

**33<sup>rd</sup> Annual Function of NESA**  
**National Virtual Conference**  
**on**  
**TECHNO-SCIENTIFIC CHALLENGES AND**  
**SUSTAINABLE SOLUTIONS FOR LIVING BEINGS**  
**DURING CHANGING ENVIRONMENT (TCSE-2021)**

**29-30, January, 2021**

*Jointly Organised by*



**National Environmental  
Science Academy (NESA), New Delhi**



**ICAR-Indian Agricultural  
Statistics Research Institute (IASRI)**



# **Souvenir & Abstracts**

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**Asian Biological Research  
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**National Agricultural  
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## **ABOUT THE ORGANIZERS**

### **National Environmental Science Academy (NESA), New Delhi**

National Environmental Science Academy (NESA), New Delhi This ACADEMY is of National level, registered by the provisions of Societies Act XXI of 1860 under the Government of Bihar in 1988, presently has its Head Quarter at 206, Raj Tower-1, Alaknanda Community Centre, New Delhi. The main objective of the Academy is to bring awareness about the environment among the masses by arranging lectures, demonstrations, training programmes, seminars, symposia, conferences, publishing journals, etc.

Its major aims and objectives include promotion of environmental sciences among young minds and researchers, setting up regional and state Chapters for dissemination of information on environment, to hold annual conference, to organise national/ international level conferences, symposia, seminars, meetings and workshops on themes of environmental concerns and to publish policy papers, synthesis volumes, proceedings, journals, newsletter, transactions and other publications for the promotion of Environmental Sciences.

Various eminent personalities had graced the Academy as its President. The first President of the Academy was Dr. K.C. Bose, Vice-Chancellor of Ranchi University; then Dr. B.S. Attri, Advisor, Ministry of Environment and Forest. Most recently Padmabhushan Dr. S.Z. Qasim was the President of the Academy till June 2015. A renowned marine scientist known for his Antarctica mission in 1981-82, he also served as Secretary of the Deptt. of Ocean Development (now Ministry of Earth Sciences); Member, Planning Commission and Vice-Chancellor, Jamia Millia Islamia, New Delhi. Currently Prof. Javed Ahmad, (Former Dean, Faculty of Science), Jamia Hamdard, New Delhi, is the President of the Academy.

The academy promotes awareness, research and publications related to environmental issues. It has organised many activities, with financial support from the different ministries of Government of India like Department of Science and Technology, Council of Scientific and Industrial Research, Indian National Science Academy, Indian Council of Medical Research, Indian Council of Agricultural Research, Ministry of Earth Sciences, and Department of Biotechnology, regularly for over last 33 years.

### **AIMS AND OBJECTIVES**

- To enhance and promote the study of the environmental sciences by encouraging students, scientists, researchers, academicians and members of the Academy for pursuing research on environment and allied areas.
- To set up Regional/State Chapters for dissemination of information on environment.
- To motivate and prepare young minds on environmental management.
- To hold Annual Conference of the Academy.
- To organise national/international level conferences, symposia, seminars, meetings and workshops on themes of environmental concerns.
- To publish policy papers, synthesis volumes, proceedings, journals, newsletter, transactions and other publications for the promotion of Environmental Sciences.

### **NESA ANNUAL AWARDS**

The Academy recognises the merit and achievements of individuals who have contributed to the field of environmental science, education and societal values by conferring (1) NESA Fellowship Award, (2) NESA Eminent Scientist Award, (3) NESA Scientist of the Year Award, (4) NESA Environmentalist Award, (5) NESA Green Technology Innovative Award (6) NESA Young Scientist

Award and (7) NESAJr. Scientist Award. Any life member of the Academy can apply or sponsor the name(s) for these awards on a prescribed form with their bio-data. Each award consists of a Citation, Certificate, Memento and a Medal, given purely on the basis of merit after proper scrutiny by an NESAAward Committee.

## **NESA PUBLICATIONS**

The Academy is publishing the following Journals (Biannual):

- 1) **INTERNATIONAL JOURNAL ON AGRICULTURAL SCIENCES**  
ISSN NO. 0976-450X NAAS RATING 2.60
- 2) **INTERNATIONAL JOURNAL ON ENVIRONMENTAL SCIENCES**  
ISSN NO. 0976-4534 NAAS RATING 3.06
- 3) **INTERNATIONAL JOURNAL ON BIOLOGICAL SCIENCES**  
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- 4) **INTERNATIONAL JOURNAL ON CHEMICAL SCIENCES|**  
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<http://nesa-india.org/nesa-journal/>
- 7) **Environmental Abstracts (Bi-annual)**
- 8) **E-NESA Newsletter (Monthly)**

## **ICAR-Indian Agricultural Statistics Research Institute (IASRI)**

ICAR-Indian Agricultural Statistics Research Institute (IASRI) is a pioneer institute of Indian Council of Agricultural Research (ICAR) undertaking research, teaching and training in Agricultural Statistics, Computer Application and Bioinformatics. Ever since its inception way back in 1930, as small Statistical Section of the then Imperial Council of Agricultural Research, the Institute has grown in stature and made its presence felt both nationally and internationally. ICAR-IASRI has been mainly responsible for conducting research in Agricultural Statistics and Informatics to bridge the gaps in the existing knowledge. It has also been providing education/ training in Agricultural Statistics and Informatics to develop trained human resources in the country. The research and education are used for improving the quality and meeting the challenges of agricultural research in newer emerging areas.

## **Jamia Hamdard, New Delhi**

Keeping the vision of Jamia Hamdard in view, its mission is enumerated as under:

To promote and advance the cause of higher education through modern methods of teaching and advanced research in such branches of knowledge as the Jamia Hamdard may continue to develop core-competence for and as may be in consonance with the emerging needs of India in general and underprivileged communities in particular.

To co-operate, collaborate and associate with national and international organizations and institutions in any part of the world having mission wholly or partly similar to those of Jamia Hamdard and as per the provision of the UGC regulations in place from time to time.

To provide avenues for higher education leading to excellence and innovations in such Branches of knowledge as may be deemed fit primarily at under-graduate, post-graduate and doctoral levels, fully conforming to the concept and idea of the Jamia Hamdard.

## **Asian Biological Research Foundation (ABRF), Prayagraj (U.P.), India**

The ABRF Prayagraj, India is a self-supporting, academic and research associated body. It is basically non-profit and Non-Government Organization: (1) to provide a common platform for scientists associated with biological sciences to interact with one another for mutual benefit and to enhance the innovative knowledge on the subjects (2) to encourage, facilitate and perform the activities related to conservation of water, nature and biodiversity (3) to promote the new scientific knowledge that has emerged from recent advances and to felicitate the persons and organizations internationally for their outstanding services rendered in basic, applied and modern biological sciences including all branches of Botany, Zoology, Agriculture, Veterinary Science, Environmental Science, Molecular Biology, Biotechnology, Biochemistry, Bioinformatics, Microbiology, and so on.

## **Al-Falah University, Faridabad, Haryana**

The Al-Falah University is recognised by University Grant Commission under section 2(f) and 12(B) under UGC act 1956.

Al-Falah University is an endeavour of Al-Falah Charitable Trust, which was running three colleges in the Campus namely Al Falah School of Engineering and Technology (since 1997, Graded A by NAAC), Brown Hill College of Engineering and Technology(since 2008), and Al Falah School of Education and Training(since 2006, Graded A by NAAC).

The Al-Falah University was created by Haryana Legislative Assembly by passing an act 21 of 2014 under Haryana Private University act 2006 amended in 2014 and notified on 2nd May 2014. This university is one of the first universities which has introduced Choice Based Credit System under semester examination as per instruction of UGC and two year B.Ed and M.Ed programme as advised by NCTE.

Spread over 62 acres of lush greenery, Al-Falah University offers world-class education to students from India and other countries by providing a learning experience designed to develop intellectual abilities as well as good social, moral and ethical values. The university is committed to providing a rigorous academic environment to equip students with knowledge, skills, insights, attitudes and practical experience in order to enable them to become discerning citizens. The emphasis by the university is placed on nurturing talent by providing need-based education to create a resource pool for developing cutting edge technologies for the benefit of the country. We believe that this pool of immense talent would enrich the national fabric and shall act as a driving force for transforming India into a great nation.

The university has all infrastructure for the sports including newly laid national level cricket pitch and ground which organises national level inter university tournaments.

Al-Falah Charitable Trust also runs a 300 bedded Hospital with all modern facilities in OPD, IPD including Operation Theatres in the campus.

## **Indian Society of Horticultural Research and Development (ISHRD)**

Registered under the Societies Registration Act XXI, 1860, was established with a view to promote interdisciplinary research in the field of horticulture and to provide a forum for expressing views on policies and programmes relating to horticultural research and development.

### **Aims and Scope**

The basic aim of the society is to promote inter-disciplinary research in the field of Horticultural Sciences and provide a forum for expressing views on policies and programmes relating to horticultural research and development. The Society has wide scope to provide a platform for communicating research data, creativity ideas and policies among the interested researchers. Scope includes activities related to fruit crops, vegetables, flowers, ornamental crops, medicinal and aromatic plants, plantations crops, spices and condiments and other crops considered under wide area of horticulture.

Progressive Horticulture, an official scientific publication of ISHRD, is a peer reviewed journal published since the year 1969. Presently the journal is published twice every year, in the month of June & December. Original contributions covering fundamental and applied research relating to various disciplines of horticultural crops, post harvest management, biotechnology, diversification, policy issues, trade, market, case studies and success stories related to horticultural field are considered for publication. Review articles, summarizing the existing state of knowledge in horticultural research, are published by invitation only.

## **RAS BIO, Moradabad, Uttar Pradesh**

Researchers association for sustainable biosphere is an association formed by Dr. Alka Rani, under society registration act 21, 1880 which aims to connect researchers from various fields who wish to propagate the idea to save Ecosystem and achieve a greenlife style that runs parallel to sustainable development via : awareness lectures, conferences, seminar, workshop etc.

## **Jai Narain Vyas University, Jodhpur, Rajasthan**

Jai Narain Vyas University, formerly known as University of Jodhpur. University of Jodhpur I was Established in 1962, and following four Government Colleges of Jodhpur became part of the University.

I. MBM Engineering College (Now Faculty of Engineering & Architecture (11 Department)),  
II. Jaswant College (now Faculty of Commerce & Management Studies with 04 Departments),

III. S.M.K. College (now Faculty of Law and Campus of Institute of Evening Studies and also being used presently for Under graduate teaching of Faculty of Arts. This also houses Coaching Centre for Weaker Sections),

IV. K.N. College for Women (The multi-faculty constituent college of the University).

Dr. S. Radhakrishnan, the President of India inaugurated the then University of Jodhpur on 24th August, 1962. In his inaugural address the Hon'ble President revered Prof. Radha Krishnan desired and defined the goals and objective "That the young people, who will be educated in this university , will go forward not as prisoners of the past, but as pilgrims of the future; will develop in them a spirit of dedication, a spirit of renunciation, a spirit of whole-hearted, single-minded concentration on the advancement of the knowledge, whether in science or humanities."

This was the only residential University in the State of Rajasthan, catering mainly the needs of students of western Rajasthan (the Marwar). Since, this University is located in the great Indian Thar Desert, its R&D activities centered on heritage, society and challenges of the region. This is the Western most University of the country and imparts education and conducts research in border areas neighboring Pakistan. It is our endeavor to provide education not only to citizens of the Desert/border Districts but also to the wards of Defence/Paramilitary forces and other Organizations which are working in strategically important sectors of the country.

Jai Narain Vyas University is now a divisional university for western part of the Rajasthan State.

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**(6) NESA YOUNG SCIENTIST AWARD**

**AGE** : Up to 35. The recipients shall get Citation, Certificate, Memento and Medal.

**(7) NESA JUNIOR SCIENTIST AWARD**

**AGE** : Below 35. The recipients shall get Citation, Certificate, Memento and Medal.

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Separate application form should be submitted for separate awards. The application forms are non-transferable and it can also be obtained by sending a bank draft of Rs. 1000/- only (per form). Drawn in favour of National Environmental Science Academy payable at NEW DELHI.

**\*Please log on to  
our website for Guidelines.**

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The background features a dynamic composition of colorful, flowing ribbons and circles. The ribbons, in shades of pink, blue, green, and orange, curve and swirl across the frame. Interspersed among these are various sized circles in matching colors, some appearing as solid outlines and others as thin, multi-line patterns. The overall aesthetic is modern and energetic, set against a light, gradient background with subtle horizontal lines.

# Abstracts



**33rd Annual Function of NESA**  
National Virtual Conference  
on  
**TECHNO-SCIENTIFIC CHALLENGES AND  
SUSTAINABLE SOLUTIONS FOR LIVING BEINGS  
DURING CHANGING ENVIRONMENT (TCSE-2021)**  
**29-30, January, 2021**

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**OP**

**A COMPARATIVE STUDY OF EFFECT OF PESTICIDES ON ENZYME  
ACTIVITY OF EPIGEIC EARTHWORM *PERIONYX EXCAVATUS*  
UNDER LABORATORY AND FIELD CONDITIONS**

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**ABSTRACT**

The LC<sub>50</sub> values of four pesticides were recorded at 96 hours, under suitable laboratory and field conditions, on a non-target epigeic earthworm *Perionyx excavatus* in the natural garden soil as per OECD guidelines. The physiochemical parameters of the soil media, viz, pH and organic carbon content were measured and the temperature and moisture content were kept constant. Chronic effect of the pesticides on the enzyme activities of the earthworms were evaluated by carrying out biochemical assays of three enzymes, viz, acid phosphatase, alkaline phosphatase and acetylcholinesterase. In case of laboratory studies, activities of acid phosphatase and acetylcholinesterase were suppressed, while those of alkaline phosphatase were elevated by the two sublethal doses of pesticides, i.e. 25% of LC<sub>50</sub> and 50% of LC<sub>50</sub> values, irrespective of the types of pesticides tested. Maximum reduction in acid phosphatase activity was seen in case of the herbicide Pendimethalin. In case of alkaline phosphatase the organophosphate insecticide Dimethoate showed the maximum elevation in enzyme activity. And finally maximum inhibition in acetylcholinesterase activity was also detected in the herbicide Pendimethalin. In case of field studies, cypermethrin showed the maximum effects in all the three enzymes. From the above results it can be concluded that these enzymes can be used as potential biomarkers and also as ecotoxicological tools to detect pesticide pollution in agro ecosystems.

**OP**

**A NOVEL DERATING CONTROL AUGMENTED WITH  
PITCH CONTROL FOR PMSG BASED WIND TURBINES**

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**ABSTRACT**

Due to high-cost involvement in wind farms, the prime objective is to extract maximum power from renewable sources like wind turbines. Therefore, operators control wind turbines at an optimal rotor speed to extract maximum possible powers. However, generation-demand balance is always necessary to address frequency stability issues. With high penetrations, operating the wind generation systems at maximum power points will not serve the purpose of generation-load balancing. To address this challenge, a novel control strategy, derating control, is proposed in this paper. However, at higher wind speeds with lower power demands, the rotor need to operate at speeds beyond its maximum speed. For safe and desired set point power operation, this paper proposes a novel derating control augmented with pitch compensation control. The performance of the proposed controller is validated for a PMSG based wind generation system.

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**OP**

**AGROFORESTRY FOR SUSTAINABLE LIVELIHOOD**

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**ABSTRACT**

Modern agriculture cover a range of risks related to production, prices and markets, financial, institutional and social aspects that often are directly or indirectly associated with weather impacts. The land distribution and the usage pattern of land have caused a significant change in the structure of the agrarian organization. The increased pressure of population has resulted in shrinking size of holdings is making farming non-viable for the small peasants. Their problem is further complicated further by the increasing costs of production and the gap between the market which are making farmers increasingly at the mercy of market volatility. The non-viability of size of holdings has compelled peasants to undertake commercial crops that are characterized by market-led instability. The land market has gone in favour of the large owners. The socially deprived and marginal farmers are losing out the race because of none-affordable technology and non-viable agriculture. They are turning into landless labourers selling –off their land at throw away price. The impact of slowdown in agricultural yield growth along with lower employment opportunities outside agriculture has increased the dependence of small and marginal farmers and landless labourers on wage income in agriculture resulting in increased vulnerability of small and marginal farmers and agricultural labourers. Unproductivity of land, small land holding, lack of employment opportunities, man –animal conflictsetc has forced the people to migrate out of the villages in search of livelihood. In this context Agroforestry can play a very important role for providing a sustainable livelihood to the marginal and small farmers. The paper provides a glimpse of agroforestry interventions ,its impact on the livelihood of the people.

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**OP**

**AGRO-TECHNIQUES AND CONSERVATION OF SOME IMPORTANT  
MEDICINAL PLANTS OF INDIAN THAR DESERT**

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**ABSTRACT**

The Great Indian desert has been formed due to the absence of the monsoon, which is the prime contributor of rainfall throughout the country. Clear skies, extreme variations in temperature in summer, high evapo-transpiration rate, sandy soils, sparse vegetation, etc. are the characteristic features of this region. To make the matter worse, the rainfall is not only scanty but also highly variable and uncertain. A vast number of desert wild plants provide important medicines for the local traditional health systems. Plant-based medicines have been used by mankind since time immemorial. The lag phase for botanical medicine is now rapidly changing for a number of reasons. According to WHO, over 80% of the world population relies on the traditional systems of medicine, which are largely plant-based, in order to meet the primary health-care requirements. The effectiveness of these systems depends mainly upon the proper use and sustained availability of genuine raw materials. The large-scale production of medicinal plants has necessitated the availability of standards to ensure their quality, efficacy and safety. The unsustainable collection from the wild not only puts the species at the risk of extinction but also affects the quality of the medicines manufactured due to absence of standardization in the quality parameters of the raw material.

Agro-techniques or cultural practices developed on ecological principles help to manipulate agro-ecosystem to ensure: (i) the minimum intra- and inter-specific competition for resources, (ii) the maximum utilization of the available resource pool, (iii) optimum climatic conditions at each phenological stage, and (iv) favourable conditions for seed germination, root growth and development of storage organs. The agro-techniques aim at regulating physiological functioning of the plants by improving the nutrients, water, light and other inputs so as to provide optimum conditions to plants for expression of their genetic potential within the constraints of environment. However, developments of sound agro-techniques for plants that have traditionally been collected from forests have been a major challenge in promoting cultivation. The various reports suggest that 95% of raw material is obtained from wild resources, while only 5% belongs to cultivation resources. Many species have become extinct and many others, which are being used presently, are threatened or have become endangered. For the last few decades, the area under forest has been decreasing and there is a consistent increase in demand for medicinal plants. Domestic cultivation is a viable alternative and offers the opportunity to overcome problems that are inherent in herbal trades, i.e. misidentification, genetic and phenotypic variability, extract variability and instability, toxic components and contaminants. It is important to identify priority medicinal plants for conservation. After identifying the key species, appropriate agronomic techniques need be adopted, so as to ensure their cultivation, propagation and integration into farming systems.

The present article gives a general account on agro-techniques and conservation measures of some important desert medicinal plants of the Indian Thar desert. The important ones are: *Asparagus racemosus* Willd. [Shatawar, Asparagaceae], *Caralluma edulis* Edgew. [Pimpa, Apocynaceae], *Chlorophytum tuberosum* (Roxb.) Baker [Adak/Safed musali, Asparagaceae], *Commiphora wightii* (Arnott) Bhandari [Guggal, Burseraceae], *Convolvulus microphyllus* Sieb. ex Spreng. (syn. *C. pluricaulis* Choisy) [Shankhpushpi, Convolvulaceae], *Corbichonia decumbens* (Forssk.) Exell [Pather-chati, Lophiocarpaceae], *Curculigo orchioides* Gaertn. [Kali musali, Hypoxidaceae], *Evolvulus alsinoides* (Linn.) [Vishnukranta/Sankhaholi, Convolvulaceae], *Phyllanthus fraternus* Webster (syn. *P. niruri*) [Bhuiamalki, Euphorbiaceae], *Prosopis cineraria* (Linn.) Druce (Khejri, Mimosaceae), *Schweinfurthia papilionacea* Linn. [Sanipat, Scrophulariaceae], *Solanum virginianum* Burm. f. (syn. *S. surattense*) [Ringani, Solanaceae], *Withania coagulans* (Stocks) Dunal [Paneer-bandth; Solanaceae], *Tribulus rajasthanensis* Bhandari et Sharma [Gokshur, Zygophyllaceae], etc. Thus, it is concluded that the conservation of biodiversity in Indian desert is very essential to maintenance for sustainable utilization of the species as well as the desert ecosystem.

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**OP**

**AIR POLLUTION TOLERANCE OF SELECTED INDOOR HOUSEHOLD  
PLANTS IN DELHI-NCR**

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**ABSTRACT**

In habitants of urban cities bear the brunt of air pollution emanating from several indoor and outdoor sources such as power plants, vehicular emissions, industries, indoor appliances, building materials, heating, cooking, furniture etc. Modern lifestyle requires us to spend long hours in the indoor surroundings where the occupants might be exposed to various pollutants and face poor indoor air quality. Scientific research is currently focused on mitigation of air pollution and the ability of plants to remove toxic air pollutants has been well documented. Green infrastructure or green spaces comprising of green walls, vertical greenery systems, vegetation barriers etc. can help in limiting the effect of air pollution within built structures. On similar lines, indoor plants can be good candidates for removal of air pollutants such as oxides of nitrogen and sulphur, dust particles etc. along with providing psychological push through, mood lifting and enhanced alertness for the occupants. However, real life studies pertaining to the role of common houseplants in the indoor set ups is very limited. The present study includes assessing the behavior of selected indoor plants (*Ficus elastica* and *Schefflera arboricola*) by calculating their air pollution tolerance index (APTI) at two indoor sites with unique characteristics of their own located in Delhi-NCR. The APTI values ranged 8.5 – 9.5 (*Schefflera arboricola*) and 9.5 - 10.1 (*Ficus elastica*). On the basis of the estimated APTI values, the sensitive species can be used as bioindicators and tolerant species can be used as sink for air pollution mitigation.

**OP**

**ALGAL BIOREFINERY: AN INTEGRATED APPROACH FOR PRODUCTION  
OF BIOENERGY AND OTHER VALUE-ADDED PRODUCTS FROM  
SCENEDESMUS SP. USING WASTEWATER AND BY SEQUESTERING CO<sub>2</sub>.**

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**ABSTRACT**

Microalgae are wonder organism which can fulfill all the requirements of current century. Ubiquity is the main reason for the versatile metabolic properties and adaptation of algae. It could use several substrate as carbon source including different wastewater. Thereby, it plays an important role in bioremediation. Green algae *Scenedesmus* sp. was found to be potential candidate to treat sewage. It could improvedissolved oxygen (DO) concentration more than six times and reduce COD, BOD, TDS as well as heavy metal concentration. It could able to sequester up to 10% CO<sub>2</sub> concentration from flue gas. Parallely, green algae are the source of different bioenergy and value-added products. *Scenedesmus* sp. was produce 17.72% v/v H<sub>2</sub> of total gases in sulfur deprived condition (anaerobic condition). Fatty acid profile of the lipid extracted from it showed abundance of fatty acids with carbon chain length of C16 and C18 required for biodiesel production. Various biodiesel properties such as cetane number, iodine value and saponification value were found to be in accordance with National Petroleum Agency (ANP255) and European biodiesel standard EN14214. GC-MS based metabolic profile of it showed the presence of many commercially important compounds such as palmitic acid, oleic acid, D-Mannitol, methyl palmitate, phytol, oleate, sucrose and D-(+)-Turanose etc. These multiple facets of *Scenedesmus* sp. could establish it as a most promising organism in sustainable algal biorefinery.



OP

**ALPINE CUSHION PLANTS IN AN ERA OF CLIMATE CHANGE:  
A CASE STUDY OF BERBERIS JAESCHKEANA IN THE HIGH-  
ALTITUDE HIMALAYA**

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**ABSTRACT**

The cushion plants constitute an ecologically important component of alpine vegetation in the high-altitude Himalaya. Growing beyond the treeline, the dwarf cushion-forming shrubs perform the role of soil-binder and act as ecosystem engineers on steep mountain slopes. These shrubs provide suitable habitats for the growth of endemic alpine plants and thus also act as conservation micro-refugia. In an era of climate change, the alpine plants are reported to experience upslope migration. This is particularly concerning for the alpine cushion plants for which there may not be sufficient suitable habitats available at higher altitudes to facilitate their upslope migration. The present study reports a case study of *Berberis jaeschkeana* - a cushion-forming alpine shrub, which occurs at an altitude ranging from 3000-4500 m across the Himalaya. Using ensemble modeling approach, the present study has mapped the current and future distribution of *Berberis jaeschkeana* in the Himalaya. The results indicated an expansion of climatic suitability of *Berberis jaeschkeana* towards much higher altitudes into the areas that are currently unsuitable and on the other hand, several currently suitable areas may become climatically low or unsuitable in the future. Currently, the total climatically suitable area for this species is 382912 km<sup>2</sup>, with an additional area becoming suitable under RCP 2.6 and RCP 8.5. Hopefully, the research insights gained from the present study will help in understanding the impending impacts of climate change on alpine vegetation in the Himalaya with wide implications for scientifically-informed adaptation and mitigation strategies.

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**OP**

**ANTHROPOGENIC PERTURBATION OF THE ATMOSPHERIC CARBON  
AND NITROGEN IN INDO-GANGETIC PLAIN (IGP)**

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**ABSTRACT**

Industrialization and urbanization have significantly altered the atmospheric composition due to larger emissions of CO, CO<sub>2</sub>, soot, NO<sub>x</sub>, NH<sub>3</sub> etc. from a variety of sources such as fossil fuel combustion, biomass burning, synthetic fertilizers, etc. in last three decades. This change in atmosphere has adversely impacted various phenomenon such as monsoon, radiative forcing, visibility, climate and biogeochemical cycle. Consequently, there has been a spurt in scientific investigations into the many facets of the multifold human alterations in the carbon (C) cycle and nitrogen (N) cycle in recent times. In order to assess the anthropogenic influence, I have studied enrichment of urban atmospheric dust in respect of crustal dust. Carbon content was found to be five to nine times higher in urban dust owing to anthropogenic emissions. Furthermore, based on different land use pattern in IGP region and characteristics ratio, carbonaceous aerosols (OC and EC) was found to be highly influenced from local anthropogenic sources such as biomass and fossil fuel combustion. Likewise, spatiotemporal variation and deposition fluxes of atmospheric reactive nitrogen (Nr) was also studied at the selected sites. Significant variation in Nr was found to be associated with the varying local emission sources ranging from microbial emission from improper sewage treatment and open waste dumping to agricultural activities and vehicular exhausts. Long range transport of atmospheric aerosols was also analyzed to understand the influence of the transported air mass. My study provides some of the key quantitative information to support regional carbon and nitrogen budget estimation in south Asia.

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**OP**

**ANTIMICROBIAL ACTIVITIES OF SOME MEDICINAL PLANTS OF  
KASHMIR HIMALAYA AS BIORESOURCES TO OVERCOME THE  
CHALLENGES OF ANTIBIOTIC RESISTANCE**

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**ABSTRACT**

Through the realization of the continuous erosion of traditional knowledge of plants used for medicine in the past and the renewed interest at the present time, a need existed to review this valuable knowledge of medicinal plants with the purpose of developing medicinal plants sectors across the different states in India. Our major objectives therefore were to explore the potential in medicinal plants resources, to understand the challenges and opportunities with the medicinal plants sector, and also to suggest recommendations based upon the present state of knowledge for the establishment and smooth functioning of the medicinal plants sector along with improving the living standards of the underprivileged communities. The review reveals that State of Kashmir harbours a rich diversity of valuable medicinal plants, and attempts are being made at different levels for sustainable utilization of this resource in order to develop the medicinal plants sector. Antimicrobial activity refers to the process of killing or inhibiting the growth of microbes. Various antimicrobial agents are used for this purpose. Antimicrobial may be anti-bacterial, anti-fungal or antiviral. Antimicrobial activity can be defined as a collective term for all active principles (agents) that inhibit the growth of bacteria, prevent the formation of microbial colonies, and may destroy microorganisms. In the field of antimicrobial finish, many common terms are used including antibacterial, bactericidal, bacteriostatic, fungicidal, fungistatic, biocidal, and biostatic. Antimicrobial activity refers to a situation where an active agent has a negative effect on the vitality of microorganisms. In present study we studied Antimicrobial Activities of Some Medicinal Plants of Kashmir Himalaya

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**OP**

**APHANOMYCES, A PATHOGENIC FUNGUS OF SOME FRESH WATER  
FISHES OF LAKHIMPUR-KHERI DISTRICT (U.P.) INDIA.**

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**ABSTRACT**

Fungal infections in fresh water fishes are prevalent and leading to number of diseases causing a great loss in fish farming. Present work was carried out during April 2017 to December 2017 to find out the fungal infections caused by *Aphanomyces* sp. in seven edible fresh water fishes viz: *Clariusbatrachus*, *Labeorohita*, *Cirrhinusmrigala*, *Catlacatla*, *Channa striatus*, *Mystusseenghala*, *Heteropneustus* of Lakhimpur-Kheri District of Uttar Pradesh. The samples of fresh water fishes were collected from different fish markets and water bodies of LakhimpurKheri District. The fish samples were collected from different culture ponds of Behjam, Nakhar, Khamaria-lalpur, Nighasan, Khutar, Kumbhi, Katarniaghat and Lakhimpur. The fish eggs were collected from local fish farms. The dead fish-samples were collected from the markets of above localities. Out of 235 fishes examined, a total 14 were found to be infected by *Aphanomyces*. The virulence nature of the fungus was studied by conducting experimental infections under laboratory conditions and found to be pathogenic resulting in a significant mortality rate.

**OP**

**ASSESSMENT OF ANTIOXIDANT, ANTIMICROBIAL POTENTIAL,  
FOURIER TRANSFORM INFRARED SPECTROSCOPY (FTIR) AND AN IN  
SILICO ANALYSIS OF THESPESIA LAMPAS ROOT EXTRACTS**

**Nitesh Singh<sup>1</sup>, Aadil Mansoori<sup>1</sup>, Gitanjali Jiwani<sup>2</sup>,  
Amolkumar U. Solanke<sup>2</sup>, Rakesh Kumar<sup>3</sup>, Anirudh Kumar<sup>1\*</sup>**

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**ABSTRACT**

Thespesia spp. have been used as medicinal plants for centuries to cure diseases all over the world. The compounds present in this are responsible for antimicrobial activities. But limited information was available about its activity against phytopathogens. In this study, we examined the methanol and chloroform extracts of Thespesia lampas root for the total phenolic content (TPC), total flavonoid content (TFC), antioxidant properties and antibacterial activities against three plant pathogen Magnaporthe oryzae (fungi) and Xanthomonas axonopodis pv. glycines (Xag) and Xanthomonas oryzae pv. oryzae (Xoo). These microorganism causes devastating yield losses in crops. Our study suggested methanol extract as a better solvent over chloroform for examination of TPC, TFC and antioxidants. Phytochemical screening of root extract was also performed, wherein presence of alkaloids, tannins, saponins, flavonoids, terpenoids, steroid, polyphenols were confirmed. FTIR analysis of crude extract was carried out to find out types of chemical bonds/functional groups in the extract. Different functional group such as C-H, C-O, C=O, C-N, C=C, O-H, N-H were detected, suggesting the existence of various metabolites in the root extracts apart from phenolics, flavonoids and antioxidants. Antimicrobial effect of extract against Magnaporthe oryzae (fungi) and Xanthomonas axonopodis pv. glycines (Xag) and Xanthomonas oryzae pv. oryzae (Xoo) was confirmed. Furthermore, in silico antimicrobial studies confirmed the inhibition activity of Thespesia lampas against phytopathogens protein like Mitogen-Activated Protein Kinase (MAPK1) (PDB ID-5Z33) of M. oryzae, Peptide deformylase (PDF) (PDB ID-6IL0) of Xoo and sucrose hydrolase (SUH)-glucose complex (PDB ID 3CZG) of Xag. In silico toxicity studies were done for its toxicity evaluation and their safe environmental disposal. Molecular study further revealed that Copaene and Squalene phytochemicals could inhibit the growth. Thus, T. lampas can be an important ingredient in pharmaceutical preparations and agricultural formulations against various plant diseases.

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**OP**

**ARTIFICIAL INTELLIGENCE FOR COMBATING CLIMATE  
CHANGE IN AGRICULTURE**

**Shashi Dahiya**

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New Delhi

**ABSTRACT**

The world's population is growing, but the amount of farmland available per head is shrinking. Agricultural productivity will have to increase if we want to safe-guard our food supply in the long term. A growing global population and changing diets are driving up the demand for food. Production is not up to the mark as the crop yields are decreasing in many parts of the world and the natural resources like soil, water and biodiversity are also getting dangerously thin. Climate change's negative impacts are already being felt, in the form of reduced yields and more frequent extreme weather events, affecting crop production extremely. Substantial investments in adaptation will be required to maintain current yields and to achieve the required production increases. The food security challenge will only become more difficult, as the world will need to produce about 70 percent more food by 2050 to feed an estimated 9 billion people. The challenge is intensified by agriculture's extreme vulnerability to climate change. Agriculture is also a major part of the climate problem. It currently generates ~1929% of total GHG emissions. Without action, that percentage could rise substantially as other sectors reduce their emissions. The climate change trends have created opportunities for Artificial Intelligence to advance the state-of-the-art in climate prediction. A huge amount of climate observation data is being generated by satellites and simulated climate data is being generated by big climate modeling projects. This data can be used for climate forecasts and building early forewarning, risk insurance models and other innovations that promote resilience and combat climate change using the machine learning techniques. These techniques are appropriate as they are increasingly fast to train and run, especially on next-generation computing hardware. As a result, climate scientists have started to explore artificial intelligence techniques, and are starting to team up with computer scientists to build new and exciting applications.

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**OP**

**BATTERY OPERATED ELECTRIC WEEDING MACHINE FOR  
SUSTAINABLE AGRICULTURE**

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and Ajay Kumar Sharma**

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**ABSTRACT**

Weed management is the important aspects in the present agricultural production system. The traditional weeding operation takes away one-third of the total cost of crop production. The manual method of weed control is effective but the scarcity of labour during the peak-season and delay in weeding operation ultimately reduces the crop yield. The uses of chemical herbicides over a period of time leads to the environmental pollution. The mechanical weeding is preferred over chemical use because of herbicides are expensive and hazardous to the environment. The available engine-operated mechanical weeders have some limitations which increase drudgery to the operator due to exposure to high levels of vibration. Hence, complexity of these situations has resulted to switch over to an electric-drive system to meet the requirements of sustainable agriculture. A battery-operated electric drive weeding machine has been developed at the Department of Machinery & Power Engineering, College of Technology and Engineering, MPUAT, Udaipur. The weeder has an electro-mechanical approach such as application of battery and DC motor as a power source and weeding tool to complete the operation with less drudgery and higher efficiency. The developed weeder operated at the forward speed of 2-3 km/h. The average weeding efficiency, percent plant damage, field capacity, and field efficiency of the machine were found 91.40 %, 2.5 %, 0.051 ha/h, and 93.5%, respectively. The average power consumption of the weeder under load and no-load condition was observed 185 W and 65 W. The minimum man-hour required for weeding was observed 20 man-h/ha. The developed weeder was found eco-friendly to the small-scale farmers

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**OP**

**BIODIVERSITY: UNDERSTANDING VALUES, THREATS  
AND CONSERVATION**

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**ABSTRACT**

For much of the time man lived in a hunter-gather society and thus depended entirely on biodiversity for sustenance. But, with the increased dependence on agriculture and industrialization, the emphasis on biodiversity has decreased. Indeed, the biodiversity, in wild and domesticated forms, is the source for most of humanity, food, medicine, clothing and housing, much of the cultural diversity and most of the intellectual and spiritual inspiration. It is, without doubt, the very basis of life. Further that, a quarter of the earth's total biological diversity amounting to 1.7 million species, which might be useful to mankind in one way or other, would be in serious risk of existence over the next 2-3 decades. On realization that the erosion of biodiversity may threaten the very existence of life has awakened man to take steps to conserve it. Biodiversity Conservation emerges more important due to the globalize process of the world economy and also for survival of the world as a balance habitat. Biodiversity of an eco system is a vital issue of an economy. Soil, water, climatic condition, forest cover and biodiversity are crucial in determining the renewable resource flow of an economy. In this paper, the overview of biodiversity status of India, its importance, threats to it and various approaches for biodiversity conservation have been discussed.



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**OP**  
**BIOREMEDIATION OF HEAVY METALS BY MICROORGANISMS**

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D.K.M. College for women (Autonomous), Vellore, Tamil Nadu, India

**ABSTRACT**

The untreated tannery wastewater which contains biotoxic substances of heavy metals are discharged in the ecosystem. It is one of the greatest threats to the environment particularly for human being. It is directly and indirectly affecting the human health and the nature cycle of the earth. So, it is the time to concentrate on the need for the development of novel, efficient, eco-friendly, and cost-effective approach for the bioremediation of these metals released into the environment and to safeguard the ecosystem. Microorganisms in the environment have modified itself to detoxify these pollutants. But additionally technological improvisation paves a new approach to reduce heavy metal pollution. Microbial-metal interactions are primarily focused on metals removal, i.e., bioremediation. The application of microorganisms as a green approach for the synthesis of metallic nanoparticles (NPs) has been reported. Biofilm mediated bioremediation can be applied for cleaning up of heavy metal contaminated environment. Genetically modified microorganisms have also been used as a remediation technique. Genetic engineering and chemical modification could alter the components of cells surface and can efficiently improve the adsorption capacity and selectivity to target-metal species. This present research work is to identify, characterize and to evaluate bioremediation of heavy metals by microorganisms, especially to satisfy the mankind and also ways towards environmental protection. Studies showed that wide varieties of microbes are involved in degradation of toxic substances. The aim of the study is to identify, isolate, characterize and improvise microbial isolates from natural environment to degrade heavy metals which will reduce the pollution in the environment.

**OP**

**BIOREMEDIATION –AN EFFECTIVE TOOL FOR TEXTILE  
EFFLUENT**

**Pooja Jain<sup>1\*</sup>, Sutaria Devanshi<sup>1</sup>,  
and Sonika Saxena<sup>1</sup>**

<sup>1</sup>Dr. B. Lal Institute of Biotechnology, Jaipur

**ABSTRACT**

With the increasing demand for textile products, the waste waters generated from these industries have also increased. Though textile industries have a contribution to the development of the global economy, water pollution by textile effluents is one of the major concerning issues over the world. The textile dye industries produces extensive amount of waste which is contaminated by dyes like reactive dyes, many types of aerosols, toxic chemicals such as dispersants, levelling agents, acids, alkalis, carriers and various dyes and other non-degradable waste materials. These compounds can be toxic, mutagenic and carcinogenic. Effluent can alter the physicochemical parameter such as odour, temperature, pH, total solids, total dissolved solids, total suspended solids, total hardness, BOD, COD, calcium, magnesium and chlorine of receiving water. Several methods were used to treat textile effluents, which include physico-chemical methods, such as filtration, coagulation, activated carbon and chemical flocculation. These methods are expensive and create a secondary disposal problem where as bioremediation is an environment friendly and cost competitive alternative to chemical treatment. Bioremediation can decolourize and normalize physicochemical parameters, such as odour, temperature, pH, total solids, total dissolved solids, total suspended solids, total hardness, BOD, COD, calcium, magnesium and chlorine of textile dye effluent. Microbial consortia of waste water can be use for environmental remediation to degrade variety of pollutants. This technology will leads to sustainable development for coming years.

**OP**

**BREEDING FOR LOW PHYTIC ACID LINES IN  
MAIZE (ZEA MAYS L.)**

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2: Professor, Biotechnology, Department of Plant Biotechnology, CPMB & B, TNAU Coimbatore

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**ABSTRACT**

Phytic acid is a ubiquitous component present in all the crops and in maize its presence in embryo hinders the bioavailability of nutrients. Phytic acid is anionic in nature and it has the ability to chelate all the nutrients in food, when consumed as a whole grain in monogastric animals. However, it has beneficial roles in plant growth as an antioxidant and regulator in several metabolic pathways (Raboy et al.2001). Identification of three mutants in maize viz., lpa-1, lpa-2 and lpa-3 for low phytic acid (lpa) were successful in reducing the phytate content as compared to wild by 60%, 30% and 30% respectively. Whereas, the yield and phenotypic expression of these mutants were very poor due to the drastic reduction of phytic acid in them. Developing low phytic acid varietal lines in barley was successful as their lpa homozygotes were viable but in maize the lpa homozygotes are lethal. This stated the essentiality of this component in maize for attaining a higher yield. The correlation studies of phytic acid with yield and yield attributing traits revealed a positive correlation of phytic acid with yield and seed size (Pramitha et al.2019). Breeding methods incorporating the hybridization of lpa introgressed elite parents would be an alternate strategy to overcome the negative pleiotropic effects of lowering phytic acid in maize. Following this, several marker assisted back cross programs have been performed by Tamil kumar et al.2014 and Senthil kumar et al.2014 for lpa-2. These introgressed elite lpa lines could be used as female parents in hybridization programs to attain low phytic acid hybrids in future.

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**OP**

**COMPARATIVE PROTEOMICS STUDY IN CHICKPEA ROOT UNDER DROUGHT  
-STRESS REVEALED COMPLEXITY OF PROTEIN ABUNDANCE**

**Lalit Agrawal<sup>1,2</sup>, Swati Gupta<sup>1</sup> and Puneet Singh Chauhan<sup>1</sup>**

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**ABSTRACT**

Global warming has been reaching to an alarming situation and leading to change in climatic condition up to a dangerous level. The irregular rainfalls, drought, flood and land degradation and other such factors are the major consequences of these climatic changes and causing a decrease in the productivity of many economically important food crops. To study the effect of drought and the mechanism of drought stress tolerance, a comparative proteomic analysis of roots of the hydroponically grown three week old chickpea seedling was performed at different time points after drought induction using 2-Dimensional gel electrophoresis (2-DE). After PD-Quest analysis 110 differentially expressed spots were subjected to MALDI-TOF/TOF and among them 75 spots were identified with a significant score. These identified proteins were classified into eight categories based on their functional annotation. Proteins involved in carbon and energy metabolism comprised 23% of the total identified proteins whereas proteins related to stress response represented 16% of the total protein spots followed by those involved in protein metabolism (13%), ROS metabolism (13%), signal transduction (9%), Secondary metabolism (5%) and N and amino acid metabolism (7%). The abundance of some proteins was validated using western blotting and Real Time PCR. The information for root proteins responsible for better drought tolerance, inferred by comparative proteomics analysis, may further be used in genetic engineering as well as breeding programs for the benefit of farmers practicing chickpea.

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**OP**

**CORONAVIRUS AND IMPACT ON ENVIRONMENTAL CONDITIONS  
IN INDIA**

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Department of studies and Research in Geography  
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**ABSTRACT**

In a short time of coronavirus has fetched a dramatic diminution in industries, road traffic, hotels and tourism industry etc. Controlled social interaction with nature during this period of time has appeared as a consecration for nature and environment. From the reports of various sources all over the world are indicating that after the outbreak of pandemic disease environmental conditions including air quality and water quality in water sources areas are improving and wildlife is blooming. Quality of air has started to improve and all other environmental parameters such as water quality in rivers have started giving a positive sign towards restoring. In this attempt evidence-based insight into improvement environment during pre and post lockdown of this pandemic situation in India.

**OP**

**DECIPHERING THE PORCINE RESPIRATORY AND REPRODUCTIVE  
SYNDROME VIRUS (PRRSV) INTERACTION SITE AT  
PORCINE CD163 RECEPTOR**

**Rajib Deb\*, Indra Singh a, Ajay Kumar Yadav,  
Seema Rani Pegu, Swaraj Rajkhowa**

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**ABSTRACT**

Porcine reproductive and respiratory syndrome (PRRS) is one of the important economically devastating diseases distressing the global pork industry. PRRS is caused by an enveloped, positive-sense, single-stranded RNA virus of the Arterivirus genus within the order Nidovirales . PRRSV infection causes severe reproductive failure in sows and respiratory disease in piglets. PRRSV infection arises largely through porcine alveolar macrophages (PAMs) in the lung. CD163, a macrophage-specific membrane scavenger receptor, is known to be the key receptor protein for PRRSV infection in swine. In the present study we identified the PRRSV (Indian isolates from NE region, India) docked site at porcine CD163 host receptor. It was observed that exon 7 of porcine CD163 host receptor can interact with glycoprotein 4 (GP4) (which complexed with glycoprotein 2a/GP2a) of PRRSV. Further, the docked nucleotide sequence was amplified from different Indian Pig breeds viz. Ghungroo, Mali, NyangMegha and Large White Yorkshire. Sequencing of the amplified products from the representative breeds revealed that, Large White Yorkshire exhibit SNP (CA genotype) at 74th nucleotide position, while all the indigenous breeds having CC genotypes. This study may reflect the variation in the susceptibility of PRRS infection among native vs exotic pig breeds.

**OP**

**EXPERT SYSTEM SHELL FOR DEVELOPING MULTI CROP  
EXPERT SYSTEMS ON CEREALS**

**S.N. Islam**

Scientist Division of Computer Applications

**ABSTRACT**

Expert Systems are the AI based application may help in this area to a larger extent that has not been utilized to the extent it should have been. Agriculture being a very vast area of application and management, there is a scope of developing expert systems in its various domains, however developing them again and again from initial stage is a difficult task. Expert System shell can be the right approach for developing multiple expert systems on various crops will be a valued contribution to our farmers. There is a wide scope of developing expert systems in multiple aspects of agriculture helping famers in selection of right variety, adopting right agronomic practices and protecting the crop from disease and insects on various crops. These shells may be utilized for developing expert systems on multiple crops ranging from cereals, pulses, horticultural crops and so on. To initiate with developing a framework for Expert System shell for cereals has been developed. This shell will be helpful in developing expert systems on cereals which may be worthy being it a staple food in India. It comprises of around 20 cereals that have a place in the food basket in most part of the world. Most of the cereals have similar production technology and some common identical traits mentioned in their DUS characteristics which may be utilized during the development process. Cereals are the edible grains or seeds that come from the grass family, Gramineae (Bender & Bender 1999). They are one of the important sources of carbohydrate, energy, protein, vitamins and minerals grown on 60% of the world cultivated area. Cereals are used as staple foods for human consumption and is consumed by them indirectly via livestock feed. Cereals are staple food in developing countries because of its affordable price. They are easy to grow and store without any deterioration in dry conditions. Major cereals crops are Rice, Maize, Wheat and Millets. Developing Expert System for each cereal is difficult and time consuming. Expert System shell for the cereal crops will minimize the effort for making expert system on multi crop cereals. The shell uses the same inference engine for all cereals and connects to the specific database on runtime.

**OP**

**ETHYLENE IN COORDINATION WITH NITROGEN IMPROVES  
TOLERANCE TO COPPER TOXICITY AND PROTECTS  
PHOTOSYNTHETIC APPARATUS BY REDUCING OXIDATIVE STRESS  
AND IMPROVING EFFICIENCY OF ASCORBATE-GLUTATHIONE  
CYCLE IN MUSTARD**

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**ABSTRACT**

This study aimed to test the efficiency of ethylene (Eth; 200  $\mu$ L L<sup>-1</sup>ethephon) in presence or absence of nitrogen (N; 80 mg N kg<sup>-1</sup> soil) in protecting photosynthetic apparatus from copper (Cu) toxicity in mustard (*Brassica juncea* L.) and find mechanisms for ethylene plus N-induced Cu (100 mg Cu kg<sup>-1</sup> soil) tolerance. Elevated Cu-accrued reductions in photosynthesis and growth were accompanied significantly by higher Cu-accumulation in leaves and oxidative stress with reduced N assimilation. Ethylene in coordination with N considerably reduced oxidative stress by improving the efficiency of ascorbate-glutathione cycle, and improved photosynthesis and growth. The impact of N in the agricultural practice may be strengthened with supplementation of ethylene may emerge as a potential tool for reversing Cu toxicity and protection of photosynthetic apparatus.



**OP**

**FERMENTED FOODS OF NORTH EAST INDIA AS A POTENTIAL  
SOURCE OF BIOACTIVE PEPTIDES – PRODUCTION AND  
FUNCTIONALITY**

**Amit Kumar Rai**

<sup>1</sup>Institute of Bioresources and Sustainable Development,  
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**ABSTRACT**

The richness and diversity of fermented food is chiefly observed in many Asian countries and North Eastern part of India. The microbial environment of fermented foods decides the functionality of the product. The protein rich fermented foods are potential source of wide range of biologically active peptides depending on the raw material and starter culture used for fermentation. The major protein rich fermented foods include fermented soybean, fermented milk and fermented fish products. These foods are naturally fermented using starter cultures including Bacillus species, lactic acid bacteria (LAB), yeasts and filamentous fungi. Fermentation by individual starter culture (at strain level) results in unique products by a series of enzymatic hydrolysis, leading to production of a diversity of bioactive molecules responsible for health benefit. Bioactive peptides in protein rich fermented foods have been reported for exhibiting antihypertensive, antioxidant, immunomodulatory, antibacterial and anticancer properties. Fermented foods of North East India can be explored for production of novel bioactive peptide with specific health benefits.

**OP**

**FORECASTING SUB-DIVISIONAL RAINFALL IN INDIA USING  
WAVELETS AND MACHINE LEARNING APPROACH**

**Ranjit Kumar Paul, A K Paul and L M Bhar**

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New Delhi

**ABSTRACT**

Agricultural performance of a country, generally, depends to a large extent on the quantum and distribution of rainfall. So it's accurate forecasting is vital for planning and policy purposes. An understanding of the spatial and temporal distribution and changing patterns in climatic variables is important for planning and management of natural resources. Time series analysis of climate data can be a very valuable tool to investigate its variability pattern and, maybe, even to predict short and long-term changes in the time series. In this study, the sub-divisional rainfall data of India during the period 1871 to 2016 has been investigated. One of the widely used powerful nonparametric techniques namely wavelet analysis was used to decompose and de-noise the series into time–frequency component in order to study the local as well as global variation over different scales and time epochs. Moreover, the feature of rainfall in a location may not be always linear so that it can be modelled through the classical Autoregressive Integrated Moving Average (ARIMA) model. To accommodate the pattern of nonlinearity and complexity, decomposition of the series under consideration is required. When the original series has much nonlinearity as its property, the MODWT simplifies it by breaking it into its sub-frequencies. On the decomposed series, ARIMA as well as Artificial Neural Network (ANN) model is applied and by means of inverse wavelet transform, the prediction of rainfall for different sub-divisions have been obtained. Empirical comparison was also carried out toward forecast performance of the approaches namely Wavelet-ANN, Wavelet-ARIMA and ARIMA. It is reported that Wavelet-ANN and Wavelet-ARIMA approach out performs the usual ARIMA model for forecasting of rainfall for the data under consideration.

**OP**

**GLOBAL RESPIRATORY ILLNESS OUTBREAK COVID-19 AND  
ITS GLOBAL CONSEQUENCES: AN OVERVIEW**

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**ABSTRACT**

Global Respiratory illness outbreak COVID-19 is a new public health crisis threatening humanity across the globe with the emergence and spread from central China in late 2019. The virus originated around Wuhan, Hubei province, China in December 2019 in bats and was transmitted through unknown intermediary sources to humans. The clinical presentation of viral infection ranges from asymptomatic to severe pneumonia with acute pulmonary distress syndrome is designated as COVID-19. WHO has characterized the disease as a pandemic due to its severity, as well as the shifting of epidemic zones across the globe from epicentre zone, China through a different stage of transmission by contact or inhalation with infected droplets and the incubation period, varies between 2 - 14 days. Treatment is essentially supportive; the effective role of antiviral agents is yet to be established and secondly without knowing the entire genome sequence of COVID-19, no drug or vaccine can be effectively administered. Prevention entails home isolation of suspected cases and those with mild illnesses and strict infection control measures at hospitals that include contact and droplet precautions. The highest risk of healthcare-associated transmission is in the absence of standard precautions, when basic infection prevention and control measures for respiratory infections are not in place, and when handling patients where COVID infection is yet to be confirmed. The pandemic acceleration of COVID-19 indicates that the initial sporadic spreading worst hit the epicentre, China. But later on, epidemic zone shifts to nearly all continents. Several countries are experiencing sustained local transmission, including Europe and America at the end of February 2020. Current status indicates that confirmed and death cases pattern is rapidly varied among the different continents and emerged as an alarming health crisis of the Era in countries like Italy, Spain, U.K, Iran, and the USA. Although India is now in the 2nd stage of transmission and too far from the 3rd stage but till government has already taken deceive control measures. At the same time some of the Asian countries like South Korea, Japan has been reporting a slowdown in the growth of COVID-19 cases due to adoption concept of "Testing is central" to outbreak response that leads to early detection to minimizes further spread. The proportion of asymptomatic cases is currently unknown and hampers the realistic assessment of the virus epidemic potential and complicates the outbreak response. WHO has already announced a large global trial, called SOLIDARITY on 27th March 2020 which is focusing on the most promising panacea therapies including remdesivir; chloroquine and hydroxychloroquine; a combination of two HIV drugs, lopinavir, and ritonavir; and that same combination plus interferon-beta. The coronavirus (COVID-19) outbreak has already brought considerable human suffering and major economic disruption. In the current scenario, the exact global impact and extension of COVID 19 pandemic acceleration and reoccurrences of 2nd and 3rd waves are yet uncertain in globally. Therefore the corona pandemic is unprecedented in its global impact and reach, posing alarming challenges to policymakers, researchers and health workers.

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**OP**

**GREEN SYNTHESIS OF NANOPARTICLES AND THEIR USE  
IN WASTE WATER TREATMENT**

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**ABSTRACT**

The conventional methods of synthesizing inorganic nanoparticles based on physical and/or chemical methods are not eco-friendly as they involve toxic chemicals as capping, reducing or stabilizing agents. Further, the procedures are complicated and costly. Hence, an important aspect of this research work is syntheses of nanoparticles by biological methods specially using the extracts of plants. The rich flora naturally contains some compounds that may serve as capping/reducing/stabilizing agents by virtue of good content of functional groups. The present work aimed at:

1. to prepare nanoparticles of some chosen metal or their oxides using green methods
2. to investigate the applicability of these nanoparticles in removing the pollutants from waste waters by adopting batch and continuous modes of extraction.

These green synthesized nanomaterials are found to be more effective and biocompatible than the conventionally synthesized materials. The inherent disadvantage of using nanoparticles-bed as adsorbent for continuous extractions is overcome by immobilizing the nanoparticles in the films or beads. Metal-alginate beads doped with nanoparticles are investigated as efficient adsorbents in the waste water treatment. The beads facilitate the easy filtration and improve the adsorption capacity. This is due to the functional groups pertaining the alginate are having high affinity for adsorbate.

The adsorbents obtained are characterized by using some surface morphological techniques such as SEM, EDX, XRD, FTIR etc. The adsorption nature of nanoparticle towards various pollutants is investigated with respect to various physicochemical parameters like pH, adsorbent dosage, agitation time, temperature and initial concentration of the pollutant using simulated waters and the conditions are optimized for the maximum extraction of the pollutants. The effect of co-ions is also studied. The experimental data is analyzed using adsorption isotherms, kinetic models and the thermodynamic parameters. Further, the methodologies developed are applied to the real polluted waters both by batch methods and continuous flow methods.

**OP**

**HEPATOPROTECTIVE ACTIVITY OF (-)-EPICATECHIN: STUDIES  
ON HEPATIC, OXIDATIVE STRESS AND INFLAMMATORY  
BIOMARKERS**

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**ABSTRACT**

**Background:** The liver performs numerous functions that are vital for life. In the absence of reliable hepatoprotective drugs, a large number of plant based therapeutic agents are used for the treatment of liver diseases. Therefore the present study aims to investigate the hepatoprotective effects of (-)-epicatechin (flavonol) against D-Galactosamine hydrochloride (D-GalN)-induced liver toxicity.

**Methods:** Rats were divided into 5 groups of 6 animals each. Group I served as the normal healthy control, group II rats were (-)-epicatechin positive control (50 mg/kg daily), group III rats were intoxicated with single injection of D-GalNi.p. (800 mg/kg body weight), group IV rats received D-GalNi.p. and (-)-epicatechin orally (50 mg/kg b/w) and group V rats received D-GalNi.p. and Silymarin orally (100 mg/kg b/w) for 21 days. The hepatoprotective potential of (-)-epicatechin in rats was evaluated by measuring the gene expression levels of three inflammatory biomarkers; Tumor necrosis factor-alpha (TNF- $\alpha$ ), Transforming growth factor-beta (TGF- $\beta$ ) and Interleukin-6 (IL-6) in addition to other liver biomarkers. Histopathological changes in the liver were assessed using hematoxylin and eosin staining (HE).

**Results:** The administration of (-)-epicatechin showed hepatic protection at an oral dose of 50 mg/kg b.w. (-)-epicatechin significantly reduced the elevated serum levels of intracellular liver enzymes as well as liver biomarkers in comparison to D-GalN-intoxicated group. Notably, (-)-epicatechin significantly reduced the expression levels of TNF- $\alpha$ , TGF- $\beta$  and IL-6 compared to their levels in D-GalN intoxicated group. These findings were confirmed with the histopathological observations, where (-)-epicatechin was capable of reversing the toxic effects of D-GalN on liver cells compared to that observed in D-GalN-intoxicated animals.

**OP**

**HUMAN SEMEN PREPARATION DURING IN VITRO  
FERTILIZATION BY TWO DENSITY GRADIENT METHODS**

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**ABSTRACT**

Human infertility is increasing at a very fast pace and now has become a universal phenomenon affecting about 8-15% couples. In India, during last few decades there is increase of 30-50% infertility cases. Reasons are many, among them; the poor quality of male semen is the major cause of infertility. Patients demanding treatment through test-tube baby, success mostly rely upon the quality of ejaculate and its preparation for in vitro fertilization (IVF). Therefore, this study compared two commonly used methods for semen preparation during IVF viz. single density gradient (SDG) and double density gradient (DDG) with patients' consent and permission of hospital. Ejaculated semen sample from 150 patients was divided in two equal volume and subjected to two different treatment methods (T1=SDG; T2=DDG) of semen preparation for IVF. The study showed, concentration of spermatozoa was non-significantly higher ( $P < 0.05$ ) in SDG (68.65 Million/ml) compared to DDG (66.17 Million/ml) treated samples. Furthermore, sperm motility (type-a and type-b) was significantly higher in T1 (92.24 %) than T2 (72.22 %) treated group. It is concluded that single density gradient method is better than double density gradient for preparation of semen samples of poor sperm count and motility during IVF to treat male infertility.

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**OP**

**IMPACT OF SOCIOECONOMIC STATUS ON MUNICIPAL SOLID WASTE  
GENERATION**

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**ABSTRACT**

Municipal Solid Waste Management is one of the major environmental challenges in most of the cities of the developing countries like India. Economic development, improved standard of living and urbanization have led to an increase in the quantity and complexity of the waste produced. Environmental sustainability demands proper Municipal Solid waste management system. MSWM is a public service, providing citizens with a system of disposing off their waste in an environmentally sound and economically feasible way. The present study reports the assessment of Municipal Solid Waste Generation, based on different socioeconomic parameters like education, occupation, income of the family, number of family members etc. The socioeconomic stratification was based on Kupuswamy's Socioeconomic Status Scale 2020 (SES), which demarcates five Socioeconomic classes of a society, viz Upper class, upper Middle, lower middle, upper lower and lower class. A questionnaire survey was conducted in the Baramulla Town (Study area) to identify the various socioeconomic classes and ten families from each class were selected and solid waste generated by them was quantified. The maximum waste was found to be generated by Lower Middle class.

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**OP**

**IMPORTANCE OF SMALL RUMINANT'S LIVESTOCK HEALTH AND  
PRODUCTION IN AGRICULTURAL SUSTAINABILITY, FOOD SECURITY  
AND POVERTY ALLEVIATION IN INDIA**

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**ABSTRACT**

Global food security linked to the health and welfare of their livestock, hence improved animal health is a realistic component of poverty eradication. Small ruminants like sheep and goat, have an important role in sustainable agriculture in developing countries and support a variety of socio-economic functions worldwide. As per 20th livestock census report in India, India has an estimated total sheep population is 74.26 million showing an increase by 14.1% whereas goat population is 148.88 million showing an increase of 10.1% over the previous census. Gastrointestinal helminthic infections of small ruminants are the foremost global infectious disease constraints to efficient livestock production which affect their health, lowering the overall production through the reduction in food intake, weight gains, work capacity, lower fertility, milk and meat production, treatment costs and mortality. The control of GI helminths based on the use of chemotherapeutics, but the availability of anthelmintic drugs is limited due to high cost of development of newer drugs and the rapid pace of development of anthelmintic resistance which is widespread and increasing. In this paper, we consider the impact of GI helminthic infections in small ruminants and control measures to alleviate these impacts. By developing various diagnostic methods, using new technologies and models, the use of phytomedicines as anthelmintics, livestock breeding strategies, improved nutrition and management, better means of using existing anthelmintic drugs to maximise their effectiveness in the face of rapidly increasing anthelmintic resistance can be optimised to limit the development and spread of drug resistance which will contribute to the global challenge of preserving food security.



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**OP**

**IMPACT OF COVID 19 ON WATER QUALITY OF KUANA RIVER OF  
BALRAMPUR (U.P.)**

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**ABSTRACT**

The outbreak of COVID-19 leads to emergence of the global pandemic, but there is no specific vaccine recommended for COVID-19. More than 216 countries are struggling against the transmission of the disease, recovery and motility. Most of the nations adopted partial or complete 'lockdown' and imposed 'social distancing' to control the rapid transmission of COVID-19 and its consequence. Though global economic growth declined due to nationwide lockdown, there are certain positive impacts on environment. We done our study in March 2020 and analyze all the parameters. Due to this lockdown the remarkably improvements of all physico-chemical parameters of that river occurs. It shows that this pandemic lockdown restore our environment naturally, it reduces all the impurities from our environment and make fit for ourselves.

**OP**

**INFLUENCE OF WATER QUALITY ON SOME HAEMATOLOGICAL  
PARAMETERS IN THE FRESHWATER FISH, NOTOPTERUS  
NOTOPTERUS**

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**ABSTRACT**

The present study is undertaken to find out the influence of water quality on some haematological parameters in the locally available fish, *Notopterus notopterus*. The temperature, oxygen and pH are important factors for ensuring survival, distribution and normal functioning of fish in an aquatic medium and these physicochemical parameters are taken as water quality criteria. The variation in these parameters may possibly effect haematological parameters. The blood parameters such as haematocrite (Hct), haemoglobin (Hb), and RBC count are assessed. As it is known that relationship exists between haemoglobin and oxygen which differs between loading and unloading sites. The fish, *N. notopterus* were collected from three aquatic bodies, two rivers (Bheema and Kagina rivers) and one small stream (Saratoga Nala). The results indicated that the RBC count, haematocrite (Hct) and haemoglobin were found to be differed, the RBC count, haemoglobin and haematocrite found to be lower in the fish from Saradagi Nala than the fish from other two aquatic bodies, this may be due to difference in the O<sub>2</sub> or CO<sub>2</sub> transport. The less number of erythrocyte count are likely due in part to an increase in oxygen consumption and metabolic rates corresponding to the less in water temperature. Bheema River creates a suitable environment for keeping normal functioning of haematology, survival and health condition of the fishes.

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**OP**

**INVESTIGATION OF MICROPLASTICS IN THE FISHES OF RIVER  
ALAKNANDA**

**Jaspal Singh Chauhan.**

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**ABSTRACT**

Plastic was introduced in the world considering its durability, flexibility and resistibility for making the human life comfortable and easy. The dependency of humans on plastic increased abruptly with time progression and now, today plastic is used almost in every aspect related directly or indirectly to humans. This result in massive blind production of new plastic products without proper disposal/recycling of the plastic which end up in waste. Hence, plastic pollution has marked its presence in almost every part of earth extending from the polar ice to deep ocean water. These plastics are converted into fine plastics of less than 5mm size (microplastics) and has potential to impact living organism

In the present study, we investigated the presence of microplastics in the fishes of river Alaknanda-a major tributary of river Ganga. Guts of fishes were collected from the local market of Srinagar Garhwal, utarakhand. The sample were digested with KOH(10%) and filtered to observed under microscope. The SEM and XRD analysis were performed to enhance the clarity of plastic present in sample. On visual inspection and microscopical study we found presence of microplastic in all the fish sample. The presence of thread/fibre were found dominant in the samples. Hence, it is concluded that river water has been severely polluted with microplastics which get bioaccumulated in the fishes.

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**OP**

**KVK PORTAL & MOBILE APP: ICT TOOLS FOR KNOWLEDGE  
DISSEMINATION TOWARDS FARMING COMMUNITY BY KRISHI  
VIGYAN KENDRAS ACROSS INDIA**

**Alka Arora, Sudeep Marwaha, Soumen Pal, S. N. Islam**

IASRI PUSA, NEW Delhi

**ABSTRACT**

In India, the research output for farming community is disseminated through more than 700 Krishi Vigyan Kendras (KVKs) under Indian Council of Agricultural Research (ICAR). KVKs, under the jurisdiction of 11 Agricultural Technology Application Research Institutes (ATARIs) are an integral part of the National Agriculture Research and Education System (NARES) with the aim for grassroots level extension activities. 'Krishi Vigyan Kendra Knowledge Network' popularly known as KVK Portal (<https://kvk.icar.gov.in/>) and KVK Mobile App have been developed at ICAR-Indian Agricultural Statistics Research Institute (IASRI) to disseminate knowledge from KVKs to farmers under the guidance from Extension Division, ICAR. These systems (KVK Portal & Mobile App) have different modules such as State/ District wise options to find KVK, Facilities, Market, Agro-meteorological advisory provided by India Meteorological Department (IMD), Events and Package of Practices etc. KVK App has feature of two way communication with the farmers. Farmers can send their queries along with description, images (in .jpeg format), audio (in .mp3) and video (in .mp4) related to the problem to the experts in KVKs and can avail possible solutions from them. KVKs, ATARIs and Extension Division can send advisory to the farmers using this App and the feature was used for issuing advisory during pandemic.

Along with sharing of information, the KVK portal is used for management and monitoring of information on KVK activities by ATARIs and Agricultural Extension Division, ICAR. In the previous years, E-Governance of major national events for farming community (like Krishi Kalyan Abhiyaan, Sankalp se Siddhi, World Soil Day, Swachata hi Sewa etc.) were digitally monitored by the Ministries through this portal using specialized dashboards for the managers. Both the ICT tools are effectively being utilized for dissemination and management of information with the aim for benefitting the farming community.

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**OP**

**MANAGEMENT TOOLS FOR THE CONSERVATION OF SUGAON**  
**LAKE OF EAST CHAMPARAN DISTRICT, BIHAR, INDIA**

**\*KUMARI PRIYANKA\*\* SUSHMA KUMARI**

- \* Harihar Sadan, Behind Poddar Glass House, Near Riddhi Sidhi Hotel,  
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**ABSTRACT**

A remarkable physical feature of East Champaran district of Bihar is a chain of lakes, running through the centre of the district. These lakes, of which the largest one at Sugaon, Motihari, Turkaulia, Pipra, Siraha, Nawada, evidently mark an old bed of the river Great Gandak.

Lakes are of natural origin and because of their magnitude as well as production potential occupy important position in Indian inland fisheries. There is a high rate of primary production in the lakes of plains which suggests that if scientifically managed, the fish production can be augmented to a greater extent.

The condition of Sugaon lake has been deteriorating under the impact of antropogenic pressure and fast pace of development and if proper conservative measures are not taken the lake is likely to further deteriorate. The paper deals in detail the various management tools for the conservation of Sugaon lake.

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**OP**

**MILLETS AS A SUSTAINABLE SOLUTION UNDER CLIMATE  
CHANGE FOR FOOD SECURITY**

**Seerat Saleem, Reiaz Ul Rehman\*.**

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**ABSTRACT**

Climate change has led to reduced agricultural productivity and threatened food security. The productivity of major cereals such as rice, wheat, maize is adversely affected by climate change. Keeping this scenario in view, millets are the most convenient crops which can be cultivated on marginal lands, because of their adaptation to various climatic fluctuations. These C4 plants belong to the grass family (Poaceae) and can withstand environmental challenges such as droughts, high temperature and salinity stress. Because of their ability to grow in adverse conditions and nutritious components, these crops provide food for millions of people in arid and semi-arid parts of the world. Millets are ideal for rain fed farming, may not require chemical fertilizers and pesticides and can withstand various biotic and abiotic stresses. When compared to the major cereals which have higher global warming potential, millets have comparatively lower carbon foot prints. Millets are highly nutritious and can substitute major cereals in terms of health benefits. Millets are also known as nutraceuticals because they store high amount of proteins, essential amino acids, dietary fibre, vitamins, minerals, essential fatty acids, antioxidants, phyto-chemicals and have hypoglycaemic, anti-tumorigenic, atherosclerogenic, antioxidant and anti-microbial properties. Besides being consumed as breads, snacks, puddings, beverages millets are also known as poor man's crops as they sustain one-third of world's population and are a means of livelihood especially for the people in Asia and Africa. Biofortified millets are potential candidates for the eradication of mineral deficiencies. Despite of all the benefits millet farming is on decline and needs intensification which will help in overcoming hunger and malnutrition.

**OP**

**MILLETS: FARMING POTENTIAL AND UTILIZATION  
FOR FUTURE**

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**ABSTRACT**

Two essential sustainability questions of the present farming are the decreasing carbon footprint and increasing energy use. Understand the suggestion of energy and carbon utilization, United Nations Organization on sustainable development goals informed about temperature raise of 2o C and it is certain that agricultural production will be seriously affected, thus in future abandoned and underutilized crop resources are extremely fundamental for sustainable long-lasting agriculture and millets fit into this criterion. Millets are well suitable to little rainfall situations, proficiently survive extensive dry spells, improve quickly after deferred rain, root organization well-organized in soil moisture withdrawal, negligible pest and disease problems, sustainable and modest crop under little management situation in marginal land. Millets have biochemical, morpho-physiological and molecular features which contribute to enhanced tolerance to abiotic stresses than other major cereals. We have a continuous rise in global energy expenditure since the past few years. One of the reasons for this is a speedy expansion of population, production and industrial extension. This leads to more utilization of non-renewable fuels, such type of fuels have an obvious impact on the surrounding environment and whole ultimately. The effects of environmental change with greenhouse gases formed by the use of fossil fuels are noticeable throughout the planet. So, the utilization of energy sources which can be used again and again (renewable) seems to have several returns. The only way out of this is biomass. Renewable fuels have accessibility and cause less pollution. The global production of biomass (calculated approximately) is 146 billion metric tons per annum. Biomass has the budding scope of providing a sustainable supply of energy and also meeting greenhouse gas reduction targets. Millets have potential to provide biomass and thus bio energy for sustainable development and reduced carbon emission. *Panicum virgatum* L. (switchgrass) and other millets turn out to be a representative species for bio ethanol and biodiesel production.

**OP**

**MULTI-DIMENSIONAL SCALING (MDS) BASED SOLUTIONS FOR  
PRIORITIZING TECHNOLOGICAL CHALLENGES  
IN PLANT BREEDING AND GENETICS**

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**ABSTRACT**

Multi-Dimensional Scaling (MDS) is primarily a data visualization method for identifying “clusters” of points, where points in a particular cluster are viewed as being “closer” to the other points in that cluster than to points in other clusters. The traditional way of performing MDS is referred to as classical scaling which is based on the assumption that the dissimilarities are precisely Euclidean distances without any additional transformation. The particular objective function (or loss function) to be minimised is a sum of squares, commonly called stress. Scree-plots are used to determine the optimum number of dimensions. In this study, information from experts was obtained via questionnaire for identification of specific technologies / scientific development that need major attention for increasing the productivity of cereals, pulses and oilseeds in India for prioritizing future technological needs has been subject to MDS analysis. . A recent approach called majorization is pursued and shown how to 'majorize' the raw Stress function, using the Scaling by MAjorising a COmplicated Function (SMACOF) theory for obtaining MDS maps. The MDS procedure suggested that the three dimensional (3-D) plot provides more information as compared to a 2-D plot when the technological factors responsible for enhancing agricultural productivity are analyzed. Thus MDS can be used as a viable alternative for prioritizing technological challenges in the field of agriculture.



**OP**

**NUTRIENT DYNAMICS IN RIPARIAN ECOTONES**

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**ABSTRACT**

Riparian buffer zones provide various agricultural practices along with benefits extending beyond ecosystem services. Besides, to reduce diffused nutrient pollution, it also enhances the aesthetic values of landscape and biodiversity. Buffer zones act as both source and sink depending on their nutrient saturation capacity. For example, under high nutrient saturation, these strips can act as a source. Also, under high nutrient saturation, these strips can act as a greenhouse gas emitter. Buffer strips can be viewed within the wider management framework rather than an end of pipe solution. Biomass also plays an important role in harvesting nutrients in both saturated and nutrient-lacking riparian buffers. Biomass removal can prevent rapid saturation in these strips. The multifunctionality of riparian buffer stripes needs to be identified and protected. Further more, in saturated buffer strips, nitrification can increase greenhouse gas emissions. Buffers should not, therefore, be viewed as an end-of-pipe solution, but within a wider management framework that controls pollutants at the source. Furthermore, biomass removal (e.g., via mowing) can prevent nutrient saturation, increasing the longevity of buffer strips; such operations should, however, be carefully timed to reduce adverse impacts of disturbance on water quality and biodiversity. Wooded buffers can be less effective than grass buffers at intercepting sediments and sediment-bound pollutants, but provide many benefits associated with mitigating the impacts of climate change. This highlights potential trade-offs between climate change and water quality objectives. Zoned buffers that combine strips of riparian woodland and grass, could therefore deliver benefits transcending these policy areas. With such buffers taking large areas of land out of production, they may not be financially sustainable, particularly in intensively managed catchments. In such catchments, to balance food production goals with other ecosystem services, vegetated and/or forested buffer strips, of variable width, should be selected based on objectives at the local or regional scale.

**OP**

**PHOTOCATALYTIC CONVERSION OF CO<sub>2</sub> TO METHANOL USING  
ADSORBENT-INTEGRATED NANOCATALYSTS: A STUDY ON  
CAPTURE AND CONVERSION OF CO<sub>2</sub>**

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**ABSTRACT**

Photocatalysis has the best potential to replace the conventional wastewater treatment technology due to its utilization of visible light to photo-degrade organic and inorganic contaminants. However, when applied in slurry form, agglomeration of nanoparticle will lead to serious decrease in photocatalytic performance due to hinderance effect. By combining the photocatalyst and adsorbents, which is designated as integrated photocatalyst adsorbent, an adsorbent material which also degrades toxic organic compounds in the presence of UV/visible light irradiation could be produced. The compound does not only preserve all the interesting characteristics of both individual components, but also overcomes serious drawbacks, such as low absorptivity, rapid recombination of photogenerated electrons and hinderance effect of photocatalyst when applied in slurry form. An experimentations have been done using developed integrated photocatalyst adsorbent for efficient capturing and maximum conversion of carbon di oxide to methanol by mutual effects of governing conditions, like as catalyst dose, pH, CO<sub>2</sub> flow rate and temperature. Approximately, 134 g/Lh of productivity and 40 mg/gcatof yield were found after 3 h of illumination under UV in an annular type Pyrex reactor at an optimum catalyst dosage of 10 g/L, flow rate of 3 L/m, pH of 3, and temperature of 50 0C.

OP

**PHYTO-DIVERSITY OF WEED SPECIES WITH THEIR HABITAT  
DISTRIBUTION AT NURSERY AND WILD HABITAT:  
A COMMUNITY ANALYSIS APPROACH**

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and Ajeet Kumar Negi<sup>1</sup>**

<sup>1</sup>Department of Forestry and Natural Resources  
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**ABSTRACT**

The study was conducted in Garhwal, India to explore and compare the status of phyto-diversity of weed species with their seasonal distribution in nursery and at wild habitat during August-2018-July 2019. Data was collected from thirteen quadrates laid randomly at both sites. The quantitative community analysis was done by evaluating frequency, density, abundance, Important Value Index and Diversity Indices ( $H'$ ,  $D_{mg}$ ,  $D$ ,  $WI$ ,  $E$  and  $\beta$ ). In findings, 34 species were reported at nursery and 17 species wild habitat. Asteraceae was the dominant weed family due to highly competitive and tolerant species such as Parthenium. Varied IVI (3.2-79.22) indicated a mixture of common as well as rare occurrence of weed species. *Murra koenigii* established higher relative frequency, most dominant while overlapping proved it as invasive seasonal habitat occupier. *Sida*, *Oxalis* etc. reoccurred due to their collective potential of germination by soil seed bank. A/f ratio lied 0.05-2.10 confirmed variation in population. Maximum overlapping as  $\beta=0.72$  was during November-January and richness was 5.91-8.45 for nursery and 2.99-4.77 for wild with a significant value of 8.45 and 4.77. Higher  $\beta$  values indicated nursery as a potential source of weed invasion. Low species richness as minimum 2.99 at wild compared to 7.87 for nursery proved this habitat as encouraging factor for invasive weed species. Seasonal treatment to soil in prior to sowing is recommended to control the potential of repeated weed growth through soil seed bank.

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**OP**

**ROLE OF NANOTECHNOLOGY IN FOOD INDUSTRY**

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**ABSTRACT**

Nanotechnology can help a wide area of food industry. This technology can be used in the food industry through tracking devices, nanosensors etc. It helps food industry in the delivery of required components, smart packaging, development of new product and so on. Generally the main use of nanotechnology in food industry is on the preservation of food. To increase the nutrition of food Nanoparticles can be used into existing food. The main benefit of nanotechnology in this sector is to develop the food component's texture, addition of additives or added flavour. It helps to develop new tastes and improve the nutritional components. This paper gives an overview of Nanotechnology, role of nanotechnology in Food industry, Application areas, advantages and disadvantages.

**OP**

**PREPARATION, CHARACTERIZATION OF BIOCHAR FOR A  
SUSTAINABLE SOIL HEALTH**

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**ABSTRACT**

Recent research suggests that biochar is a promising approach to minimize soil contamination caused by heavy metals and organic pollutants. It also involved in the amendment of soil by altering the nutrients, pH and other factors. Through intensive literature review, this paper was aimed to better understand the selection of feedstock processes, preparation, and characterization of biochar. Wide variety of feedstock used for the biochar production based on the cost effectiveness, ease availability and they are ecofriendly to the environment. Among the the rmochemical processes, pyrolysis is the promising techniques followed for the production of BC. The stabilization efficacy was mainly determined by cation exchange capacity, pH, and ash content of the biochar. The physiochemical characteristic of the biochar is analyzed using various methods such as SEM, FTIR, TGA and BET analysis. The surface area places a major role in the metal sorption. The quality characteristics of biochar as a soil amendment varied greatly with the feedstock materials and the pyrolysis conditions. Biochar plays a great role in the increasing the pH which helps the acidic soil region and its high-water retention capacity enhance the moisture level in the soil which enhances the microbial communities and its activity. Biochar becomes stabilized in the soil by interacting with soil particles. The inherent characteristics of the biochar as dictated by feedstock and pyrolysis conditions, interact with climatic conditions such a precipitation and temperature to influence how long biochar carbon remains stored in the soil. Due to its carbon sequestration in the soil, it helps in increasing the fertility of the soil and also enhances the crop yield.

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**OP**

**ROLE OF INTER-DISCIPLINARY SCIENCE RESEARCH  
FOR ENVIRONMENTAL SUSTAINABILITY**

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**ABSTRACT**

Environmental degradation forced us to link up the theoretical understanding with people and their evolved practices to protect the natural resource receiving enhanced interest and attention in the field of interdisciplinary research. Community based research evolves on the intersections between environment and society has provided substantial view into community-based dynamics of scientific environmental research and its impacts on biotic and abiotic community. The systemic environmental challenges like climate change, biodiversity, environmental and human health cannot be addressed by adopting principles of environmental sustainability, stewardship and science. Interdisciplinary Science research is a more systematic inquiry to understand ways of doing “from within”, from the people for the environment. It is an inquiry that is to be done instead of designing and constructing an object. This session we focus on scientific knowledge that reveals the interdisciplinary process at work that should be proportional to the supporting evidence.

It will be concluded that the reconciliation of community based environmental science research and education plays a meaningful role by facilitating collaborative interdisciplinary practices between scientific community and environmental resource management to serve the society as well

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**OP**

**ROLE OF INTERNET OF THINGS (IOT) IN AGRICULTURE**

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**ABSTRACT**

The IoT (Internet of Things) had brought revolution to every domain whether it is education, healthcare, business, transportation, homes, agriculture etc. The new trends in technology is ready to change the concept of traditional farming approach. Smart agriculture concept is surely going to change the whole scenario of farming. It will help farmers in getting more and more benefits of their crops and can also help them in avoiding many issues related to weather and soil conditions which are harmful for their crops. Farmers can keep an eye on various factors like changing weather conditions, soil and fertilizers, pest control, cattle etc by using drones and sensors. Use of smart sensors and analyzing data received from it will lead to the precision farming concept. Precision farming is the latest buzzword in agriculture field whereby making using of wireless technologies one can do precise and controlled farming. In India farmers are still not able to adapt this new concept, as implementation of latest technology requires handsome amount. There is a need of cost effective and simple solutions that farmers can use readily and get adapt gradually. Agriculture is an important pillar of Indian economy hence integrating technology with agriculture will give rise to new era and will strengthen the economy as well. This paper is outlined to discuss role of IoT in Agriculture domain, benefits of IoT in agriculture and adaptation issues and challenges related to it.

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**OP**

**ROLE OF TRADITIONAL MEDICINE IN THE MANAGEMENT  
OF COVID-19**

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**ABSTRACT**

Traditional knowledge (TK) is integral to the identity of most local communities. It is a vital constituent of a community's social and physical environment. Their rich endowment of TK and biodiversity plays a critical role in their health care, food security, culture, religion, identity, environment, trade, and development. TK has a wide range of commercial and scientific uses; it is becoming increasingly valuable to non – indigenous outsiders.

World Health Organization (WHO) estimates that 4 billion people (80 percent of the world population) use herbal medicine for some aspects of primary health care. The COVID-19 pandemic is a severe crisis to harrow humankind in a century; a genuine emergency for the whole world, and an overwhelming challenge. Till now, modern medicine is able to provide only symptomatic treatment of COVID-19. Most of the conventional antiviral drugs such as lopinavir, ritonavir, chloroquine, and hydroxychloroquine have not proved as effective as expected and therefore, scientists have again turned their eyes towards traditional medicine to find out the solution to combat novel Corona Virus (SARS-CoV-2). Health officials, mostly in China and India, have started encouraging an alternative medicine as a preventive measure to help those who get sick with mild to moderate respiratory infection through traditional herbal remedies.

In India, total tribal population is 8.6% belonging to 461 tribal communities. They are widely distributed all over the country, living inside the forest areas and foothills of mountains. Rajasthan the largest state of country having 13.47% tribal population (Census, 2011), still surviving in deciduous forests of the Aravallis, the one of the oldest mountain ranges, and Vindhyan ranges. The major tribes of the state are Bhil, Meena, Garasia, Damor, Sahariya and Kathodiya. Living close to nature, the tribal's have acquired unique knowledge about the properties and uses of wild flora and fauna most of which are not known to the outside world and this knowledge is transmitted from generation to generation orally through oral folklore, although it is often kept secret.

Extensive field survey of tribal dominated area and literature review found that several plant species such as *Curcuma amada*, *Swertia chiratia*, *Enicocetma axillare*, *Caesalpinia bonduc*, *Ocimum americana*, *Echinops echinatus*, *Adhatoda zeylanica* etc. can be used to treat or as preventive medicine for respiratory infections like the common cold, influenza, fever and pneumonia. Some are *Withania somnifera*, *Tinospora cordifolia*, *Curculigo orchioides*, *Dioscorea* spp. *Boswellia serrata* etc. thought to boost the immune system and put the body in a healthier position to fight against infections. Other traditional medicines *Cissampelos pareira*, *Eulophia ochreatea*, *Leea macrophylla*, *Hemidesmus indicus*, *Dioscorea* spp. etc. are believed to be having amazing antiviral that block certain infections from replicating in the body. Traditional Indian medicine are being evaluates for their potential role against COVID-19. This folk wisdom, if subjected to scientific scrutiny, could benefit humankind in many ways in finding out possible solutions for the management of COVID-19.

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**OP**

**ROOFTOP RAINWATER HARVESTING FOR DRINKIN  
WATER SUPPLY – A CASE STUDY**

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**ABSTRACT**

The Akshaya Boys' hostel of College of Agricultural Engineering, Raichur, Karnataka with roof top area of 902 m<sup>2</sup> was chosen for roof top rainwater harvesting. The area near underground water storage tank was thoroughly cleaned to remove weeds and to avoid dampness around the underground storage tank during rainy season. The inside tank was properly cleaned and two coatings, white painting was done both on inside and outside of the water storage tank. The storage capacity of the tank is 65.3 m<sup>3</sup>. Since, it was already existing tank, the provision was made to divert excess water to nearby farm pond and overflow from storage tank to recharge nearby borewell. The twelve lateral lines of the size of 4 inch PVC pipes are connected from terrace to 6 inch PVC main line to collect roof top rainwater from two different directions. The two screen filters are provided before water enters into the storage tank to remove inert materials from the water. It was also ensured to keep terrace clean to harvest quality water. Two ball valves are fitted to regulate flow as out and in system. After the establishment of system in August, 2019, during 2019 and 2020, the rainwater was harvested and used for drinking purpose after filtration. The rooftop rainwater harvesting potential ranged from 73 to 86% from RCC rooftop. The stored rainwater quality was carried out to test its quality for drinking purpose. The quality parameters like, pH, TDS, EC, Ca, Mg, Cl and Carbonates ranged between 6.8-7.6, 55-75 mg/l, 0.18-0.28 dS/m, 0.6-1.6 mg/l, 0.0-0.2 mg/l, 0.6-1.5 mg/l and 0.0 mg/l respectively during long term storage period which were well within the recommended Indian Standards (IS 10500 : 2012) for drinking water. So, it was concluded that, the rooftop rainwater can also be used for drinking water purpose along with other domestic uses when proper care is taken for execution, harvesting and storage.

**OP**

**SOCIO ECONOMIC CHALLENGES DURING PANDEMIC ERA  
AN APPROACH TOWARD EMPLOYMENT GENERATION THROUGH  
DAMASK ROSE IN HIGH ALTITUDE REGIONS (GARHWAL HIMALAYA)  
OF UTTARAKHAND**

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**ABSTRACT**

Uttarakhand shares its borders with China and Nepal was initially a part of Uttar Pradesh (UP). Since its geographical condition were unique, initially a part of Uttar Pradesh (UP). A new state of Uttarakhand was created on 9 November, 2000 and has 13 districts. Out of these, 9 districts are with hilly terrain and have several villages in the high altitude range. These regions face severe problem of migration due to several reasons like medical facilities, lack of job opportunities and education being prominent. Keeping this in view, we initiated propagation of damask rose which is famous for its aromatic oil. The work was initiated in 2014 with initial survey. Several locations were surveyed and finally a cluster of villages in Dhontri Village area (region between Chaurangi-Khal, Dhontri, Kamad/Thandi) Dunda Block, District Uttarkashi was identified because of progressive nature of farmers. This cluster also had several government schools which have helped. Since then, by the year 2020-21, a farmer cluster has been developed along with nurseries and commercial production of rose oil is scheduled for the year 2022-23. This effort has become even more important because of the reverse migration that Uttarakhand has witnessed during the pandemic era where the slogan of Vocal for Local has gained prominence. In this paper we share our data and journey and this is one of the unique efforts by member of NESA to promote socio economic growth of a remote hilly region of district Uttarkashi in Uttarakhand.

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**OP**

**SOCIO ECONOMIC CHALLENGES DURING PANDEMIC**

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**ABSTRACT**

COVID-19 has heightened human suffering, undermined the economy, turned the lives of billions of people around the globe upside down, and significantly affected the health, economic, environmental and social domains. This study aims to provide a comprehensive analysis of the impact of the COVID-19 outbreak. The socio-economic crisis has reshaped investment in energy and affected the energy sector significantly with most investment activity facing disruption due to mobility restrictions. Delays in energy projects are expected to create uncertainty in the years ahead. While the nationwide lockdown has resulted in financial losses and has affected all segments of society, the domino effect on health, healthcare and nutrition could possibly pose major setbacks to previously gained successes of National health programs. This review found that a 72-hour delay in the collection and disposal of waste from infected households and quarantine facilities is crucial to controlling the spread of the virus. With current economic crisis, fragile health care system and critical health literacy, a well-managed and coordinated action plan is required from all segments of the society led by the public authorities. But in addition, drastic improvement in air quality index of urban centers of the country has been recorded amid lockdowns. Broad sector by sector plans for socio-economic growth as well as a robust entrepreneurship-friendly economy is needed for the business to be sustainable post pandemic.

**OP**

**STUDY ON THE USE OF PLANTS EXTRACT IN BEEKEEPING TO  
REPLACE ANTIBIOTICS USAGE FOR MITE CONTROL TO REDUCE  
POTENTIAL HUMAN HEALTH RISK**

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**ABSTRACT**

Honey is valuable, natural and raw food across the globe, which can be consumed as a sweetener as well as a medicine due to its therapeutic effect on human health. In India at the time of winter and monsoon the colonies of honey bee *Apis Mellifera* are infested by *Varroa Jacobsini* mite causing high bee mortality. To protect their hives, the beekeepers in India make use of various Indian and Chinese antibiotics to control and prevent bacterial foulbrood disease caused by *Varroa Jacobsini* mites in colonies of *Apis Mellifera*. The use of antibiotics in honey hives causes a potential risk on human health. Numbers of samples were collected from various parts of India and were investigated for the presence of antibiotics such as metronidazole, sulphonamides, tetracycline, oxytetracycline, erythromycin and chloramphenicol residues. Oxytetracycline and erythromycin concentrations were found to be above the tolerance limits established by EU and CODEX for export quality honey. The use of antibiotics is a threat to both health and economy. In this study different apiaries in near Uttar Pradesh and some places of Uttarakhand with infected bee colonies were treated with a blend of different oils extracted from plants and promising results were obtained. The use of extracts of eucalyptus blended with mint, lemongrass and neem extract offers promising results. The Mite Mortality obtained with these formulations approaches upto 100% efficiency without any significant Bee Mortality. Keywords: honey, *Apis Mellifera*, antibiotics, EU, CODEX, plant extract, Mite mortality, Bee mortality.

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**OP**

**SUSTAINABLE PRODUCTIVITY OF SUGARCANE VARIETIES IN  
LOWER SHIVALIK HILLS OF UTTARAKHAND**

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and Prabhat Kumar**

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**ABSTRACT**

Sugarcane farming is the largest source of livelihood in plains of Uttarakhand but its productivity is lower (60.5 & 64.6 mt/ha) than the national average (70.0 & 68.2 mt/ha during 2016-17 & 2017-18)\*as well as amongst other states of lower Shivalik Hills. Hence, a study was undertaken to measure the impact and efficiency of improved sugarcane varieties. CO 0238 was the most popular improved variety of sugarcane and had the highest BCR (3.15:1). Among the local varieties, Pant 97222 showed the highest BCR (1.29:1). Among the sugarcane varieties, net return was maximum in case of CO 0238 (Rs. 212056.08) than all other selected varieties. Box Plot technique implied to find out the yield variations between improved and local varieties. CO 0238 gave average yield of 950-975q/ha whereas, returns from CO 0239 and CO 0124 were 845-890 q/ha respectively. In case of local sugarcane varieties, it was observed that average yield were 665-685 q/ha, 660-675 q/ha and 630-710 q/ha for Pant 97222, COH 119 and COS 94270 respectively. To measure sustaining productivity (economic efficiency) of varieties and to recognise best suited variety for particular region, multivariate regression analysis has been used. The results showed that CO-0238 yielded 170q/ha more than that of CO-0124. Similarly, CO-0139 has produced 81q more yield per ha compared to CO-0124. Results indicate that CO-0238 was the best suitable variety in terms of yield in that region.

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**OP**

**TRACKING ENVIRONMENTAL ISSUES AND ACTIONS**

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**ABSTRACT**

Life support system or environment of Earth is undergoing rapid and unprecedented changes in recent decades. How to follow up and understand emerging environmental issues and concerns, from local to global level employing newer and emerging tools and technologies is presented in this communication. An experiential perspective for the benefit of students, professionals, researchers and any citizen is presented here in to further the debates on actions and programmes to be undertaken.

**OP**

**UPCONVERSION AND SPECTROSCOPIC PROPERTIES OF Ho<sup>3+</sup>-DOPED  
IN ZINC LITHIUM TUNGSTEN ANTIMONY GERMINATE GLASSES**

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**ABSTRACT**

Glass sample of Zinc Lithium Tungsten Antimony Germinate  $(45-x)\text{GeO}_2:10\text{ZnO}:10\text{Li}_2\text{O}:10\text{WO}_3:25\text{Sb}_2\text{O}_3:x\text{Ho}_2\text{O}_3$ . (where  $x=1, 1.5$  and  $2$  mol%) have been prepared by melt-quenching technique. The amorphous nature of the prepared glass samples was confirmed by X-ray diffraction. Optical absorption, Excitation, fluorescence and Raman spectra have been recorded at room temperature for all glass samples. Judd-Ofelt intensity parameters  $\Omega_\lambda$  ( $\lambda=2, 4$  and  $6$ ) are evaluated from the intensities of various absorption bands of optical absorption spectra. Using these intensity parameters various radiative properties like spontaneous emission probability, branching ratio, radiative life time and stimulate demission cross-section of various emission lines have been evaluated. The value of stimulated emission cross-section ( $\sigma_p$ ) is found to be maximum for the transition ( $5F_4 \rightarrow 5I_8$ ) for glass ZLTAG (HO 01), suggesting that glass ZLTAG (HO 01) is better compared to the other two glass systems ZLTAG (HO1.5) and ZLTAG (HO02).

**OP**

**TRANSFORMATION OF SERI-WASTE INTO VALUE-ADDED  
PRODUCT: SCOPE AND PROSPECTS**

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**ABSTRACT**

India is home to a diverse silkworm fauna with huge potentialities for exploration and exploitation for the benefit of the society. Among the various species of silkworms, the mulberry (*Bombyx mori*) and non mulberry silkworms (*Antheraea mylitta*, *Antheraea proylei* and *Antheraea assamensis*) are commercially exploited for reeling of silk in India. Over the last few decades, the Indian silk industry has witnessed a significant progress in the production of raw silk. The production has reached to 0.035 million MT during the end of 2018-19 as against 0.018 million MT in 2006-07. However, this increased raw silk production that involves boiling and reeling of cocoons generated huge (0.282 million MT) reeling waste pupae as major silk industrial byproduct causing serious disposal problem. The present study investigated nutritional potential of this silk industrial byproduct based on its chemical composition and antioxidant properties. Preliminary results indicated that the reeling waste silkworm pupae generated as industrial byproduct not only possess high nutritional value but also strong antioxidant potential to scavenge free radicals. The scope of relying on this silk industrial byproduct as an excellent economic substitute of costly protein in the development of animal feed product is discussed.



**OP**

**VARIABILITY IN PRIMARY AND SECONDARY METABOLITES IN TWO  
BULBOUS MEDICINAL PLANTS OF THE RAJASTHAN  
DESERT**

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**ABSTRACT**

Medicinal plants are the main source of modern pharmaceuticals and healthcare products. Plant products have been ingredients of phytomedicines since time immemorial. These can be derived from various plant parts such as barks, leaves, flowers, roots, fruits, seeds, etc. Knowledge of the chemical constituents of plants is necessary because such information will be valuable for synthesis of complex chemical substances. Phytochemicals are the natural bioactive compounds found in plants. Extraction and characterization of several active phytochemicals from these plants has led to manufacturing of several drugs. The present study was conducted to investigate variability in primary and secondary metabolic products in two medicinally important plants, i.e. *Dipcadi erythraeum* Webb. & Berth (Piazi; Fam.: Asparagaceae) and *Drimiaindica* (Roxb.) Jessop (Jangalipiaz; Fam.: Asparagaceae). For chemical analyses, bulbs of both plants were collected randomly from Bhimbhadak, Jodhpur (15 km away in north-west direction from the University Campus) in three developmental stages (vegetative, flowering and fruiting). The bulbs were washed with running tap water, oven-dried and ground for further chemical analyses. The results revealed that total phenols and phosphorus were found to be maximum during vegetative stage whereas total sugars and crude protein during fruiting stage in *D. erythraeum*. In case of *D. indica*, total sugars and phenols were maximum during flowering whereas phosphorus and crude protein during vegetative stage. Total alkaloid values in both plants were slightly increased during fruiting stage as compared to other stages. When compared with the values of secondary metabolites in both plants, bulbs of *D. erythraeum* accumulated higher amount of total alkaloids as compared to *D. indica* whereas vice-versa results obtained for total phenols. Finally, it was concluded that selected plants have the potential to act as a source of useful drugs because they are the source of primary and secondary metabolites such as total sugars, protein, phosphorus, total alkaloids and phenols.

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**OP**

**VISUALIZATION AND ANALYSIS OF LANDSCAPE DIAGNOSTIC  
SURVEY DATA UNDER CEREAL SYSTEMS INITIATIVE FOR SOUTH  
ASIA**

**Soumen Pal, Alka Arora, Sudeep, Ajit, S. N. Islam  
and Ranjt Kumar Paul**

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**ABSTRACT**

The Cereal Systems Initiative for South Asia (CSISA) is a regional initiative to sustainably increase the productivity of cereal-based cropping systems, thus improving food security and farmers' livelihoods in Bangladesh, India and Nepal. CSISA works with public and private partners to support the widespread adoption of resource conserving and climate resilient farming technologies and practices. The initiative is led by the International Maize and Wheat Improvement Center (CIMMYT), is jointly implemented with the International Food Policy Research Institute (IFPRI), the International Rice Research Institute (IRRI) and Indian Council of Agricultural Research (ICAR). As a part of it, in India, the Krishi Vigyan Kendras (KVKs) used to perform the Landscape Diagnostic Survey (LDS) which can help in identifying sources across states to bridge yield gaps. LDS has so far been deployed in eight Indian states covering more than 100 districts for detailed diagnosis of current production practices and yields. These data are aggregated and stored at ICAR Data Centre located in ICAR-Indian Agricultural Statistics Research Institute (IASRI). There were altogether 14491 data points including data from rice, wheat and maize crops. With these data, a dashboard has been created for showcasing information which can be used for further analysis. The dashboard is linked with Krishi Vigyan Kendra Knowledge Network or KVK Portal and hosted at <https://kvk.icar.gov.in/CSISA.aspx>. A number of reports, graphics and map views have been developed and integrated into this dashboard. This dashboard can help in identifying the thrust or target areas where intensive extension or revised extension recommendations are required. This can also help the policy makers to frame effective and accurate planning for Indian agriculture.

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**OP**  
**WATER QUALITY ISSUES OF TREATED WASTEWATER IN  
AGRICULTURE**

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Environmental Science, Guru Nanak Dev University, Amritsar

**ABSTRACT**

Treated wastewater can be a good alternative to groundwater in the agriculture sector. But, farmers are hesitant to use treated wastewater in Punjab due to the water quality issue. The second aspect is easy availability of groundwater due to subsidized electricity in the state and with good quality water having total dissolved solids (TDS) less than 500 mg/L in the groundwater of Punjab. This paper discusses government regulations regarding the use of treated wastewater in agriculture production with guidelines related to bacterial count, sodium absorption ratio, toxic metals, BOD, suspended solids in the treated wastewater. New legislation on Punjab guidelines for groundwater extraction and conservation, 2020 exempted water cess on water abstraction from groundwater for agriculture use but emphasizes water saving in existing crops with priority given to overexploited area viz. orange and yellow category as per groundwater resources.

**OP**

**WOOD PROTECTION AGAINST DETERIORATION BY BIOLOGICAL  
ORGANISMS UNDER STORAGE CONDITION**

**Pawan Kumar Poonia\*<sup>1</sup>, Vijay Daneva<sup>1</sup>, Surya Sagar  
SM<sup>2</sup> and Vinayak Upadhya<sup>2</sup>**

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<sup>2</sup>College of Forestry, Sirsi, UAS Dharwad, Karnataka, India

**ABSTRACT**

India is a diverse tropical country with large number of wood species and multitude of wood deteriorating organisms. This creates problem of protecting wood under outdoor storage conditions and difficult to resolve. The present study was carried out to understand the nature and causes of wood deterioration and to develop suitable control methods. The study was carried out in the local timber depot at College of Forestry Sirsi, Karnataka (India). *Acacia auriculiformis* wood under study was stored for six months under outdoor conditions exposing to all natural environmental factors. The effect of prophylactic treatment (i.e., borax-boric acid and chromated copper arsenate), and wood with bark and without bark before stacking were studied.

Study results revealed that the stored wood with bark was mainly affected by borers insect while, the wood without bark was infected by fungi whereas, slight attack (i.e., 10-15%) of termite were also observed on both the stacks. Debarked billets suffered less damage than billets stored with bark. Fortnight spraying of borax-boric acid or chromated copper arsenate (CCA) did not give effective protection for the woods with bark. The results suggest that debarking of wood before stacking and application of CCA at frequent intervals were effective to prevent establishment of the insect and fungi under storage condition.

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**OP**

**ENVIRONMENT AND HUMAN HEALTH COMPARATIVE  
ANALYSIS OF STATUS OF RURAL HEALTH AND SANITATION IN  
MODEL VILLAGES OF MAHARASHTRA AND TELANGANA**

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**ABSTRACT**

Ministry of Human Resource Development had declared certain villages as Model Villages of which maximum are concentrated in Maharashtra and Telangana. There are numerous indicators of a village to be declared as a Model. In this study, comparison has been done between the status of human health in four Model Villages of Maharashtra and Telangana. For this purpose, a multidimensional index was developed through Principal Component Analysis named Rural Health Status Index (Cronbach's Alpha reliability coefficient 0.7). The indicators used to develop the index were: No. of family members using toilets, no. of family members practising physical exercise & frequency of practice, no. of family members smoking/drinking & frequency of the habit, quality of services rendered in Village Health Centre & number of family members accessing health services, quality of drinking water, last occurrence of diarrhoea in the family and occurrence of last birth in family at hospital/home. Thirty farmers from each village were interviewed using a semi-structured interview schedule (N=120). While the model villages of Maharashtra (Hivre Bazar and Mann) had Health Indices of 0.608 and 0.514 respectively; those of Telangana (Gangadevipally and Ramachandrapur) had Health Indices of 0.462 and 0.428 respectively. The index values indicate that the globally renowned Model Village of Hivre Bazar under the leadership of Sarpanch Popatrao Pawar achieved newer heights of not only an awareness about conservation of natural resources thus leading to sustainable livelihoods but also keeping themselves healthy through maintenance of proper hygiene and sanitation in the village.

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**OP**

**TRADITIONAL FISH HARVESTING TECHNIQUES IN THE  
RIVER GANGA AT PATNA**

**Syed Shabih Hassan**

Department of FRM, College of Fisheries, Guru AngadDev Veterinary  
and Animal Sciences University, Ludhiana (Punjab),

**ABSTRACT**

Patna is located in lower-middle stretch of the Ganga river system. Varieties of indigenous, sturdy plank built boats are used for operating the larger nets in high as well as low water currents in the River Ganga at Patna. Small riverine crafts known as 'Dinghis' or 'Nao' are extensively employed. Shallops with white screen are also used to lure jumping fish. More than 30 types of fishing nets and gears were recorded in the River Ganga. Various gillnet, long lines, and plunge basket traps or individual fish traps are dominantly used during high water. Such gears generally get a small catch per unit effort but it is used for a long period. Plunge basket trap or filtering gears are used on the migration routes, particularly where water flows off the flood plain into the rivers. Long fences containing several small cages (Rectangular trap) locally called 'ArsiPinjra' are used to catch the fish into one central holding chamber. Drag nets/seine nets, large meshed gill nets, shallop with white screen, purse net, scoop net are used during dry season, as low water level is helpful in operation of such gears. Large mesh sized gill net is used usually in the middle stretch of the river in order to catch big size fish during dry season. Hilsa and Indian major carps of commercial value are caught by purse net and gill nets. The application of gears varies with current, depth of water, nature of fish to be captured, and availability of raw materials. Nearly, all riverine fishing gears are artisanal, small scale and labour intensive and are traditionally been employed at Patna for many decades. Nevertheless, with the advancement of technical know-how and ideas, certain gears are used more frequently. By and large, the cotton and jute nets have been replaced by nylon nets. Many of the fishing gears are employed for a short time when water level is suitable for their use. As a result, fishermen use a series of gears especially when the water level starts increasing with the onset of monsoon or when flood starts receding. Generally, static, filtering, plunge basket trapping and long- lining gears are used when flood water rises or recedes as the fishes are migrating either towards flood plains or back for the purposes of feeding or breeding. During monsoon period, some of the nets like shooting nets are used for the collection of spawn while other nets for fry, fingerlings and brooders. Application of bamboo reeds and strips for forming barriers 'bari' across the width of narrow channels are also common. The study also provides impact of degrading environment and other related factors on the Ganges fishery as well as socio-economic condition of fishermen along the River Ganga near Patna.

**OP**

**ICHTHYOFAUNAL DIVERSITY IN THE RIVER GANGA FROM  
HARIDWAR TO ALLAHABAD**

**Syed Shabih Hassan**

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and Animal Sciences University, Ludhiana (Punjab)

**ABSTRACT**

The Ganga has been a major source of capture fisheries in India. The river sustains a diverse flora and fauna including 382 species of fishes. Field survey was conducted during summer and monsoon at six selected stations in a total stretch of about 800 km between Haridwar and Allahabad. The intensity of fishing and fish diversity is low between Haridwar and Narora where a maximum of 34 species were encountered in September. Bagrids and Cirrhinus mrigala constitute the major catch upto Narora. With the convergence of a few small tributaries, the Ganges water gets augmented at Kanpur resulting in the increase in both the diversity (56 species) and abundance (15 times as compared to upper reaches) of fishes in the river. Further increase in both diversity (69 species) and catch (double that of Kanpur) was observed at Allahabad. The fish catch was most representative at Allahabad, where an important component of the Ganga fishery, the Hilsa, is encountered for the first time. The fishermen used traditional nets and gears in all major landing sites of the River Ganga which prove to be ineffective, as more manpower is required to get a poor harvest. It also appeared that lack of trained fishermen in fisheries sector resulted in low catch. The shifting course of the river, declining water level & fish productivity, lack of co-operative development for fish culture practice and violation of fishery regulation are affecting the Ganges fishery. Overall the major threats to Ganga fishery include pollution due to industrial and urban waste, indiscriminate use of chemical fertilizers and construction of a series of dams and barrages. All these have led to a decrease in water flow and degradation of riverine habitat in the river stretch.

**OP**

**META-ANALYSIS OF RETINOBLASTOMA AND IDENTIFICATION OF  
TARGET GENES**

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**ABSTRACT**

Retinoblastoma is a malignant tumour of the retina which commonly occurs in young children. It is an aggressive eye cancer of infancy and childhood. Retinoblastoma occurs due to the inactivation of both allele in Rb1 genes. Several studies reported the exposure of air pollutant and subsequent the development of retinoblastoma in children. Most of the children affected of the malady live in poor and middle-income countries where the mortality is about 70%. The diagnostic approaches currently available have their limitations however, genome-level technologies could make genetic testing a reality for every child affected of this malady. In the light of this fact, meta-analysis of human Retinoblastoma was done to identify gene enrichment, function and pathways analysis of hub genes. Total of 253 genes were identified using intense data mining from different databases like UNIPROT DB, NCBI etc and literature survey. The meta-analysis was performed using the Metascape server (<https://metascape.org/gp/index.html>) and the results were then analysed. Gene enrichment analysis shows that 123 genes have function in cancer out of which 57 are microRNAs. KMT2D and IGLV5 transcription factor is identified as drug target gene. KMT2D gene encodes for a methyl transferase protein which is a transcriptional regulator of beta-globin and estrogen receptor genes and IGLV5 is involved in the immunoregulation against foreign molecule entering human system. Functional and Process enrichment analysis shows that RB1 gene can be potential drug target. It encodes for a tumor suppressor protein called Retinoblastoma protein and involved in E2F transcription factor network and Mitotic Prophase pathway. This study identifies functional genes involved in Retinoblastoma and these genes can be further used as drug targets.



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**PP**

**CLIMATE SMART AGRICULTURE AND WATER MANAGEMENT IN  
INDIAN HIMALAYAN REGION**

**Pooja kala\***

Graphic Era Hill University, Dehradun

**ABSTRACT**

The Indian Himalayan Region extends from the Northern region of Jammu and Kashmir to the eastern region of Sikkim. Water is one of the major resources in addition to various other natural resources available in the region, also contributing towards the nation's economy. In the recent year's climate change has severely hampered the rainfall patterns, forest cover changes, anthropogenic activities glacier-mass balance and river flows. This has subsequently led to the degradation in water availability in certain areas of Himalayan belt. There are traditional methods of water conservation such as Naulas, Dhara etc. that had always been available in the region, including certain other practices that now need to be revived in the region. Also, the recent challenges of climate changes have posed a threat to available water resources in the region, with a major need for formulation of policies to conserve the same.

**PP**

**DOMINATION OF CLIMATE CHANGE ON GROWTH & MATURITY  
OF SEED**

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**ABSTRACT**

Climate Change refers to an overall alteration of mean climate conditions which increases in the surface temperature of the earth's atmosphere, ocean, and landmass. Primary causes of climate change are the increases in concentrations of various atmospheric "greenhouse gases". These gases were contributed by different sectors like energy supply, industries, forestry, agriculture, transport, residential and commercial building and other waste. Methane, CO<sub>2</sub> and nitrous oxide are the major greenhouse gases that cause the climate change by increasing the surface temperature of the earth's atmosphere, ocean and land mass.

When temperature is increasing otherwise decreasing above or below the optimum level will reduce the rate of different physiological process, seed germination, vegetative growth, flower initiation and reproductive development. In majority of the crops increasing temperature above the optimum level is reduce the pollen production and viability, seed setting, and number of seed which is ultimately reduce the seed yield. There is very little effect of elevated CO<sub>2</sub> on different stage of plant except vegetative growth and flower initiation. In some crops like rice, wheat, tomato and cucumber temperature is increase above the 30 0C which leads to male sterility. In case of potato no tuber formation, when night time temperature is increase above the 20 0. Need to study the pollen viability of different crop for hybrid seed production at different temperature condition. Seed viability study for processing, storage and transport at different temperature condition. Need to standardize the pollination time for all the crops. There is need to prepare a package of practice for seed production with respect to climate change.

**PP**

**ASSESSMENT OF LONG DURATION PIGEON PEA (*Cajanuscajan*)  
VARIETIES WITHSTAND DROUGHT AND WILT DISEASE IN RAINFED  
REGION OF NORTH EASTERN ZONE OF TAMIL NADU**

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**ABSTRACT**

A study was conducted for evaluation of different long duration and high yielding pigeonpea varieties in rainfed region of North Eastern Zone of Tamil Nadu to assess its drought and wilt disease tolerance. The field trials were conducted at Vellore district, Tamil Nadu during Kharif season 2017-18 using improved varieties along with ruling varieties as comparative check. The experimental plot was laid out in Randomized Block Design (RBD) and replicated in five times with the improved varieties of LRG 41, LRG 52 and CO-8 that are conferred for rainfed condition along with ruling pigeonpea variety CO-7 as Farmers practices. During the study, the recommended dose of fertilizer (RDF) was applied as per crop production guide. The growth and yield attributes viz., plant height (cm), number of primary and secondary branches per plant, number of pods per plant, seed yield (kg/ha), Stover yield (kg/ha) were recorded. The wilt disease caused by *Fusarium udum* Butler which is predominant yield limiting disease was also recorded. The results on field level performance the genotypes revealed that the pigeonpea CO 8 was recorded maximum plant height (184.2 cm), higher number of primary branches per plant (16.7), secondary branches per plant (29.5), number of pods per plant (279.8), minimum incidence (7.0 %) wilt disease with higher yield of 1290 kg/ha was gained. Based on the on farm trial results, it could be concluded that the long duration pigeonpea variety CO 8 was found to be better option for achieving higher productivity and profitability under the rainfed region of North Eastern Zone of Tamil Nadu.

**PP**

**REVERSIBLE APPRAISAL OF RESTRAINED STRESS FOLLOWING  
WITHDRAWAL IN MALE ALBINO RATS**

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**ABSTRACT**

This experiment was conducted out to ascertain the impact of restrained stress and its withdrawal probable variation on gravimetry, organ weight, hematological factors and level of serum cortisol in male Wistar albino rats. Adult male rats weighing around 200 to 220g were taken for the experiment and were separated at random into 3 groups of 6 animals each. Group I (control) kept undisturbed in the metabolic cage all over the 42 days experimental period. Group II (stress) rats were kept in a wire mesh restrainer for 6 hr/day for 42 days. Group III (stress+ withdrawal) rats were stressed for 21 days and withdrawal of stress intended for remaining 21 days (total 42 days). At the end of the assessment period, all the experimental rats were forfeited and gravimetric, organ weight, hematological factors and serum cortisol level were assessed. Findings shown that restrained stress being a psychological stress substantial ( $P \leq 0.05$ ) alter in the gravimetry, organ weight, hematological parameters and serum cortisol level. In contrast, Group III of withdrawal of stress shows consequent progress in these changes may possibly counteract restrained stress stimulated damage that preceded to oxidant antioxidant balance and alter hypothalamic-pituitary- adrenal (HPA) axis.

**PP**

**COMPARABLE STUDY OF SEMEN FREEZING AND THAWING IN  
RESPECT OF SPERM SURVIVAL AND MOTILITY**

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**ABSTRACT**

Phytic acid is a ubiquitous component present in all the crops and in maize its presence in embryo hinders the bioavailability of nutrients. Phytic acid is anionic in nature and it has the ability to chelate all the nutrients in food, when consumed as a whole grain in monogastric animals. However, it has beneficial roles in plant growth as an antioxidant and regulator in several metabolic pathways (Raboy et al.2001). Identification of three mutants in maize viz., lpa-1, lpa-2 and lpa-3 for low phytic acid (lpa) were successful in reducing the phytate content as compared to wild by 60%, 30% and 30% respectively. Whereas, the yield and phenotypic expression of these mutants were very poor due to the drastic reduction of phytic acid in them. Developing low phytic acid varietal lines in barley was successful as their lpa homozygotes were viable but in maize the lpa homozygotes are lethal. This stated the essentiality of this component in maize for attaining a higher yield. The correlation studies of phytic acid with yield and yield attributing traits revealed a positive correlation of phytic acid with yield and seed size (Pramitha et al.2019). Breeding methods incorporating the hybridization of lpa introgressed elite parents would be an alternate strategy to overcome the negative pleiotropic effects of lowering phytic acid in maize. Following this, several marker assisted back cross programs have been performed by Tamil kumar et al.2014 and Senthil kumar et al.2014 for lpa-2. These introgressed elite lpa lines could be used as female parents in hybridization programs to attain low phytic acid hybrids in future.

**PP**

**STUDIES ON THE DIVERSITY, ABUNDANCE AND ECOLOGY OF  
TETTIGONIID FAUNA (INSECTA: ORTHOPTERA: ENSIFERA) FROM  
KASHMIR, JAMMU AND KASHMIR, INDIA.**

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**ABSTRACT**

The family Tettigoniidae is the only family under superfamily Tettigonoidea which constitute more than 7200 species under 1020 genera within the order Orthoptera, out of which around 160 species under 68 genera are reported from India (Shishodia et al.). The Tettigoniid or katydid fauna of Jammu and Kashmir is less explored and insufficiently unknown. The previous studies included 7 species belonging to 7 genera under 4 subfamilies. Virtually all Tettigoniids are associated with vegetation, particularly during inactive periods when the insects retreat into or onto leaves. These habits are best known for cryptic species whose wings mimic leaves or sticks but even ground-dwelling. The grasshoppers are important pests and pose constant threat to agricultural crops all over the world. When the population of grasshoppers grows to catastrophic dimensions, they are among the most devastating enemies of agriculturists. Most katydids are omnivorous, feeding on vegetation, seeds, carrion and occasional prey. Feeding by katydids can damage crops, but a significant economic impact is rare because population densities are usually low. In Kashmir due to their low abundance because of the seasonal variation they are very less harmful to agricultural crops.



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