, *K. pneumoniae sub sp. pneumoniae*, *MRSA*, *VRE*, *E. coli SILF*, and *E. aerogenes* with inhibition zones between 14 and 20 mm and MIC values between 7.80 and 62.25 g/ml, respectively. According to the results of the DNA nicking assay, salvianolic acid B and EtOAc extract shielded the pBR 322 supercoiled DNA from the damaging effects of the free radicals produced by Fenton's reagent. Significant cytotoxicity was shown in an in vitro cytotoxicity study, with salvianolic acid B and EtOAc extract at concentrations of 5 µM each inhibiting MG63 cancer cell line (osteosarcoma cells) by 72.62% and 68.42%, respectively. To our best knowledge, this is the first report of antibacterial potential of salvianolic acid B against VRE.

Keywords: Antibacterial, Salvianolic acid B, MRSA, VRE, Antibiotic Resistance

AS 62

The study of role of ATOX1 and MEMO1 copper-binding proteins in Cancer Biology

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Abstract

Cancer is a worldwide health concern today, with millions of new cases and deaths recorded yearly. Despite significant advancements, cancer therapy remains a problem due to treatment resistance, restricted access to advanced treatments, and disease-type variability. Metals such as Copper have shown an essential role in various stages of cancer. Recent research points out the importance of copper-binding proteins in advancing breast cancer. These proteins can regulate cell proliferation, angiogenesis, and metastasis, among other aspects of cancer biology. Through the bioinformatics method, we identified that ATOX1 and MEMO1 have copper binding patterns, which might have more significant implications in various forms of cancer: hepatocellular, urothelial and endometrial. The analysis of missense mutation with potentially harmful consequences in these proteins across various cancer types shows their potential as significant factors in cancer formation and progression. For further research, we understand the expression pattern of ATOX1 and MEMO1 in different cancer types and found the over-expression of ATOX1 in numerous cancer types. The interaction study of ATOX1 with other copper-binding proteins reveals that it plays a critical function in copper homeostasis inside cells. At the same time, MEMO1 has been shown to interact with copper ions, which may be more context-dependent or indirect than ATOX1's participation in copper control. Further research into the functional consequences of these mutations and underlying molecular pathways may provide insightful knowledge, which helps develop innovative therapeutic strategies for better prognostic biomarkers.

Keywords: ATOX1, Cancer, Copper, Expression Profile, MEMO1

AS 76

Mineral Nutrition for alleviating abiotic stresses in agricultural crops under Changing Climate Scenario

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Abstract

The direct and indirect consequences of climate change are causing several abiotic stresses to crop growth and the environment. Abiotic stresses, for instance, drought, temperature variations, soil salinity, soil alkalinity and heavy metal stresses have started showing the impacts on the growth and productivity of crops under all agricultural ecosystems, which is further a add on to the problem of food security worldwide. Erratic rain patterns cause water deficit, which has a substantial impact on plant functions such as seed germination, growth, development,

photosynthesis and reproduction, with serious consequences for plant growth and yield. In general, nutrients such as nitrogen, potassium, calcium and magnesium increase the concentration of antioxidant enzymes such as superoxide dismutase (SOD), peroxidase (POD) and catalase (CAT) reducing reactive oxygen species (ROS). Nutrients such as potassium and calcium help in improving stomatal regulation and osmotic adjustments by improving water uptake. Under temperature stress, these nutrients aid in maintaining a high tissue water potential. Micronutrients such as iron, boron and zinc help in activating various physiological changes in plants, activate defence mechanisms and improve the metabolic process by which the plants adapt to various adverse stresses. There are some combinations of nutrients which together can more effectively ameliorate the stress and vice versa. Silicon has proved its role in the regulation of plant physiological processes to relieve various abiotic stresses. Though plant nutrients are a low-cost and sustainable way of managing abiotic stresses, there is still much that needs to be further explored. On the basis of the myriad benefits of nanotechnology in agriculture, nano fertilizers have become promising tools for mitigating the environmental stresses.

Keywords: Mineral nutrition, Abiotic Stress, Nanofertilizers.

AS 77

Eradicating antibiotics from industrial wastewater using *Moringa oleifera* seeds as a natural coagulant

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Abstract

Water is a resource that is essential for life and something that almost all living things require. However, because of the numerous evolutionary ways of contamination that result from various advances in technology made over the years, this resource is becoming increasingly scarce in its pure state like the water coming from industrial areas have so many harmful antibiotics in it. It might lead to several water-borne illnesses. The examination of water quality in terms of nutrients, heavy metals, and significant pollutants has advanced significantly over the past several years, but there is still a lack of knowledge regarding the presence of antibiotics in water bodies. The water quality that can be obtained for various life activities has been significantly decreased by the presence of these substances. As a result, effective treatment technology is required to offer sufficient management.

Industrial wastewater can be treated using herbal processes instead of using chemical ones. Due to their environmental friendliness and numerous additional advantages, such as cost savings, a decrease in the production of byproducts, and increased biodegradability, "greener" methods of wastewater treatment are gaining popularity. Regarding treating contaminated effluents,

Moringa oleifera (MO) is employed as a natural coagulant for various purposes. MO seeds have demonstrated their ability to effectively remove suspended particles in a variety of extracted and purified forms for use in water treatment applications. Precipitation, coagulation/floatation, sedimentation, filtration, membrane process, electrochemical techniques, ion exchange, biological process, and chemical reactions are a few ways used to treat wastewater. We will be using some methods like chromatography and spectroscopy based for the analysis of contaminants present in wastewater. Also, we will design an advanced filter assembly containing layers of MO seed powder to remove antibiotics from the water. Later, these filters can be used in various industries like cosmetics, chemicals, textile, pharmaceuticals etc. for wastewater treatment.

Keywords: antibiotics; industrial wastewater treatment; MO seed powder; filter assembly

AS 82

***Prunus cerasoides*: a Himalayan endemic winter blooming cherry tree for the upliftment of rural economy**

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Abstract

Prunus cerasoides, often known as the sour cherry or the wild Himalayan cherry, is a species of deciduous cherry tree from the Rosaceae family that is indigenous to the temperate biome and grows at elevations of between 1,000 and 2,500 meters. As it is utilized for food, medicine, fuel, fodder, lumber, dyes, tannins, and other multipurpose materials, it is one of the most significant multipurpose tree species in the Himalayan region. The wood, which has a lovely colour and is relatively hard, sturdy, long-lasting, aromatic, and termite-resistant, is used in carpentry and decorative furniture. The branches, suckers, and saplings are utilized to prepare the handles for agricultural equipment and to produce walking sticks. The plant is praised for its great medicinal value in the conventional medical system and is utilized in a number of Ayurvedic compositions. The kernel is used as a treatment for bladder stones. The bark, twigs, and leaves all have cyanogenetic material in them. Broken bones can be plastered with bark. Due to the numerous Hindu rituals that involve the tree's branches and twigs, the tree also holds a special place in Hindu mythology. The tree is also grown for its decorative value and its gorgeous appearance

throughout the winter when it blooms. Because of the multiple applications of this tree, it offers a chance for the Himalayan region's inhabitants to improve their livelihood.

Keywords: Pajja, multipurpose tree, medicinal value, ornamental tree

AS 83

Empowering livelihoods through Lingad (*Diplazium esculentum* (Retz.) Sw.): an endemic & economically important fern of Himachal Pradesh, North Western Himalayas

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Abstract

Diplazium esculentum (Retz.)Sw., commonly known as Lingad, is a pteridophyte belonging to the family Athyriaceae. Lingad is also known as 'jangli sabji' among Himalayan and sub-Himalayan communities due to its edible purposes. This terrestrial fern species holds a pivotal role in the local ecosystem, cultural heritage, and economy. While the genus *Diplazium* have around 350 species, only a handful are edible, with Lingad reigning as the most popular species. In India, Lingad distribution transcends to the sub-temperate to temperate Himalayan region of Himachal Pradesh, Jammu & Kashmir and Uttarakhand. It thrives along riverbanks, streams, canals, marshy terrain, and hills at elevations ranging from 1,300 to 2,300 meters above sea level. Lingad contributes substantially to the local economy, with annual sales generating revenue. Its cultural importance is equally profound, with Lingad often featured in special dishes during VIP occasions. Beyond its culinary uses, *Diplazium esculentum* has a storied history in traditional medicine, being employed to treat various ailments such as diabetes, smallpox, asthma, and diarrhea. It possesses a diverse array of pharmacological properties, including antioxidants, antimicrobial agents, and antidiabetic compounds. Around the world, Lingad is used to address health concerns like cough and is revered as a post-childbirth tonic for women. Despite its immense value, Lingad faces a sustainability crisis due to exclusive reliance on wild harvesting from natural forests. To safeguard this precious fern, urgent action is needed. Sustainable cultivation practices must be developed through a synergy of local knowledge and scientific expertise, with community involvement being pivotal. Regulatory measures should be implemented to curtail overexploitation, ensuring responsible harvesting practices. Due to its ecological, cultural, and economic significance underscores the urgency of these actions, ensuring its legacy for future generations while preserving cultural traditions and supporting local livelihoods.

Key words: Lingad, Sustainable, Edible, Conservation and Livelihood.

Bearing Fruit from Barren Lands: Significance of Seabuckthorn Cultivation in Lahaul - Spiti, Himachal Pradesh

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Abstract

The district of Lahaul and Spiti in Himachal Pradesh is part of the North-Western Himalayan region, which is a well-known biodiversity hotspot. The elevation ranges from 2801–3800 meters, harbouring 354 plant species. Among this flora, seabuckthorn (*Hippophae rhamnoides*) has emerged as a beacon of hope in the district. It is a versatile and resilient shrub with the ability to sustain growth in harsh environments with extreme temperatures, including snowfall, drought, and salinity. This adaptable plant is laden with a rich array of nutrients, including oleic acid, proteins, and potassium, among many other micronutrients. Apart from being nutritious, seabuckthorn has been used for treating different health problems like heart and lung diseases, showing its important role in medicine. Also, its use in traditional herbal medicine systems adds an interesting aspect to its potential as a treatment. The importance of this plant for the environment is huge. Its deep root system acts like a shield for the soil, keeping it steady and stopping it from washing away. In places like Lahaul-Spiti, where soil erosion is a big problem, this helps protect the delicate ecosystem naturally. Simultaneously, it enriches the soil with nitrogen, enhancing its fertility and contributing to sustainable agriculture. Beyond its medicinal and environmental properties, its culinary potential extends to juices, jams, and teas, offering a unique flavour profile and health benefits. Economically, seabuckthorn cultivation holds the promise of improving local incomes, while its positive environmental impact through soil stabilisation underscores its role in sustainable agroecosystems.. In conclusion, the seabuckthorn plant emerges as a symbol of resilience, nutrition, and economic opportunity in Lahaul- Spiti, Himachal Pradesh. Its adaptability, nutritional richness, and diverse applications position it as a promising future crop and food source, offering a path towards improved food security, economic growth, and environmental sustainability in this unique Himalayan region.

Keywords: Seabuckthorn, Lahaul-Spiti, biodiversity, agriculture, medicine and sustainability.

AS 116

An Ethical Dilemma of Three Parent Baby

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AS 119

Importance of Biotechnology in Human Life and Ethical Issues: Review

Shruti Sharma, Sneha, Sweety, Preeti, Ritu, Himanshi, Teena, Dr. Geetanjali Sahni, Navdeep and Tannu

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Chemical Sciences (CH) CH -09

Plasma Induced graft polymerization of Itaconic acid onto PP mesh

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Abstract

Polypropylene is an unflinching element of biomaterials for human healthcare for its excellent features to be used as a biomaterial in mesh, sutures, implants and wound care devices. However, due to its surface inertness and low energy it lacks the functionalities which are required for various applications. In order to improve its surface properties, Plasma followed *via* grafting is an interesting approach that allows redesigning its chemistry and hence the physical behavior. This surface modification endows the desired groups on the surface without disturbing the material's bulk integrity. The current methodology aims at designing the functionalized PP using plasma followed by grafting. The process involves the plasma treatment of the mesh and carry out grafting of an appropriate monomer so that the mesh becomes receptive to the binding of an antimicrobial agent. The influence of grafting conditions such as reaction time, temperature and monomer concentration were calculated. The surface modifications lead to the shift in contact angle from 131° to 28°. The optimized conditions were characterized *via* different techniques such as STEM, FESEM, AFM, ATR-FTIR and XRD. As a result, this modified PP mesh opens up new study directions that provide inventive and innovative materials with enormous potential for biological applications.

CH -12

Kinetics and thermodynamics of adsorption of Isopropylacetate vapors by modified activated carbons

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Abstract

The adsorption isotherms of isopropylacetate, a hazardous air pollutant, have been determined gravimetrically on different samples of granulated and fibrous activated carbons associated with different porous and chemical structure. Several chemical treatments such as oxidation, degassing and impregnation have been carried out on as-received activated carbon cloth (ACC) to modify the surface characteristics of the activated carbon. The adsorption increases on oxidation while decreases on degassing which can be correlated to increase and decrease in the concentration of surface oxygen groups. Cu impregnation causes increase in adsorption while Cr and Ag impregnated samples decreased the adsorption. The adsorption kinetics data has been examined using the Linear Driving Force and Empirical Diffusion models. The trends in isosteric heats of adsorption for modified and unmodified ACC indicate the effect of both surface heterogeneity and lateral interactions. The results suggest that the adsorption involves the polar-polar interactions with carbon surface functional groups.

Keywords: Activated carbon, Adsorption kinetics, Thermodynamics, Surface functional groups, Metal impregnants

CH -13

Surface Modification of Polypropylene by Carbon Dioxide (CO₂) Plasma

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Abstract

A key issue regarding three-dimensional hydrogel structures is the maintenance and improvement of mechanical integrity of the processed scaffolds. In this project special attention is given to the addressed issue and in order to do so, fabrication of hydrogel membrane on Polypropylene (PP) fabric is carried out. PP is an inert, biocompatible, strong and biostable polymer with its monomeric unit being propylene. But it lacks the functionality which is necessary to make it an effective engineering material so that it could be used in the field of healthcare as an important biomaterial. Surface modification of Polypropylene was carried out via RF Plasma Processing Technique. Surface of PP fabric was functionalized using carbon dioxide plasma under various experimental conditions such as plasma power, plasma treatment time, and the gas flow rate. This treatment resulted in the introduction of carboxyl functionality on the fabric surface and hydrophilicity was introduced. Hydrophilic nature was further confirmed by a decrease in the contact angle from 153° to 46° . The processed fabric was now hydrophilic enough to hold the hydrogel *via* ionic interactions and thereby became a biomaterial.

Keywords: Polypropylene (PP), RF Plasma Processing, Hydrophilicity

CH -14

κ -Carrageenan-Polyethylene Glycol based Hydrogel for Antimicrobial Applications

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Abstract

Pathogenic micro-organisms like bacteria, fungi, viruses, or parasites cause skin infections contributing to the global disease burden. Majority of the new skin diseases included fungal (34%) and bacterial (23%) infections. Though the modern world is equipped with advanced technology in the health care system yet there are a lot of limitations. Classical treatments such as topical ointments, creams, or anti-infective drugs exist, but they have limitations like poor water solubility, first-pass metabolism and low bioavailability. Biopolymers are considered useful materials for the preparation of scaffolds with minimal side effects. Their efficiency can be further increased by the addition of herbal products such as essential oils (volatile oils)

possessing antimicrobial and antioxidant properties. The present study is aimed at assessing the antimicrobial activity of Tea Tree Oil (TTO) with varying concentrations induced in κ -carrageenan (CG)/PEG-Vitamin E-based hydrogel membrane. The antimicrobial activity of Tea Tree Oil is because of the presence of terpinene-4-ol which makes it a useful drug for the treatment of skin infections. Under the optimal TTO dose, the antibacterial studies indicated around 90% activity against gram-negative bacteria. Thus, these membranes suggest a great potential in the futuristic healthcare system.

Keywords: Skin infections, Membranes, Tea Tree Oil (TTO), Antimicrobial activity

CH -15

Development of CG-PEG/ Vitamin E based Hydrogels for Scar Prevention

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Abstract

It has been observed that in most cases, scar formation occurs during natural healing of wound, infection and acne. Scarring is because of the formation of new tissues with different quality and texture and sometimes may induce deformities. There are numerous treatments in the market for scar prevention but side effects such as burning sensation, skin irritation, and redness are unavoidable. With advancements in Science & Technology, attention has been shifted to the fabrication of biocompatible matrix with antimicrobial features. The most promising materials are hydrogels which can be used as effective drug delivery systems for sustained release of drugs under moist environment. In the present study, vitamin E loaded hydrogel membranes with varying compositions of kappa-carrageenan (CG) and polyethylene glycol (PEG), have been synthesized through green chemistry approach. Vitamin E, an anti-oxidant, was loaded as a bioactive agent for the prevention of scars. The film was characterized using Fourier transform-infrared (FTIR) spectroscopy. Percentage swelling of film was determined to investigate their hydrogel properties. Antibacterial studies showed about 70% activity against gram-negative bacteria. Thus, the results showed that CG-PEG / Vitamin E holds a great potential in the healthcare sector.

CH -21

Mutual induced-fit controlled signal amplification of hydrogen bonded capsule formation

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Abstract

Mutual induced-fit is well known process in biological system, proceeds by mutual interactions of two or more than two components. However, in an artificial system to mimic such process is challenging, especially by purely organic components. In this work, we have shown importance of mutual induced-fit in signal amplification of hydrogen-bonded capsule formation. Two different types of highly flexible ligands (one N-bridged and another triazine bridged) are used. N-bridged tripodal ligand acting as clip over the adduct obtained from triazine bridged ligand, bringing the resultant adduct in the cone-shape conformation. The resulting cone-shape conformation undergo solvent polarity dependent hydrogen bonded capsule formation as a sole product. In absence of N-bridged tripodal ligand only 50% capsule formation observed through ¹H NMR at 100 mM concentration. However, in the presence of N-bridged tripodal ligand, organic components undergo mutual interactions to opt the cone-shape conformation and 100% capsule formed (independent of concentration). In this presentation, I will discuss the complete working process with mechanism. The complete process is characterized by IR-spectra, ¹H and ¹³C NMR spectra, concentration dependent ¹H NMR titration spectra, ¹H-¹H COSY, ¹H-¹H NOESY, DOSY NMR, high resolution ESI mass spectra and also by energy-minimized structure.

Keywords: Mutual induced fit, hydrogen bonded capsule, triazine & N-bridged ligand

CH -22

Adsorption mechanism of metformine from water system using *Vachellianilotica* plant

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Abstract

Water shortage and pollution are on par with climate change as the most difficult ecological issues of twenty-first century. Living styles of peoples had been changed because of increase in population worldwide. Industrial development because of technologies leads to fast globalisation. Industrial production of agricultural and chemicals products as well as waste resulted in production of various types of pollutions in various countries of world. In the absence of standard regularity norms several classes of PPCPs exist in the water system. The presence of these PPCPs caused a threat to biota and our ecosystem. Their presence or incomplete correction in waste water in a wastewater treatment plant, depending on the use method of treatment, shows inadequate removal and need an additional water treatment process. So to resolve this problem agro waste material has been used in this study. Activated carbon was prepared from stems of *Vachellianilotica*. Physical activation was done for preparation of activated carbon. Characterisation of activated carbon carried out by FTIR and FESEM. Highly porous structure of activated carbon responsible for the adsorption of pollutant from aqueous solution. Batch experiment was conducted for studying the effect of various parameters on the adsorption of metformine.

Keywords: Activated Carbon, Pollutant, Antidiabetic drug

CH - 25

Photocatalytic Water Splitting vs Hydrogen Evolution: Key Differences and Scalability Aspects

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Abstract

In this work, we focused on understanding the fundamentals of photocatalysis process (light absorption, charge separation and transfer and necessity of active catalytic sites) and discussing the green and eco-friendly ways of H₂ evolution. Photocatalysis has been recognized as green alternative to the commercial steam reforming process, which consumes a large amount of energy and produce air pollutants like CO₂. Photocatalytic water splitting and H₂ evolution are two different processes, which can be utilized for the green H₂ production. Herein, we revealed the basic differences between overall water-splitting process and H₂ evolution reactions, which are generally mistaken as the same. Along with it, we took into consideration the various synthesis strategies of photocatalysts such as heterojunction formation, composites, defect

engineering, doping, etc. in detail. Besides this, the bottlenecks of photocatalysis are also discussed which include the photogenerated charge recombination, low light absorption, necessity of active sites, etc. Through in this work, we anticipate that a better understanding of above mentioned processes could be disseminated and high performing hybrid materials for photocatalytic green H₂ production will be realized in the near future to explore scalability possibilities.

CH -37

Extraction and Characterization of Essential Oils from Leaves and Rhizomes: A Comprehensive Study on *Zingiber officinale* the Aromatic Plant Resource

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Abstract

In this work, we have put our focus on Acknowledging the importance of essential oils. We have targeted the extraction and characterization of essential oils from *Zingiber officinale* Rose, commonly known as ginger, which is a versatile aromatic plant with a rich history of traditional and modern applications. *Zingiber officinale* rhizome are commonly known for its essential oils. However, the remaining part of the herb goes to waste which can also be used. The research methodology involved the application of extraction techniques to capture the aromatic essence of this valuable plant resource. The resulting essential oils were analyzed using advanced analytical techniques such as gas chromatography-mass spectrometry (GC-MS) and Fourier-transform infrared spectroscopy (FTIR) to identify and quantify their chemical composition. In conclusion, this comprehensive study contributes valuable insights into the extraction and characterization of essential oils, providing a foundation for future research and applications in diverse industries. So, we have carried out a comparative study to find out the chemical composition of essential oils in the leaves of *Zingiber officinale* along with roots. The results underscore the significance of understanding the chemical composition and bioactive properties of essential oils derived from this aromatic plant resource, opening doors to new possibilities in natural product development.

CH -54

Congo red dye removal by adsorption using biochar-based lanthanum ferrite nanocomposite

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Abstract:

In this study biochar based lanthanum ferrite (BC/LaFe) nanocomposite prepared through one step chemical precipitation has been used for the removal of Congo red dye from water system. BC/LaFe nanocomposite was analysed for structural studies using Field emission scanning electron microscopy (FESEM), high resolution transmission electron microscopy (HRTEM), energy dispersive X-ray analysis (EDX), X-ray photoelectron spectroscopy (XPS), X-ray diffraction analysis (XRD), Fourier –transform infrared spectroscopy (FTIR). The anticipated average crystallographic size was observed in the range from 5 nm to 9 nm. The effect of various parameters like contact time, temperature, adsorbent dose and concentration of dye were optimised for the removal of Congo red. The maximum removal of 88 % and 98% was observed using BC and BC/LaFe at 40 °C. Kinetic studies indicated the pseudo second order reaction for the removal of dye from water. The adsorption isotherm strongly followed the Langmuir model ($R^2=0.99$), with a maximum adsorption capacity of 98.86 mg/g.

Keywords: Biochar, Nanocomposite, Congo red, *Adsorption*, Isotherm, Kinetics,

CH -56

Investigation of molecular interactions of the drug Aspirin in water by volumetric and UV-vis spectroscopic methods

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Abstract

The behaviour of nonsteroidal anti-inflammatory drug aspirin in water was studied to explore molecular interactions at different temperatures. The Density (ρ) of aqueous solutions of the drug

Aspirin have been measured over wide temperature range $T = (300.15 - 315.15)$ K with equal interval of 5K within the concentration range $(0.001-0.010)$ mol·kg⁻¹. From this data, various volumetric parameters viz. apparent molar volume (v_a), partial molar volume (v^0), Masson's coefficient (S_V), partial molar expansivity (α^0), thermal expansion coefficient (α^0), and Hepler's constant ($\frac{\partial v^0}{\partial T}$)_p have been calculated and the results obtained are analysed in terms of solute–solute and solute–solvent interactions and structure making/breaking ability of solute in the aqueous solution. The UV absorption spectra for Aspirin in water have also been recorded to provide additional supporting evidences to analyze solute-solvent interactions.

CH -61

Transition metal-free approaches for arylation of heteroarenes

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Abstract

Heteroareomatics represent a ubiquitous class of compounds that have a vital role in sustaining life. Several heteroarenes are the essential components of fundamental biological systems and govern in their functions. These compounds form the backbones of important natural products, pharmaceutical agents, agrochemicals and polymers. In the recent decades, C-H bond activation-functionalization using the transition metals emerged as an alternative approach to overcome some of the limitations associated with the cross-coupling reactions, however, high cost and environmental concerns related to the transition-metals still present significant challenges. Lately, the development of benign transition-metal free arylation approaches have received much attention as a key stride towards achieving the sustainable organic synthesis. Metal-free methods for the synthesis of heteroarenes systems offer exciting possibilities to address the economy and environmental issues. Metal-free synthesis is essential when working with biomolecules and enzymes, as metal ions can interfere with biological processes. Metal-free synthesis is critical for promoting sustainable and environmentally friendly chemistry, enhancing safety, lowering toxicity, and enabling the synthesis of pure and high- quality products in a variety of fields such as pharmaceuticals, materials research, and chemical manufacturing. The mechanisms involved in the transformations using various reagents and catalysts, but not metal.

CH -72

Green biosynthesized ZnO@WO₃ nanocomposite for highly efficient photocatalytic remediation of organic pollutants

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Abstract

The widespread usage of toxic plastic additives in the plastics industry and dyes in various industries has drawn scientific attention since their ability to leak from consumer goods raises concerns for the environment. Plastic additives and dyes also have endocrine disruptor, genotoxic, and persistent properties that have been demonstrated. Therefore, the photodegradation of bisphenol A (BPA) and Auramine O (AO) in water was investigated. Herein, structural design of ZnO doped WO₃ nanocomposite have been synthesized via facile precipitation and green synthesis methodology. Sharp PXRD peaks made sure that the spherical nanocomposite had great crystallinity and purity. XPS analysis, PXRD and FE-SEM confirmed the effective doping of ZnO with WO₃. Subsequently, ZnO@WO₃ nanocatalyst was evaluated for the effective elimination of BPA and AO at variable reaction parameters (pollutant: 2–25 mgL⁻¹; catalyst: 5–25 mg; pH: 5–9, dark-sunlight-artificial bulb). At neutral pH and in the presence of sunlight, ZnO@WO₃ demonstrated maximal degradation of 2 mgL⁻¹ of BPA (91%) and AO (96%) at a catalytic dosage of 15 mg. The yellow color of AO decolourised within 3h confirmed effective removal of AO. First order kinetics followed by initial Langmuir adsorption constituted the degradation process. Presence of different radical quenchers (t-BuOH, p-BZQ, Na₂EDTA) concluded that hydroxyl radical plays a significant role for degradation of toxic BPA and AO. Formation of safer metabolites after degradation of BPA and AO confirmed by LC-MS analysis. Efficiency of green fabricated ZnO@WO₃ also investigated in real wastewater sample for the removal of BPA and AO. Nanocomposite demonstrated remarkable sustainability and cost-effectiveness by remaining effective for up to eight cycles without experiencing any appreciable activity reduction. A potential and different photocatalyst for industrial applications, green synthesized ZnO@WO₃ nanocomposite has good surface properties.

CH -75

Vanadium removal from industrial residue leachates using hybrid ion exchange resin

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Abstract

A hybrid ion exchange resin was prepared by altering Tulsion A-62(MP), a commercial strongly basic anion-exchanging resin, with hydrated ferric oxide (HFO) particles of average crystallite size 49.6 nm and the removal of Vanadium from industrial residue leachates on Tulsion A-62(MP) and HFO-Tulsion was observed under optimized parameters. This study examines the effectiveness of Vanadium removal from industrial residue leachates utilizing Tulsion A-62(MP) and Fe-loaded Tulsion A-62(MP) as selective sorbent materials. The resin and HFO ion-exchange Tulsion's interaction with vanadium solution, the optimum equilibrium was reached at 180 min. Almost all the vanadium ions were removed by the sorption process when the pH was between 6.0 and 7.0. The Freundlich and Langmuir adsorption isotherms were used to compare the equilibrium data for Vanadium adsorption and it was found that both are highly suitable for vanadium adsorption. Under the same conditions, evaluation of the adsorption attainment of the prepared HFO-Tulsion and the anion resin indicated that the HFO-Tulsion had an elevated adsorption capability with a value of 38.0 mg/g than that of the resin (32.0 mg/g). Regeneration of HFO-Tulsion was achieved with negligible capacity loss. It is possible that modifying anion resin with hydrated ferric oxide can greatly enhance the adsorption performance in the elimination of vanadium from industrial residue leachates.

Keywords: Vanadium Removal, Ion exchange resin, Toxic Removal.

CH -99

Revolution of Biodiesel Catalyst Manufacturing

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Abstract: There is a growing need to create renewable energy sources that have less of an effect on the environment, despite the enormous demand for energy in the industrialized world and due to the extensive use of fossil fuels, there are issues with pollution. Research and business are undergoing rapid and significant technological changes related to biodiesel manufacturing. The expense of the feedstock and the production system have the biggest effects on the price of biodiesel. The overall expense of production can be decreased by improving the catalyst's efficiency. This presentation therefore seeks to offer a summary of current catalyzed transesterification patterns of homogeneous & heterogeneous acid/base, nano catalytic and enzymatic transesterification. With targeted research and development, the finest biodiesel

production that is economically feasible and environmentally safe for a better future can be achieved. There are numerous factors that influence the creation of biodiesel.

Keywords: enzyme catalyst, nanocatalyst, magnetic catalyst, non-magnetic catalyst, tranesterification

CH -95

A Sustainable Technology Assessment for Converting Municipal Solid Waste to Energy in the Himalayan Region

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ABSTRACT

The present study explores MSW to energy innovations as a potential solution to understand better MSW's potential applications in energy generation, existing technologies, technological feasibility, and environmental effects. The study used a Multimoora-based MCDM model to convert MSW to energy in a picture-fuzzy environment to build more effective technology for future generations. The incineration, pyrolysis, gasification, and bio-methanation conversion technologies were explored and assessed based on various physical and chemical criteria like energy efficiency, capacity, useful side product, environmental effect, waste material, cost aspect, temperature, and the system's long-term utilization from MSW to energy. A comparative analysis was done to verify the superiority of the proposed MCDM model with the Technique for Order of Preference by Similarity to the Ideal Solution (TOPSIS) model. The results of both picture fuzzy Multimoora-based MCDM and TOPSIS models showed that, although other technologies are also effective, as having a high output, the Bio-methanation technology is highly effective in converting MSW to energy with the least environmental damage.

Keywords: Municipal solid waste, picture fuzzy MCDM model, energy conversion, bio-methanation, environment.

CH -112

Bio Synthesis, antimicrobial and photocatalytic activity of Ag–ZnO Nanocomposite

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Abstract:

In the present investigation, biosynthesis of Ag-ZnO nanocomposites were prepared using leaves of *Dalbergia sissoo*. The morphological sizes and shapes of nano composites were characterized by scanning electron microscopy. The effect of Ag-ZnO nano composites was tested on *Streptococcus mutans*, *Escherichia coli* and *Pseudomonas aeruginosa* in antibacterial tests including growth kinetics, antimicrobial susceptibility (disc diffusion) and minimal inhibitory concentration (MIC). The photocatalytic behavior of the synthesized systems was studied as well by the removing reaction of methylene blue (MB) in water solution.

CH -126

Fabrication of CMC-PVP based RGO modified magnetic hydrogel for the adsorption and photo-reduction of hexavalent chromium from simulated waste water

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Abstract

Chromium (VI) is considered as highly toxic among other heavy metal ions due to its carcinogenic activity. The present laboratory scale experiment depicts the fabrication of CMC/PVP-RGO-NiFe₂O₄ (CPRN) based hydrogel. The CPRN was investigated for the adsorption and photo-reduction removal of hexavalent chromium (Cr VI). Here Carboxymethyl cellulose (CMC) & Polyvinylpyrrolidone (PVP) taken as main backbone for the hydrogel fabrication. The reduced graphene oxide (RGO) was taken as surface modifier followed by nano NiFe₂O₄ as magnetic substrate. The fabricated magnetic hydrogel composite (CPRN) was characterized by using XRD, FTIR, FESEM, and HR-TEM. The adsorption results showed that about 92.2% of Cr (VI) has been adsorbed on CPRN over a time period of 2 h. On the other hand about 94.7% was photo-reduced over 1 h of solar illumination. The kinetics of overall adsorption

and photoreduction process are pseudo-second-order fits and follow the Langmuir models, which suggests the single layered adsorption mechanism. The maximum adsorption capacity of CPRN was estimated about 338.6 mg/g.

Keywords: Adsorption, RGO, Hydrogel, Hexavalent chromium (VI), Nano NiFe₂O₄

CH -130

Design, Synthesis, *In-vitro* Anti-cancer Activity, ADMET Profile and Molecular Docking of Novel Pyridazine Analogues

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Abstract:

Novel pyridazine compounds were synthesized and characterized by spectroscopic means and elemental analysis. All the synthesized compounds were screened for their cytotoxic activity *in vitro* on colon cancer cell line (HCT-116) and breast cancer cell line (MCF-7). In addition, the antitumor activity of the synthesized compounds was tested *in vivo* against Ehrlich's ascites carcinoma (EAC) solid tumor grown in mice. The *in vitro* vascular endothelial growth factor receptor (VEGFR) enzyme inhibition assay was carried out for the most active compounds at a single dose of 10 μ M. The obtained results revealed that compound 6b, which showed potent cytotoxic activity against HCT-116 also, exhibited the highest inhibition in the VEGFR kinase assay (95.2%). The obtained results showed that, the most active compounds could be useful as a template for future design, optimization, adaptation and investigation to produce more potent and selective VEGFR-2 inhibitors with higher anticancer analogs.

Keywords: Pyridazine; VEGFR-2 inhibitors; anticancer agents; molecular docking.

Environmental sciences (EVS) EVS -60

Algal mediated green synthesis of Ag/ZnO nanomaterial for photocatalytic degradation of monocrotophos

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Abstract:

An environment friendly bio synthesis technique has been employed for the synthesis of Ag-ZnO nanomaterials using the aqueous extract of *C vulgaris*. The various instrumental techniques such

as Fourier transform infrared (FTIR) spectroscopy, X-ray diffraction (XRD), scanning electron microscopy (FESEM), photoluminescence spectra (PL small area diffraction (SAED) pattern, electron dispersive X-ray (EDX), UV-visible (UV-vis) spectrophotometry have been used to study the detailed anatomy of prepared nanocomposite. The XRD results indicated the nanocrystalline structure of composite material. The band gap energy of the materials was identified to be 3.3eV. FTIR study helped to identify those functional groups and bond that are responsible for stabilization and capping the nanoparticles or the precipitates. The degradation rate of 86.41% was recorded for monocrotophos using nanocomposite under synergetic adsorption-photocatalysis (AP) after 120 minutes of solar illumination.

Keywords: Nanomaterials, *C.vulgaris*, Monocrotophos, Photocatalytic.

EVS 41

Adaptive Evolution of *Candida shehatae* with Inhibitor Tolerance for Production of Lignocellulosic Ethanol

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Abstract

Bioethanol derived from lignocellulosic biomass aptly named second generation bioethanol has potential green fuel capable of reducing our fossil fuel dependence. Produced from non-edible feedstock it solves ethical issue of food vs. fuel, while also providing a suitable technique for waste biomass management. However, there are some hindrances which must be issued for commercialization of second generation bioethanol and to reduce the production cost. Acid hydrolysis is very versatile method of pretreatment which can be utilized on a wide of lignocellulosic feedstock and comparatively costs less than enzymatic hydrolysis. However, the main concern regarding acid hydrolysis is the generation of inhibitors which need to be removed before fermentation thus adding to overall cost. Further, the main product of acid hydrolysis is xylose which is fermented by conventional ethanologenic strains. In the current study, we selected a xylose fermenting yeast *Candida shehatae* NCIM 3501 for adaptive laboratory evolution. To improve the inhibitor tolerance of *C. shehatae*, it was repeatedly sub-cultured in two separate batches containing xylose and xylose-glucose mixture, respectively, both supplemented with inhibitors (furfural, 5-HMF, and acetic acid). After 18 transfers the yeast was able to tolerate an inhibitor mix 0.232 g/l furfural, 0.304 g/l 5-HMF and 0.36 g/l acetic acid.

EVS 86

Assessment of groundwater quality of Chatha region of Jammu and Kashmir, India

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Abstract

The present study deals with the assessment of Water Quality of groundwater of Chatha region of Jammu district of Jammu and Kashmir. The water samples were collected from fifteen different sites of the Chatha region. The water quality parameters such as pH, electrical conductivity (EC), temperature, total dissolved solids (TDS), phosphate (PO_4^-), nitrate (NO_3^-) and sodium (Na^+), etc. were analyzed using standard methods. The Water Quality Index (WQI) was found in excellent category except for one site. Kelley's Index, Sodium Adsorption Ratio (SAR), and Sodium Hazard (%Na) were evaluated to test irrigation water quality. The indices showed that the groundwater of the study area is suitable for irrigation purpose. Sulphate was found to be the leading anion in both the seasons. Magnesium was found as the dominant cation in the winter season and calcium in the summer season. The overall average or mean value for both the seasons for total dissolved solids, electrical conductivity, pH, total hardness, total Alkalinity, phosphate, nitrate, sodium, sulphate and chloride was recorded as 301.9 ppm, 0.59 mS, 7.46, 276.26mg/L, 237.63 mg/L, 3.22 mg/L, 6.65 mg/L, 19.48 mg/L, 230.22 mg/L, and 14.36 mg/L respectively. In winter season, TDS, EC, total hardness, calcium, magnesium, total alkalinity, nitrate, sodium, sulphate and chloride were reported to have significant positive correlation with each other. Overall, the water quality of the study area can be considered good for drinking and irrigation use.

Keywords: Water Quality Index, Irrigation Indices, Sodium Adsorption Ratio, Sodium Hazard, Kelley's Index.

EVS - 91

Zero-valent iron Nanomaterial-Immobilized Cellulase for Efficient Cellulose Hydrolysis

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Abstract:

Cellulose, the most abundant biopolymer on Earth have great potential as a sustainable feedstock for biofuels production. However, its recalcitrant nature necessitates the use of cellulase enzymes

for efficiently breaking down into fermentable sugars. Immobilizing cellulase enzymes on nanomaterials has emerged as a promising approach to enhance cellulose hydrolysis efficiency, thus making it a key area of research in the field of biomass conversion. Immobilizing enzymes on magnetic nanomaterials facilitates easy recovery, separation, and recycling of the biocatalysts. Consequently, the development and deployment of nano-biocatalytic systems present an environmentally friendly and cost-effective approach for catalytically breaking down lignocellulosic biomass. This paper summarizes the various nanomaterials used for cellulase immobilization and their impact on cellulose hydrolysis. Magnetic nanoparticles (MNPs) like zerovalent iron nanoparticles (nZVI) have gained prominence as excellent adsorbents and as potential immobilization supports. Thus, it can be used as an efficient MNP for hydrolyzing the biomass. The potential applications of immobilized cellulase-nanomaterial systems in biofuel production, biorefineries, and other biotechnological processes have been discussed. The biomass conversion with an overview of the advancements, challenges, and future prospects associated with the hydrolysis of cellulose using immobilized cellulase on nanomaterials are also mentioned.

Keywords: Biomass, Enzyme immobilization, Nanomaterials, Zero-valent iron nanoparticles, Biofuel

EVS - 93

Implementation of constructed wetland for sustainable wastewater phytoremediation: a review

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Abstract

In the present scenario, growing population demands for increased water supply leading to the generation of huge quantities of wastewater from various sources like residential sewage, industrial and agricultural runoff, etc. have resulted in the contamination of water bodies, indirectly affecting aquatic life prevailing there. Waterbody contamination caused by the discharge of untreated effluent affects both urban and rural areas such as leading to human health issues as well as environmental pollution. Constructed wetlands (CWs) are artificial or engineered wastewater treatment methods recommended as an easy, cost-effective, economical, eco-friendly, and green technology for wastewater treatment. CWs provide a land-intensive, small-energy as well as minor functional necessities substitute to conventional treatment systems. But, the sustainable operation as well as successful solicitation of these systems remains a challenge. Here we describe clarifications for the execution of CWs via a general review of CWs solicitation and the current improvement on their sustainable strategy as well as procedure

for wastewater treatment. Various types of constructed wetlands for wastewater treatment such as surface flow or free water surface flow constructed wetlands and subsurface flow constructed wetlands are well-explained. Removal efficiency of CWs for pollutants such as nitrates, phosphates, BOD, and COD are also enlisted. Furthermore, future investigation on upgrading the stability as well as sustainability of CWs has been highlighted.

Keywords: Constructed wetlands, Pollutant removal; Sustainability, Wetland plants.

EVS 96

Assessment of Water Quality of River Ujh, Udhampur District (J&K)

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Abstract

Rivers are the backbone of human civilization, providing a large source of freshwater for sustaining agriculture, industries, and human life in general. However, the ever-increasing development has led to the deterioration of these precious resources across the globe. The excessive fertilizers used in agricultural fields find their way into rivers through surface runoff. Indiscriminate discharge of industrial and domestic sewage into the rivers further declined the health of rivers. Therefore, it is important to monitor the quality of rivers and make efforts to prevent any further degradation. In the current study, River Ujh has been taken into account as it is a major tributary of River Ravi. In order to evaluate the level of pollution in this river the most crucial parameters i.e., Dissolved Oxygen (DO), Biological Oxygen Demand (BOD), Chemical Oxygen Demand (COD), and the presence of *E. coli* were determined along its course in the Udhampur district. The present study discusses the analysis of 10 samples along the stretch of 25 km taken from that region during the pre-monsoon period. The level of DO for all the samples was above 5 mg/L and that of BOD and COD was below 5 mg/L, and 20 mg/L, respectively. However, four samples tested positive for *E. coli*. The presence of *E. coli* in four samples collected from Lodhra, Chakahal, and Chigli Kiya (2 samples) indicates that water cannot be used for drinking purposes however the river water can be used for irrigation, agricultural and recreational activities.

Keywords: River water, DO (Dissolved Oxygen), BOD (Biological Oxygen Demand), COD (Chemical Oxygen Demand), *E. coli*.

EVS - 97

Future of algae as biofuels feedstock: A sustainable way towards circular bioeconomy

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Abstract

Rising energy consumption, global warming, and excessive fossil fuels depletion have raised inquisitiveness in alternative renewable biofuel sources. The best way to meet current and future fuel demand is to replace it with renewable biofuels. Biofuels not only provide an alternative to fossil fuels, but also help to reduce the toxic gaseous emissions. These may have solid (charcoal, sawdust, etc.), liquid (bioethanol, biodiesel, etc.), or gaseous (biogas, bio-syngas, etc.) forms. Biofuels, depending on feedstocks employed, can be a) Primary or natural (firewood, wood chips, animal waste) and b) Secondary. Secondary biofuels can be 1st generation from food crops like wheat, barley, corn, coconut, etc., 2nd generation from lignocellulosic woody biomass like non-edible part of food crops like sugarcane, corn etc. and non-food crops like jatropha, cassava etc., 3rd generation from microbes like algae, bacteria, etc. and 4th generation from altering 3rd generation genetically or metabolically. Specific to this study, algae serve as an excellent feedstock for biofuel production. Accumulation of lipids and carbohydrates during their metabolism makes algae an interesting feedstock for extracting the biofuel. Algae can produce different renewable biofuels such as biomethane, biodiesel, biohydrogen, etc. along with value-added bioactive compounds (carotenoids and pigments) having wide applicability in nutraceuticals, pharmaceuticals, cosmetics, etc. Different conventional and non-conventional methods of lipids (algal biofuels) extraction and estimation in algae are discussed in this study.

Keywords: *Biofuels, biofuels generations, algae, bioenergy, circular bioeconomy*

EVS 100

Sustainable Fuel Pellet Production from Agro-Residuals and Animal Waste Densification: A Review of the Indian Scenario

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Abstract

Policymakers around the world are beginning to recognise bioenergy as an increasingly significant low-carbon resource to satisfy climate policy goals. The potential of agricultural and animal waste and the future expansion of India's bioenergy industry can both be tapped with the help of a biomass pelletization facilities. India has a diversity of biomass resources, such as agricultural waste, forestry waste, organic municipal solid waste, because of the country's various geographic and climatic characteristics. India is also rich in its livestock resources thus producing enormous amount of animal waste. These resources have the potential to be crucial in addressing the nation's rising energy needs while reducing environmental concerns and fostering rural development. The enormous contribution of bioenergy to the production of power and other uses is also widely acknowledged in India. The non-woody biomass (also known as agricultural waste) that is present in rural regions along with the animal waste could become a sustainable and financially feasible raw material for bioenergy generation with improved technologies. It is projected that 28446 MW of electricity can be produced from 228 MMT of surplus agricultural residue. When used in their original condition, these residues have poor heating value per unit volume and significant transportation and storage expenses. Densification of these surplus residues into Pellets can address the problem of storage and transportation issues. A realistic scenario of pelletization opportunities, socio-economic impact and policy trends related to agriculture waste in India is presented in this review

Keywords: Agricultural waste, Animal waste, Bioenergy, Densification, Pellets

EVS 102

Valorization of rice straw for xylanase production from *Fusarium* sp. under submerged fermentation

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Abstract

Lignocellulosic biomass is a tremendous bioresource for the production of second generation biofuel. But complexity of its structure poses a difficulty in accessing its structural components

(cellulose and hemicellulose). Hemicellulose is a heteropolymer in which xylan constitutes the major portion of its structure. To access the xylan, xylanolytic enzymes are required but commercially available enzymes are quite expensive that makes the process of biofuel production expensive. Bacteria and fungi are the producers of cellulase and xylanase. So, extraction of the crude enzymes from its source (fungi and bacteria) makes the process economical for large scale production. In this study, *Fusarium* sp. was procured from Indian Type Culture Collection (ITCC) and Identification/Culture Supply Services, Division of Plant Pathology, Indian Agricultural Research Institute (IARI), New Delhi and screened for xylanase production. Parameters like temperature and pH were optimized for xylanase production by one factorial at a time method. The procured fungus showed a positive growth for xylanase production. The optimum conditions for aforementioned enzyme production were 40 °C temperature and pH of 5.

Keywords: Fungi, Xylanase, Optimization, *Fusarium* sp.

EVS 103

A biomonitoring of Plankton in the polluted stretch of Tawi river, Jammu City, Northwest Himalayas

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Abstract

The present study deals with the role of biological parameters especially plankton community to assess the water quality of polluted stretch of Tawi river in the Jammu City. Pollution status of the selected sites were assessed based on the Palmer's Pollution Index, Shannon Wiener Index and Physico-chemical parameters. A total of 32 species belonging to 7 taxonomic groups of phytoplankton and 5 species belonging to 5 taxonomic groups of zooplankton were identified from the river stretch. Different patterns of dominance of indicator plankton community and species along with physico-chemical quality observed confirms the pollution status of the river stretch. These outcomes give detailed information to understand the water quality affecting factors in the Tawi River system. Hence, management and remedial measures are required on urgent basis to prevent future deterioration of water quality in Jammu city.

Key words: Palmer Pollution Index, Plankton, Shannon Wiener Index, Water quality

EVS 109

Use of Biochar and Nano-biochar for Wastewater Treatment: An Approach Towards Sustainability

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Abstract

Wastewater treatment is a global challenge that requires innovative and sustainable approaches. The present industrial era is the major contributor to contamination in groundwater and waterbodies such as rivers, ponds, and wells. The use of biochar and nanobiochar offers hope for an advanced yet sustainable approach to wastewater treatment. The thermochemical processing of organic matter under oxygen-deficient conditions yields biochar, a material rich in carbon. It has diverse properties, such as a high surface area, porosity, and the presence of surface functional groups. All these properties facilitate the adsorption of different organic and inorganic molecules, including heavy metals. Biochar also serves as an ideal material for the recovery of many substances, such as nutrients and heavy metals. Further processing the biochar into nanobiochar using different physical and chemical methods enhances the treatment efficiency.

The biochar can be reused many times, thereby causing little problem for its disposal. The material has a long shelf life and is biodegradable in nature. The present review explores the multidimensional role of biochar and nanobiochar for wastewater treatment-based applications in the real world.

Keywords: biochar, nanobiochar, wastewater treatment

EVS 110

ASSESSMENT OF THE WATER QUALITY OF THE SPRING WATER OF RAJOURI DISTRICT OF JAMMU

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Abstract

Water quality assessment of spring water was carried out in the Rajouri district. The water of this spring is used for multiple activities including drinking; washing, bathing and for various treatments like skin treatment, body ache, arthritis etc. The type of spring found in present study where fault spring, contact spring and kart spring The physical and chemical parameters; temperature, pH, total dissolved solids (TDS), electron conductivity(EC,) dissolved oxygen (DO), alkalinity and hardness,were analyzed as per the standard protocol of American Public Health Association (APHA). Comparative analysis of pre and post monsoon of Rajouri district was carried out. The samples were collected from a total of 25 springs throughout the district. The average value of temperature 22.8 -18.7, pH 7.81- 7.88, EC 0.60- 0.81 TDS 270.9 -310.4, Do 5.03- 4.48, alkalinity 45.8- 113.8, hardness 186.72- 277.28, during pre and post monsoon are respectively. All selected physicochemical parameters were found under prescribed limits as stated by Indian Standard 10500. No significant difference was found in the spring water quality in pre and post monsoon samples.

Keywords: Spring water, APHA, Water quality, IS 10500

Physical Sciences (PH) PH -18

Concept of Dark Matter from Casimir Effect and Cosmological Constant Following Standard Model of Cosmology

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Abstract

Earlier works analysed that dark matter is made of non-baryonic particles and non-interacting with electromagnetic radiation but it gravitates. Neutrinos (ν) are product of β -decay process. Characteristics of ν indicates that non-interacting ν may be a dark matter (DM) particle and can contributes to the mass of DM. Recent work *shares* this vision. Following the seesaw model may explain the connection between dark matter and ν mass.

The Casimir Effect (CE) is a physical force acting on the macroscopic boundaries of a confined space which arises from the quantum fluctuations of a field. The CE is a small attractive force that acts between two close parallel uncharged conducting plates. The force arises due to the quantum fluctuation of the electromagnetic field. The nature of this attractive force F_{cas} varies as $1/L^4$, L is plate separation. This small force, is active within distances below a micrometre it becomes the strongest force between two neutral objects analogues to molecular force. It may be considered as a dubbed Dark Energy (DE). The cosmological constant Λ that only plays a role

once the structure is formed at late times. The EDE model Garcia et al considered small contribution at high redshift dark energy model and it asymptotically simulates the effect of the Λ , is F_Λ , that varies as L and drives cosmic acceleration. The attempt emphasized “DM” and “DE” arise from the same fundamental physical process: emergence principle. Modified Einstein GTR equation also concludes smallness of Λ as dark energy. In this work authors hypothesised formation of micro-cluster (MC) of DM from ν by quasi-static equilibrium between F_{cas} and F_Λ in frozen-in approximation where MC's to form DM clump.

Keywords: Neutrino, Dark matter, Casimir Effect, Cosmological constant, Frozen-in approximation

PH -108

A Graphical Study of Magnetic Susceptibility of Different Magnetic Materials as a Function of Temperature

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Abstract:

The magnetic susceptibility is the internal property of magnetic materials which differentiate them from other materials. Slightly Negative magnetic susceptibility indicates diamagnetic materials, slightly positive indicates paramagnetic materials and highly positive susceptibility indicates ferromagnetic susceptibility. In the present work a graphical study of magnetic susceptibility of different magnetic materials as a function of temperature has been taken under consideration. As the magnetic susceptibility is the result of internal magnetization of a material. Therefore, it is the result of orientation of spins in the magnetic domain which further gives change in hysteresis loop properties for various magnetic materials

Key Words: Hysteresis, Magnetic susceptibility, Magnetic domains, Magnetization.

PH -42

Neutrino less Double Beta Decay in Different Active-Sterile Neutrino schemes

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Abstract

Neutrino-less double beta decay ($0\nu\beta\beta$) is a way to investigate lepton number violation and the nature of neutrinos. Three types of neutrinos have been discovered, but experiments like LSND and MiniBooNE suggest that there may be an additional type of inactive neutrino that does not interact with matter, called a sterile neutrino. In this work, we study

neutrino-less double beta decay in three different schemes such as 3+1, 2+2 and 1+3, which involve one sterile neutrino and three active neutrinos. We analyse each scheme for normal ordering as well as for inverted ordering frameworks. In light of current and future neutrino-less double beta decay experiments we also constrained the mass of sterile neutrino for both the orderings. The detailed analysis of all these schemes will help us in understanding physics governing neutrino-less double beta decay and the obtained value of mass of sterile neutrino could help in future experimental exploration.

Keywords: Sterile Neutrino, Neutrino less Double Beta Decay, Active Neutrinos.

PH -105

Reflection and Transmission of Plane Sh-Wave at an Interface Between Monoclinic Elastic Solid Half Space and Monoclinic Elastic Solid Half-Space

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Abstract

The Reflection and Transmission of plane SH- wave interacting at an interface between monoclinic elastic solid half space (M2) and monoclinic elastic solid half space (M1) has been investigated. The expression for reflection and transmission coefficients are obtained in closed form and are computed for different values of non-dimensional self-reinforced and monoclinic elastic parameters and presented graphically. The problem studied by Agustin Udias and Elisa Bufon (2018.pg.129), when both the half spaces M_1 and M_2 are isotropic elastic and SH wave is made incident at an interface has been reduced as a special case of our problem.

PH -107

A Comparative Study of Magnetic Susceptibility of Different Materials at Room Temperature

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Abstract

The behaviour of a material in a magnetic field is characterised by its magnetic susceptibility. The Quincke's Method is used to determine the magnetic susceptibility of either diamagnetic or paramagnetic material in the form of a liquid or an aqueous solution placed in capillary tube so that the meniscus stands in a strong magnetic field. A Comparative study of magnetic susceptibility of different materials has been studied at room temperature. The materials taken

under consideration are FeCl_3 , ZnSO_4 , MnSO_4 and water as a reference. It is found that FeCl_3 shows the paramagnetic nature at room temperature while H_2O , ZnSO_4 , MnSO_4 shows the diamagnetic character at room temperature.

Key Words: Quincke's tube, magnetic susceptibility, magnetization, room temperature,

PH -90

Green Hydrogen Production Promoted by Cobalt-Nickel Magnetic Nanomaterials

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Abstract

The current work concentrates on the design of Nd/La doped $\text{Co}_{0.7}\text{Ni}_{0.3}\text{Fe}_2\text{O}_4$ nano catalysts for the green, clean, and sustainable production of hydrogen through overall photocatalytic and electrocatalytic water splitting routes using sol-gel auto-combustion. The spinel phase with Fd3m geometry and cubic polycrystalline nature was observed for the developed catalysts. Cubic, and spherical formed agglomerated nanoparticles having average grain size of 127.10 and 120.08 nm was confirmed for produced $\text{Co}_{0.7}\text{Ni}_{0.3}\text{Fe}_2\text{O}_4$ and $\text{Co}_{0.7}\text{Ni}_{0.3}\text{Nd}_{0.02}\text{La}_{0.02}\text{Fe}_{1.96}\text{O}_4$ catalysts through the FESEM results. Maximum magnetization of 64.81 emu/g and coercivity of 1234.54 Oe were attained by the undoped $\text{Co}_{0.7}\text{Ni}_{0.3}\text{Fe}_2\text{O}_4$ catalyst. This shows the superior magnetic behaviour of our prepared catalysts, which makes them useful for permanent magnets' application. The electrocatalytic activity of produced electrocatalysts were determined towards electrocatalytic HER (Hydrogen evolution reaction) via a three-electrode system in 0.5 M H_2SO_4 electrolyte. The produced $\text{Co}_{0.7}\text{Ni}_{0.3}\text{Nd}_{0.03}\text{La}_{0.03}\text{Fe}_{1.94}\text{O}_4$ nano catalyst shows excellent electrocatalytic HER activity as compared to other prepared samples. HER responses were utilized to elucidate the reaction kinetics for the electrocatalytic activity through Tafel plot. Furthermore, the estimation of photocatalytic hydrogen production for the prepared photocatalysts was conducted under ambient conditions, with irradiation from a UV-visible light source spanning a wavelength range of 200-2400 nm. Compared to other sample compositions, $\text{Co}_{0.7}\text{Ni}_{0.3}\text{Nd}_{0.03}\text{La}_{0.03}\text{Fe}_{1.94}\text{O}_4$ nano photocatalyst shows the maximum photocatalytic activity of $15.52 \text{ mmol g}_{\text{cat}}^{-1}$. Three successive cycles were analyzed for the photocatalytic hydrogen evolution rate, repeatability, and stability. This makes them excellent antibacterial agents for the biological applications. Hence, with photocatalytic/electrocatalytic water splitting traits, the prepared nano catalysts are highly efficient and suitable for the production of clean and green hydrogen energy sources.

Keywords: Nanocatalysts; $\text{Co}_{0.7}\text{Ni}_{0.3}\text{Fe}_2\text{O}_4$ magnetic nanomaterials; Nd/La substitution; H_2 generation; Photocatalysis/Electrocatalysis.

PH -36

Neutrino Mass and Muon ($g - 2$) from a Z_4 Scotogenic Model

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Abstract

Fermilab in 2021 has reported 4.2σ discrepancy in the measurement of muon magnetic moment. There is also a mismatch of 7σ between mass of W boson measured by CDF-II collaboration and SM results. Also, there is no explanation of non-zero neutrino mass within SM. In this work, we consider a discrete Z_4 symmetric scotogenic model that explains non-zero neutrino mass, muon ($g - 2$) and W boson anomaly, altogether. We extend the model by a Vector like lepton (VLL) triplet ψ_T in order to resolve muon ($g-2$) anomaly. The coupling of ψ_T with inert doublet η provides positive contribution to muon ($g-2$). The real component of η is considered as Dark Matter candidate. The model explains muon anomalous magnetic moment Δa_μ for $1.3 < y_\psi < 2.8$ and mass of Dark Matter candidate in the range $152 \text{ GeV} < M_{\eta_0 R} < 195 \text{ GeV}$. The explanation of W-boson mass anomaly, further, constrain the mass of DM candidate, $M_{\eta_0 R}$, in the range $154 \text{ GeV} < M_{\eta_0 R} < 174 \text{ GeV}$.

Mathematical Sciences (MS) MS-03

Utilization of Taguchi method for optimization of geometric and flow parameters of circular heat exchanger tube with combined solid ring and square wing twisted tape inserts.

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Abstract

In this research paper, an attempt is made for optimizing multiple responses by using the Taguchi method to investigate the performance of circular heat exchanger tube fitted with combined wing and solid ring twisted tape inserts. Taguchi Techniques and analysis of variance have been applied to investigate Reynolds number (Re) ranging from 5000 to 21000, twisted tape parameters such as ring pitch ratios (d_R/D_T) from 0.5 to 2.0 and wing pitch ratios (P_W/W_T) from 2.0 to 3.5 respectively. The investigation revealed that heat transfer is increased around 5.66 times higher than plane circular heat exchanger tube. The optimum value of thermal hydrodynamic performance parameters has been found corresponds to $N_{TT}=3.0$, $d_R/D_T=1.0$ and $P_W/W_T=3.0$.

MS-78

Propagation of Rayleigh Wave in Hygro-Thermoelastic Half-Space with Rotation, Magnetic Field, Two-Temperature and Initial Stress

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Abstract:

The present research article deals with Rayleigh Wave propagation in hygro-thermoelastic half-space with rotation, magnetic field, two-temperature and initial stress. We consider the governing equations in terms of moisture concentration and displacement temperature to be solved analytically. The frequency equation of the Rayleigh wave is calculated using a surface wave solution. We calculate the penetration depth and show it graphically. We also discussed the effect of different parameters for a particular material. The components of displacement, mechanical stress, moisture concentration and temperature distribution in the medium are

obtained and presented analytically. The variation of these quantities is presented graphically to the effects of rotation, magnetic field, two-temperature and initial stress.

Keywords: Rayleigh Wave, Hygro-Thermoelastic, Rotation, Magnetic Field, Two-Temperature, Initial Stress

MS-94

A Note on H_g -Paracompactness in Hereditary Spaces

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Abstract:

In this paper the notion of H_g -paracompactness has been introduced in hereditary generalized topological spaces to generalize the concept of μ -paracompactness of generalized topological spaces. Some of the properties have been investigated for these spaces. It has been proved that H_g -Paracompactness of μ -open sets implies that of H_g -open sets. A necessary condition of H_g -Paracompactness has been established for g - H -regular hereditary spaces.

Keywords: generalized topologies; hereditary classes; paracompactness.

MS-127

A Generalized form of Topological Vector Spaces

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Abstract:

In this paper, we have introduced a new generalized form of topological vector spaces, namely, almost β -topological vector spaces by using the concept of β -open sets. We have also presented some examples and counter examples of almost β -topological vector spaces and determined its relation with topological vector spaces. Some properties of β -topological vector spaces are also characterized.

Keywords: β -open sets, δ -open sets, regular-open sets.

Paper No.-128

Irresolute Topological Rings with Inherent Properties

Shallu Sharma and Ms.Tsering Landol

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Abstract:

We studied new notions of analogues of topological rings. Salih acquaints us with the notion of irresolute topological ring in 2018. In this paper, we further studied the space closely and characterized indispensable properties of the space. We prove that every open subset of an irresolute topological ring is irresolute topological ring. We also obtained the equivalent condition of neighborhood of an element in an irresolute topological ring. It is proved that ring homeomorphism of an irresolute topological ring is irresolute if it is irresolute at identity element e in the irresolute topological ring R .

Key words: Semi-open set, irresolute, semi-compact, irresolute topological ring.

Paper No.-131

Different Classes of Continuity in Cone Metric Spaces

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Abstract:

The different forms of continuity are discussed thoroughly on cone metric spaces. A new notion namely Lebesgue cone metric spaces is also introduced in this paper. We established certain equivalent conditions on Lebesgue cone metric spaces.

Key words: Compact, totally bounded, complete cone metric spaces.

Paper No.-132

Fixed Point Theorems in Cone Metric Spaces via C-Distance over Topological Module

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Abstract:

In 2011, Wang and Guo introduced c -distance in cone metric spaces. The idea of cone metric spaces over topological modules was presented by Branga and Olaru in 2020. Combining these two ideas, we introduce cone metric spaces with c -distance over topological module and establish a fixed point theorem.

Key words: cone metric spaces with c -distance; topological module; fixed point theorems.