Abstract and Souvenir



UTTARANCHAL UNIVERSITY

TH PLANT SCIENCE RESEARCHERS MEET

PSRM-2021

NATIONAL CONFERENCE ON ADVANCES IN PLANT SCIENCES RESEARCH



20-21, November 2021









Organized By :

PLANTICA- Association of Plant Science Researchers (APSR)
School of Life and Applied Sciences, Uttararanchal University
Hemvati Nandan Bahuguna Garhwal University (A Central University), Srinagar

In Collaboration with















Venue
Swami Vivekanand Auditorium,
Uttaranchal University
Dehradun

Abstract and Souvenir

4th Plant Science Researchers Meet - 2021

National Conference
On
Advances in Plant Sciences Research

20 & 21 November, 2021



PLANTICA

Organized by

PLANTICA

Association of Plant Science Researchers (APSR)
Dehradun, Uttarakhand, India
www.pgrindias.in and www.plantica.in

In Association with



In Collaboratrion with















Veer Chandra Singh Garhwali Uttarakhand University of Horticulture & Forestry

Bharsar, Pauri Garhwal, Uttarakhand-246 123

Ref. UUHFNCI REC UUHF 104 2021

Date: 12-11-2021

MESSAGE



I am delighted to learn that "Plantica Foundation" is organizing "National Conference on Advances in Plant Science Research, 20-21 November, 2021 (4th PSRM, 2021)" with a motto to accelerate scientific research in the field of Plant Sciences.

I believe this conference will facilitate networking, information exchange and collaboration within and among the academician, scientist, researchers and students for future development of different dimensions related to plant Sciences.

I am very much concerned about the close relationship between the 'Agricultural Education' and the related industry. I would like to thank Plantica Foundation for having brought us together to discuss different challenges worldwide which the farmers are facing in. It seems to me pertinent to launch this topic which could be treated in a transversal way throughout the programmed sessions.

I hope the conference will specifically be rewarding for professional and personal benefit of scientific and research communities as we proceed towards a scientific progressive society contributing for knowledge sharing and implementation for sustainable development of the nation as whole.

(A.K. Karnatak) Vice Chancellor



Sri Dev Suman Uttarakhand University New Tehri Garhwal, Uttarakhand



Dr. P. P. Dhyani Vice Chancellor

MESSAGE

My Dear colleagues and friends,

I am delighted to know that "Plantica Foundation" is organizing "National Conference on Advances in Plant Sciences Research (4th PSRM, 2021)" from 20th November 2021 to 21st November 2021 at Uttaranchal University in Dehradun. I am sure that it will provide a wonderful platform to the researchers, subject experts, administrators and policy makers from different fields of plant sciences for an effective and productive exchange of not only knowledge but also sharing of experiences among the distinguished delegates of the conference having varied level of expertise. The conference will also offer ample opportunities to explore collaboration in the field of plant science research and technology transfer.

I congratulate the "Plantica Foundation" for their excellent efforts.

I wish the event a grand success.

(**Dr. P.P. Dhyani**)
Vice Chancellor







Additional Principal Chief Conservator of Forest Uttarakhand Forest Department Nodal Officer, Land Survey Directorate, Uttarakhand

MESSAGE

It's a matter of great happiness for me that Association of Plant Science Researchers, Plantica Foundation, Dehradun in association with School of Agriculture and allied Sciences, HNB Garhwal University is organizing 4th Plant Science Researchers Meet 2021 during 20-21 November, 2021. I extend my all good wishes to the convener, chief organising secretaries, organising secretaries and the national organising committee members for highlighting young plant scientist on a national level platform in the form of a seminar. It is really phenomenal and worth replicating by academic institutions.

Soil is an important element for a plant which provides a compulsory medium for its germination, growth and establishment. Soil erosion and landslides has become a day to day affair in almost all the Himalayan states and especially in the state of Uttarakhand. We all have witnessed heavy landslides and excessive soil erosion during monsoon 2021 season in Uttarakhand. I am of the opinion that our young plant scientist should seriously look into this matter and work over "soil stability". This being a compulsory requirement for the plant growth they must do contemporary researches for the stabilization of the land through appropriate vegetative measures. This problem statement opens up many new challenges before the plant scientist. These challenges not only include selection of site specific species but also aim at standardizing silvicultural systems for the propagation of these floral species. It may be grasses, legumes, shrubs, climbers or even trees.

Finally, it gives me immense pleasure to see that PLANTICA foundation is constantly progressing and supporting latest researches in Plant sciences and I wish all the best and good luck to the foundation for doing an outstanding work which will certainly be beneficial for the field practitioners as well as the local communities of the state.

(Dr Kapil Joshi)
APCCF

H. N. B. Garhwal University (A Central University) Srinagar Garhwal- 246 174, Uttarakhand, India

School of Agriculture & Allied Science

Prof. J. S. Chauhan Dean Tel: 01370-297127 (off) Mobile: +919412079499 email: js99chauhan@gmail.com



Message

I am delighted to know that Association of Plant Science Researchers (APSR), Plantica Foundation, Dehradun is organizing National Conference on Advances in Plant Science Research: under 4th Plant Science Researchers Meet on November 20 and 21, 2021.

I am confidant that National Conference on Advances in Plant Science Research will serve an excellent forum to congregate large number of delegates including researches, policy planners, agroindustries, marketing agencies, NGOs and progressive farmers to brainstorm and conceptualize a meaningful strategy for investigation in plants particularly in agricultural crops. This will promote awareness, advancement and disseminate knowledge on commercial and scientific aspects to project the importance of conservation and propagation of plants and further to strengthen the plant science fraternity.

I am sure the deliberations during this conference will help in preparing a roadmap for the quality agricultural produce for the food security to meet the challenges of climate change and resource crunch in agriculture.

On this occasion, I extend my greetings and felicitations to our honoured guests, all invitees, participants and members of the Association. I congratulate the Plantica Foundation and Association of Plant Science Researchers for their sincere efforts to take-up the noble task for organizing such an important conference and wish the Conference a great success. I wish the conference a great success.

Dated: November 01, 2021 Place: Srinagar Garhwal (Dr. J. S. Chauhan)

Dean

School of Agriculture and Allied Sciences



UTTARANCHAL UNIVERSITY

Message from the Desk of Chancellor



I am very happpy to see that 4th Plant Science Research Meet (PSRM-2021) is going to be conducted in the campus of Uttaranchal University from 20-21st November 2021 by joint collaborative effort of PLANTICA- Association of Plant Science Researchers (APSR), Uttaranchal University Dehradun & HNB Garhwal University. This plant science meet will be executed in the form of National conference on Advances in Plant Science Research. I appreciate the efforts of School of Applied and Life Sciences and Agriculture for collaboration with Plantica for organizing fruitful and valuable events for students, research scholars and faculty members.

I welcome all the eminent speakers & delegates in the conference and also convey my heartiest greetings at the release of 'souvenir' on this occasion.

I wish the conference a great success and hope that such conferences/ scientific meets on recent trends and developments in scientific research will be organized on regular basis and will be beneficial for all participants and society. I wish comfortable stay of all participants and delegates in the University Campus during the conference.

(**Jitender Joshi**) Chancellor Uttaranchal University



UTTARANCHAL UNIVERSITY

Message from Vice Chancellor



I am happy to note that National Conference on "Advances in Plant Sciences Research-2021" is being organized in campus of Uttaranchal University on 20-21st November 2021 by PLANTICA-Association of Plant Science Researchers (APSR), in joint collaboration with School of Applied and Life Sciences of Uttaranchal University, Dehradun. It is a matter of great pleasure that researcher and experts of Plant sciences and allied fields from various parts of India are going to deliver their expert talks in the Meet. The deliberation in the conference will be useful for all participants and recommendations of the experts will lead to new ideas about advancement in Plant Science Research.

I convey my heartiest congratulations to the organizing committee for release of 'souvenir' on this occasion. The souvenir chronicles the thoughts and innovative practices shared by eminent scientists, research scholars and educationists from the wide spread fields of biological science, chemical science and interdisciplinary areas .I wish my best wishes with thanks to all the Authors, Reviewers, Sponsors, Eminent Speakers, Members of Advisory Board , Executive committee members and student-volunteers of the conference for successful organization of the conference. On behalf of Uttaranchal University I would like to welcome all the delegates and guests to the conference. I hope that all participants will enjoy the conference and find the technical session exciting and fruitful.

Prof.(Dr) Dharam BuddhiVice Chancellor
Uttaranchal University





Indian Academy of Rural Development (IARD) Plantica Foundation, Dehradun, Uttarakhand www.pgrindias.in and www.plantica.in



Dr. Anoop Badoni
Ph. D, FAPSR, FIBTCA
Founder – PLANTICA
President – APSR
Scientist and Director – IARD

Dear Students, Research Scholars, Faculty, Scientist and Professors,

It is my privilege and honor to welcome you all to the 4th Plant Science Researchers Meet – 2021 under major theme "National Conference on Advances in Plant Sciences Research" in association with Uttaranchal University, Dehradun and H.N.B. Garhwal University (A Central University), Srinagar and in collaboration with ITM University, Gwalior, RIMT University, Punjab, Sanskriti University, Mathura, Graphic Era Hill University, Dehradun, UCBMSH, Dehradun and SPKM, Sawantwadi, Maharashtra.

The main goal of organizing this conference is to share and enhance the knowledge of each and every individual in this fast-moving Information Era. We have given a good opportunity for those who have a thirst in knowing the present developments and also share their ideas. Additionally, this conference will also facilitate the participants to expose and share various novel ideas. The conference aims to bridge the researchers working in academia and other professionals through research presentations and keynote addresses in current research and development in Plant Sciences. You will get ample opportunities to widen your knowledge and network.

I am delighted to say that 4th PSRM- 2021 is being organized at Uttaranchal University, Dehradun with all its glory. From the very start PSRM Conference has been the trend setter in this continent. Numbers of participants are increasing every year. We have observed a steady rise in the number of quality manuscripts being received in the conference. Major cornerstone has been the number of key persons/researchers present for key notes and discussions in the conference. There are few authors who are attending the conference every year which in itself is an indication that they are getting good inputs from the conference for their research work.

I wish that PSRM will keep on growing in coming years with more impact on the National as well as International research community.

On behalf of Organizing Committee of 4^{th} PSRM -2021 and on my personal behalf I would like to welcome all distinguished scientists, researchers and students and thank them for participation in the conference.

Thanks to all members of APSR, Editorial and Advisory Board of PLANTICA, all organzing committee members, all collaborative partners specially Uttaranchal University to accept our invitation to host the conference and all participants to support us by your valuable suggestions, research and time for making the conference a success.



UTTARANCHAL UNIVERSITY

(Established vide Uttaranchal University Act, 2012)

Ref. UU/SALS /2021/ 11-conf. mess, 10 Nov, 2021

Prof. Dr. Ajay SinghCo- Convener – 4th PSRM, 2021
(Dean- School of Applied & Life Sciences)
Uttaranchal University, Dehradun



MESSAGE

On behalf of Uttaranchal University and Co-Convener, it is my proud pleasure to extend a warm welcome to all dignitaries, guest and delegates in this National Conference on "Advances in Plant Science Research (4th Plant Science research Meet-2021) on 20-21 Novemebr,2021. Theme of the conference is based on Research and advances in Plant Science field. As Uttarakhand State is having rich diversity in variety of plant and this is need to discuss current advances to make it useful for all researcher in plant sciences and allied field.

Our Technical programs are rich and varied with the talks of distinguished experts of plant sciences, Agricultural sciences, pharmaceutical sciences, chemical sciences and allied fields. Hopefully they will be useful for all participants. As a co-convener and Dean- SALS, I thank to Shri Jitendra Joshi ji, Chancellor of the University. for providing full support along with infrastructure to organize the event smoothly. We are thankful to Prof. (Dr) Dharam Budhi Vice Chancellor and Prof. (Dr) Rajesh Bahuguna Pro-Vice Chancellor of Uttaranchal University to provide guidance to organize the conference successfully. I wish happy & fruitful stay for all the delegates.

(Dr.Ajay Singh) Co- Convener/Dean-SALD National Conference On Advances in Plant Sciences Researchers

Abstract and Souvenir

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4th Plant Science Researchers Meet (PSRM) - 2021 **National Conference on Advances in Plant Sciences Researchers** 20 & 21 November, 2021

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AEROPONICS – AN EXCELLENT TECHNOLOGY TO PRODUCE DISEASE FREE SEED POTATO

Dr. R.K. Arora

M. Sc., Ph.D., ARS

Ex- Principal Scientist, Indian Council Agricultural Research – CPRI rkacpri@yahoo.com, dr.arora.rk@gmail.com

Knowledge gained through research in plant sciences can play an important role in increasing food production and solving many environmental issues. Aeroponics is one of such technology which was initially envisaged as a solution to grow plants in space but it has been picked up as a novel technique to produce high quality disease free seed potatoes under high tech cultivation. The technique involves growing plants in soilless media by planting high quality tissue culture plants on table tops on the boxes wherein the roots get suspended within the boxes and get nourished by a mist of nutrients sprayed by high pressure nozzles operated by the pumps for set timings. The units are often housed in insect proof structures to facilitate production of virus free seed potatoes. The crop can be grown in all seasons and at places which are otherwise not suitable for seed production. The technique enables us to produce up to 50 seed tubers per plant as against around 6 produced through conventional methods. The technology saves on water and fertilizer since the same nutrition solution is circulated many times in the chamber. Seed produced by this technique is free from soil borne diseases which are difficult to control in field multiplications. The technology has picked up with many progressive farmers and reputed seed companies engaged in high quality seed potato production. High number of seed tubers of high quality produced by this technique has eliminated the need for additional field generations followed in the traditional system. Because of these qualities the technology has great potential to bridge the gap between demand and supply of high quality seed which is instrumental in increasing potato productivity.

SUSTAINING BIODIVERSITY CONSERVATION THROUGH PEOPLE'S PARTICIPATION: "CONCRETE HEAPS TO CARPET GREEN"

Dr Kapil Joshi, IFS

Additional Principal Chief Conservator of Forest, Uttarakhand

The state of Uttarakhand is situated in the northern part of India and shares international boundaries with China in the North and Nepal in the East. It has an area of 53483 Sq. Km, out of which 34651 Sq. Km (64.79%) is forest area. Physiographical, the state is divided into three zones namely- The Himalayas, the Shiwaliks and the Terrai Region. The state has a temperate climate except in the plain areas where the climate is tropical. Nainital is one among the 13 districts of Uttarakhand State with a geographical area of 4251 Sq. Km, out of which 3093 Sq. Km (72.76%) is forest area. The work area described in this paper is known as Hanumangarh Hillock which is situated at Manora ridge of Nainital forest division. Hanumangarh Hillock consists of a famous temple of lord Hanumana. In front of the temple lies a vast, rugged, rocky but flat area of about 5 acres in the form of a hillock. Since 2007, the area attained a "free to all" type status and it was illegally being used as a garbage dump of municipality waste, dumping of construction waste of the city and a recreational paradise for antisocial elements. This paper reflects light on how a stinking and loosely bound heap of "city garbage and concrete mix" was converted into a lush green centre of biodiversity conservation in the Himalayan region. Approaches to achieve this were people's participation, involvement of social elites of the area, consensus generation through participatory mean and use of a technologically sound methodology to stabilize a highly fragmented and degraded land mass. The paper discusses the role of jute geo textiles in the control of soil erosion and Mass Wasting. The paper also details the appropriateness of participation based conservation approach while dealing with a degraded land of high social and political and ecological sensitivity.

SOIL-PLANT-MICROBE INTERACTIONS TOWARDS IMPROVING SOIL HEALTH, PLANT GROWTH AND NUTRITION

Dr. Sanjay Arora

Principal Scientist

ICAR-Central Soil Salinity Research Institute, Regional Research Station, Lucknow, U.P.

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Soil is an important natural resource providing water, nutrient, and mechanical support for plant growth. In agroecosystem, continuous manipulation of soil is going on due to addition of input, removal of nutrients, changing water balance, and microbial life. These processes affect soil properties viz. physical, chemical, and biological, and the deviation of these properties from the normal status is controlled by soil buffering capacity and soil resilience. If these changes are beyond the reach of soil resilience, then soil loses its original state, leading to soil degradation. At present, the extent of the degraded area in the world is 1.036 to 1.470 million ha. This urges the need for maintaining soil health rather than the mere addition of input for crop production. Soil health is an integrative property that reflects the capacity of soil to respond to agricultural intervention, so that it continues to support both agricultural production and the provision of other ecosystem services. Maintaining the physical, chemical, and biological properties of soil is needed to keep it healthy, and this is possible through the adoption of different agronomic approaches. The diversification of nutrient sources with emphasis on organic sources, adoption of principles of conservation agriculture, enhancement of soil microbial diversity, efficient resource recycling through the integrated farming system, and amendment addition for correcting soil reactions are potential options for improving soil health. The agro-techniques such as green and brown manuring in arable land and agroforestry on degraded and marginal land were followed on piece meal basis and for economic gain. The potential of these and several other options for maintaining soil need to be recognized, evaluated, and quantified for their wider application on the front of soil health management avenues. The use of crop residue, agro-industrial waste, and untreated mineral or industrial waste (basic slag, phosphogypsum, etc.) as soil amendments has a huge potential in maintaining healthy soil along with serving as sources of crop nutrition. In salt affected soils, neither physical nor chemical remediation methods are cost-effective for saline/sodic soil reclamation. There is an urgent need for better methods to raise plants/crops on salt affected soils to meet the food, fiber and livelihood demand of growing population. Halophilic microorganisms are salt tolerant bacteria and fungi having potential for bioamelioration of salt stress. The applications of halophilic bacteria include recovery of saline soil by directly supporting the growth and stress tolerance of vegetation, thus indirectly increasing crop yields in saline soil. Plant-microbe interactions are beneficial associations between plants and microorganisms and also a more efficient method for reclamation of saline soils. Bacteria are more commonly in this technique than fungi.Plant growth promoting halophilic bacteria induces plants salt stress tolerance and can help in coming out with the cost-effective solution for saline soils, improving agricultural crop yields and improving soil health. Inoculation of halophilic plant growth promoting bacteria through their formulations is known to mitigate salt stress and enhances crop growth and yields. Halophilic microbial formulations developed by authors Halo-Azo, Halo-PSB, Halo-Zinc, Halo-Mix are effective in enhancing crop growth and yield under salt stress and Halo-CRD as effective crop residue decomposer for recycling of nutrients with proper management of paddy residues to avoid burning and in-situ management of residues for soil health.

Assessment of Storage and Seed Germination Behaviour on Germinability in the Endangered Medicinal Plants and Traditional Crops: A conservational Approach to the Central Himalayan Agro-ecosystems

Prof. Dr. J.S. Chauhan

Dean

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The study is divided into two sections dealing respectively with assessment of storage and seed germination behaviour in rare, endangered and threatened (RET) medicinal plants and Agroecosystems of the Himalayan region. When cultivation of any crop comes into picture, the availability of good planting material becomes more crucial. Good source of quality seed is necessary for raising healthy plants. The Seed can be made available through standard seed testing procedures accepted by International frontiers. In the wild natural regeneration of (RET) species is very low and erratic in the nature due to various physiological reasons. Ultimately, there is an urgent need for rapid uniform seed germination along with vigorous and synchronized seedling establishment and need to identify morphological traits for the assessment of quality seedlings. Some medicinal plant species have become scarce in the forest due to environmental change; insufficient natural regeneration, seed dormancy, and emptiness nature of seeds, over exploitation by human interference in their habitats and rapid increasing demand in the market and human pressure have been identified as the possible causes of vulnerability in endangered and threatened medicinal plant species. Unscientific and excessive harvesting of aboveground plant parts before seed setting has mounted tremendous pressure on some existing populations. Habitat loss and degradation have been identified as the major factors for threatening. The second emphases of the studies are various factor those affects agroecosystems of the Himalayan region. A large section of the central Himalayan population largely depends upon agricultural based activities for their livelihood. Traditional agroecosystems in the Himalayas are complex, in which crop husbandry, animal husbandry and forests constitute interlinked production systems. The land use change in the Himalayas is significant and affects a whole range of issues. These encompass concerns such as global warming and climate change, biodiversity depletion, biological invasion, land degradation and hydrological imbalances ultimately affect the natural resources. The present theme is an attempt to understand the status and changing scenario of the Central Himalayan agroecosystems, and to assess the rate, causal factors and ecological and social dimensions or indicators and their impacts on agrobiodiversity loss.

PRODUCTIVITY STATUS OF ORGANIC FARMING IN RUDRAPRAYAG VERSUS TRADITIONAL FARMING IN HILL DISTRICTS OF UTTARAKHAND

Dr. Sanjay Sachan

Head, Krishi Vigyan Kendra (GB Pant University of Agriculture & Technology) Jakhdhar, Rudraprayag, Uttarakhand

In the hill districts of Uttarakhand traditional farming is done in which minimal inorganic inputs like urea, DAP, weedicides, insecticides and fungicides are used, whereas district Rudraprayag was declared as organic district in 2015-16 and the use of inorganic inputs was banned thereafter. In the entire hill districts of Uttarakhand mainly rainfed farming is done which is all over prone to vagaries of nature. A look at the production data of 2019-20 revealed that in rice district Rudraprayag had an average productivity of 12.87q/ha, whereas Uttarakhand hill districts had an average productivity of 14.58q/ha and district Tehri had a productivity of 17.13g/ha followed by Uttarkashi at 16.93g/ha. In wheat district Rudraprayag had an average productivity of 15.77g/ha whereas Uttarakhand hill districts had an average productivity of 18.22g/ha and district Champawat had a productivity of 22.00g/ha followed by Tehri at 20.94q/ha. In nutricereal crops like finger millet district Rudraprayag had an average productivity of 12.90g/ha, whereas Uttarakhand hill districts had an average productivity of 14.29 g/ha and district Champawat had a productivity of 15.98q/ha followed by Tehri at 15.96q/ha. In barnyard millet the district Rudraprayag had an average productivity of 15.16 g/ha, whereas Uttarakhand hill districts had an average productivity of 13.81 g/ha and district Tehri had a productivity of 16.03g/ha followed by Uttarkashi at 15.18q/ha. However the data of Amaranth crop reveals all together a different picture as highest productivity of Amaranth is recorded at 11.50g/ha and its also more than Uttarakhand hills data of 10.79q/ha. It is also to be noted that Amaranth crop is ODOP of district Rudraprayag. A lot of productivity gap is there in special reference to rice, wheat and nutricereals. More research and extension work needs to be done to increase the productivity of these crops so that farmers are able to increase their agricultural income.

CONCEPT OF MIYAWAKI PLANTATION METHOD AND ITS POTENTIAL TO MITIGATE CLIMATE CHANGE

¹Rathod Digvijaysinh*, ²G. Rajeshwar Rao, ³S. Saravanan, ⁴Nanita berry

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The scientific management of forest is fundamental to the continuous production of goods and services. The Forest is categorized into different groups based on origin, age, composition, stands, structure, Ageclass distribution, working circles. The plantation forest is a man-made forest. The practice of plantation trees was initiated in our country during the 18th century. The National Forest Policy (1988) aims at bringing 33% of the geographic area under forest and tree covers. The present total forest and tree cover of the country is 8, 07,276 sq km which is 24.56% of the geographical area of the country. Forest recovery takes a long period, and the outcomes are frequently disappointing, as evidenced by more than 200 years of reforestation practice. For us, such long time duration is too long to complete the process of forest restoration or recovery because we live in a world where industry and urbanization are developing very rapidly. So we need alternative methods like the Miyawaki plantation technique. Prof. Akira Miyawaki proposed reliable forest restoration method i.e. "native forests by native trees," based on the vegetationecological theories and applied first in Japan. Miyawaki plantation having the ability to absorbed air pollutants and reduce noise pollution. During the study on Miyawaki plantation observed that among all species planted in plantations on different sites observed that maximum height growth was recorded in Melia azedarach (12.7 m) followed by Gmelina arborea (6.3 m), Vitex negundo (6.0 m) and minimum in Lawsonia inermis (0.2 m), Limonia acidissima (0.4 m) and highest diameter growth in Melia dubia (9.20 followed by Gmelina arborea (8.39 cm), Melia azedarach (7.03 cm) and lowest in the Limonia acidissima (0.58 cm). Miyawaki plantations have a positive impact on microclimate parameters (temperature, humidity, light intensity), augmenting birds and butterflies population by providing food and shelter, great potential for carbon sequestration, aesthetic and recreational values of the city is also increasing.

Key words: Man-made Forest, Microclimate, Native trees, Reforestation

RECENT ADVANCES IN NEW FRUIT CROP VARIETIES DEVELOPMENT PROGRAMME IN INDIA

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Fruit crops play an important role in the economic development, nutritional security, employment generation and overall economic growth of nation. The worldwide mean daily fruit consumption of one person is approximately 170 g at the moment, which results in a total world consumption of about 390 million tonnesfruit crop production is thus of particular economic importance. It is being cultivated in India on 2313 lakh hectares area with annual production of 22353 MT/ha. The per capita consumption of fruits in India is only around 46gm/day against a minimum requirement about 92g/day, recommended by (Indian Council of Medical Research and National Institute of Nutrition, Hyderabad). Highly productive cultivars are one of the most important basic requirements which must be available to cover such a demand. Fruit breeders are therefore always in search of new genotypes, which are more productive, highly resistant and better adapted to existing environmental conditions. Fruits exhibit vast diversity in various forms, shapes and aspects. According to climatic requirements, they are temperate, tropical and subtropical crops. Major tropical and subtropical fruits include mango, banana, citrus, grapes, litchi, pineapple, papaya, Sapota, guava, mangosteen, avocado, jack, ber, passion fruit etc. Apple, plum, peach, pear, cherries, and nuts are the main temperate fruits. The various institutes worldwide and from India developed lot of new improved fruit varieties with high nutritive values and other qualitative parameters and also suitable for export by using different and modern breeding techniques.

NANOFORMULATIONS OF BIOPOLYMERS VIZ. SILICA, CHITOSAN AND CHITO-OLIGOSACCHARIDES (COS) AS POTENT PESTICIDAL AGENTS AGAINST COTTON BOLL WORM

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Chitosan and chito-oligosaccharides (COS) are the natural molecules having significant pharmacological action and promising agricultural activities. Such preparations were obtained from exoskeletons of crustaceans after series of processing steps. These molecules are responsible for inhibiting microbial growth attacking the crops, inducing natural defensive mechanisms in plants and enhancing the growth of the crops. In the present study, the antifungal activities of chito-oligosaccharides (COS), growth promoting and pesticidal activities of chitosan were determined on cotton crop and the reduction in percent population of cotton boll worm was studied. The results of the study showed promising activities of Chitosan and chito-oligosaccharides (COS) as illustrated in the study.

Keywords: Chitosan, Chito-oligosaccharides (COS), crustaceans exoskeleton, growth promotion activities, pesticidal activities, cotton crop.

AIOT(ARTIFICIAL INTELLIGENCE OF THINGS): AN APPROACH TOWARDS HI-TECH AND ECO-FRIENDLY AGRICULTURE THROUGH AEROPONICS

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AIOT is the convergence of AI (Artificial Intelligence) and IoT (Internet of Thing) which is going to redefine the phase of automation in agriculture, i.e. Agriculture 4.0 revolution. Both the components, AI and IoT are independent technology which together act as the digital nervous system. AI is the decisionmaking system like brain and has overall control over the IoT which functions as peripheral nervous system. The combination of these two develops a self-correcting and self-healing system of high degree of automation called as AIoT (Artificial Intelligence of Things). IoT is the cloud-based data storage facility where information is collected through sensors from different sources while the artificial intelligence ensures real time response to the changes or deviations. The cloud-based computing system provides three key aspects viz. connectivity, storage and compute which are the foundation of IoT. The first generation of cloud based IoT provided five key capabilities: to collect, to store, to process, to analyse and to control. Aeroponicculture is one of the hi-tech approaches which is based on AI and is perfect application of IoT. It provides growth-controlled atmosphere where root system remains suspended in air and mist of nutrient solution. Aeroponics results in lowering of water requirement per unit of area and provides eco-friendly conditions for plant growth. This technique ensures: the proper exploitation of the vertical space of the green house with optimized root, tubers and foliage growth in plants; keep precise control over root zone nutrient or rhizosphere, water regimes and environmental condition around the root system; greater water and nutrient use efficiency; and better cropping due to well managed nutrient availability and pH of growing media.

Keywords: Aeroponics, AIoT, Artificial Intelligence, cloud-based computing system, Internet of Thing.

BIOPOLYMER-BASED NANOTECHNOLOGY APPROACHES TO DELIVER ENCAPSULATED BIOACTIVE COMPOUNDS FOR FOOD APPLICATIONS

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Food nanotechnology is an emerging and rapidly evolving field that encompasses an extremely broad range of disciplines and has found various applications in different food sectors. Bioactive compounds possess plenty of health benefits, but they are chemically unstable and susceptible to oxidative degradation. The application of pure bioactive compounds is also very limited in food and drug formulations due to their fast release, low solubility, and poor bioavailability. Encapsulation can preserve the bioactive compounds from environmental stresses, improve physicochemical functionalities, and enhance their health-promoting and anti-disease activities. Micro and nano-encapsulation based techniques and systems have great importance in food and pharmaceutical industries. The emerging applications evolve towards the preparation of nanoparticles with better physicochemical and biological properties. Nanoparticles of biopolymers like proteins (whey casein, gelatin, collagen, Keratin, etc.) and polysaccharides (starch, β glucan, cellulose, pectin, chitosan, pullulan, and others) allow the formation of fibers and capsules with good loading efficiency and delivery capacity of bioactive compounds. Bioactive compounds in the free form are often unstable and degradation during passage through the digestive system further decreases the amount of biologically active compounds reaching the absorption site. Encapsulation in a biopolymer matrix facilitates the delivery process and protects bioactive compounds like vitamins, polyphenols, and probiotics from harsh environmental, thermal, and gastrointestinal processes. Currently, the nanoencapsulation of bioactive compounds is highly popular and considered more advantageous than microencapsulation. The nanoencapsulation increases the bioavailability, solubility, and bioactivity of encapsulated compounds and thereby increases their bioavailability and bioactivity after digestion.

Keywords: Nano-encapsulation, Bioactive Compounds, Biopolymers, Food Nanotechnology

APPLICATION OF WASTEPINE NEEDLES ,ALOE VERA WASTE ,KAOLIN CLAY AND PVA IN DEVELOPMENT OF BIO-HYBRID FILM

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In the present scenario, non-biodegradability of plastics like polythene is one of the most important environment issues that needs to be addressed. Utilization of biodegradable bioplastics made from renewable bioresources can provide a sustainable and environmentally friendly solution. The present study proposes a short method for developing biodegradable bioplastic from forest waste material like pine needles, aloe vera waste and clay. In this workpine needles and Corn cob have been used as a source of carbohydrate and starch. Kaolin clay has been used as a filler and Butyraldehyde as a cross linker.Kaolin Clay /Silica as a Fillerhave been used in making Nano composite along with PVA (Poly vinyl alcohol) and Plasticizer (Glycerol or Glycol). Consequently Bio Hybrid film were casted. In this study used material are almost waste materials. Modified hummers method were applied in prepraration of nanocomposite methods. Plastic film formed has shown better strength properties as compared to PVA film or PVA-Polyethene film, PVA-cellulose Film and PVA-Starch Film. These new material film have shown good thermal stability as compare with traditional bag due to which it can be used in making disposable bags and disposable palates. Such bags may be used for carry material at -°C to 100°C conformably, even film is stable up to 110°C. In this study Butyraldehyde have been used as a cross likers in the ratio of 3-5%(v/w), Kaolin Clay /Silica have been used as a Fillerin the ratio of 2-3 %(w/w) and PVA were used in making Nano-composite along with plasticizer (Glycerol or Glycol). In this study less chemical have been used in making of Nano Compositeby using modified Sol gel Method (Casting Method) and Thermal (extruder or extrusion) method. Cross linked Agent (2-5%, v/w) are providing higher thermal stability & more strength in Bio Plastic Film. Fillers (2-10 %, w/w) are providing smoothness increases in upper layer and increases Water replicance. Bio plastic bag prepared by these nanocomposite film can be used to replace traditional Non degradable bag. In this study prepared nanocomposite film is also biodegradable with some photolytic effect. Such composite films were characterized by using Water Absorption, UV- Visible Characterization, SEM, FT-IR and TGA. SEM analysis confirmed formation of Nano-composite in the range of 70-80 nm size. FT-IR proved formation of new bonding in composite and TGA was used for thermal stability determination. Overall such films prepared are bioplastic which are having sufficient strength properties along with thermal stability due to which it can be used in making bio plastic carry bags.

MORPHOLOGICAL VARIATION IN FLORAL CHARCTERS ON TUBEROSE (*Polianthes tuberosa* Linn.) CULTIVARS TREATED WITH EMS

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Mutagenic effectiveness of EMS was studied on four cultivars of tuberose ($Polianthes\ tuberosa\ Linn.$) cv. Kalyani Single, cv. Kalyani Double, cv. Suvasini and cv. Prajwal by treating them with 2 doses of EMS (0.1%, 0.2 %) .The findings indicated that there was significant morphological variation related to floral character in cultivar prajwal and Suvasini treated with EMS (0.1%, 0.2 %). The findings indicated that mutagenic treatments with lower doses EMS lower doses (0.1%,) resulted in increase in floral size of few florets within a spike.

INDIA'S AGRICULTURE: SITUATION, CHALLENGES, POLICIES, AND STRATEGIES

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During the 1970s, India's agriculture had a tremendous technological breakthrough with the Green Revolution. Food grain production increased significantly, and the country moved closer to self-sufficiency. For the Indian agriculture sector, it was a watershed event. However, since then, demand has skyrocketed, outpacing productivity growth by a factor of ten. The lack of investment in research and development, infrastructure development, and technology application is one of the primary hurdles to India's agricultural prosperity. The current government's goal of doubling farmers' income by 2022 is a lofty one. This method, if effectively executed, would address the core causes of India's agricultural hardship. The purpose of this study is to provide an overview of India's agriculture sector, as well as the issues it faces and potential solutions.

Keywords: Watershed, Green Revolution, Investment, Productivity, and Development

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Abstracts

KINSHIP: FLORA AND AVIFAUNA

Ashish S. Ghormade

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Birds interact with organism by many more ways and it's not an observation of nowadays it has been observed earlier. Most birds from urban parks depending on specific plant community due to specific dietary and nesting habit and requirement. These present days, most of the locust attacks on crop that is happened due to break down the food chain and birds kept in the cage. By keeping all things these in mind, we are trying to investigate the significance of ornamental plants as bird's food plants as well as why they love those specific plants (flora) and many more

things through this study. Threats include, increasing poaching for feathers and meat, habitat destruction, mortality due to chemical fertilizers and pesticides, poisoning by farmers to prevent crop damage and extraction of various parts of flora for traditional medicines. To keep maintaining of kinship (loving relationship) between flora (ornamental plants) and avifauna (birds) plays an important role in regulating the ecosystem balance. So, the proper implication of conservation measures is the need of hour before extinction.

Key words: flora, fauna, conservation, ecosystem

Abstract- PSRM-4/NCAPSR/002

IMPACT OF CLIMATE CHANGE ON PLANT DISEASES P. S. Barde, M. S. Joshi & P. G. Borkar

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The Global climate change is the most prominent issues of the environment due to increasing concentration of greenhouse gases (GHG) in the atmosphere. The earth's observed climatic changes over the past 50 years are caused by various human activities Amezon and Austrelia bushfire are recent example. Green house gases are having a major share in the CO₂ being an important climate change, culprit in the scenario (Nazir etal., 2018). Around 450million tonns of CO₂ is singly emitted by Austrelia fire and now there is no availability of sink to absorb that emitted CO2 as early lost amezon forest which is called as "Oxygen source planet". Due to the elevated CO₂ concentration, there is an increase in atmospheric temperature, leading to global warming which will have a substantial impact on plant-disease interactions as well as growth and cultivation of different crops (Luck et al., 2011).

The classic disease triangle recognizes the role of climate in plant diseases as no virulent pathogen could induce disease on a highly susceptible host if climatic conditions are not favorable. Climate influences all stages of host and pathogen life cycles as well as occurance of disease. Disease severity over a period can fluctuate according to climatic variations. The main factors of growth and development of diseases are temperature, light and water. The climate change affects the survival, vigor, rate of multiplication, sporulation, and dispersal of inoculums, rate of spore germination and penetration of pathogens. Climate affects all life stages of the pathogen and host and clearly poses a challenge to many pathosystems. The environmental change, especially combined with pathogen and host introductions, may result in unprecedented effects. More research is needed to obtain base-line information on different disease systems. Thus it is concluded that systematic quantitative

analysis of these effects will be necessary in developing future disease management plans,

planting schedules, chemical and biological control methods and increased monitoring for new disease threats.

Abstract-PSRM-4/NCAPSR/003

EFFECT OF WEED MANAGEMENT PRACTICES ON WEEDS AND NUTRIENT UPTAKE BY BLACKGRAM (VIGNA MUNGO L.) CROP

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A field experiment was conducted at Birsa Agricultural University, Ranchi, Jharkhand during rainy & winter seasons of 2015-16 and 2016-17. The experiment was laid out in randomized block design with 12 treatments i.e. haloxyfop 81 g/ha, haloxyfop 108 g/ha, haloxyfop 135 g/ha, haloxyfop 270 g/ha, fenoxaprop-p-ethyl g/ha, quizalofop-ethyl 43.8 61.9 imazethapyr 100 g/ha each applied at 20 DAS, pendimethalin 1000 g/ha, oxyfluorfen 100 g/ha each applied at 3 DAS, two mechanical, two hand weeding each performed at 25 and 45 DAS and weedy check, replicated thrice. Black gram var. Birsa Urd-1 was sown at 30 cm using 30 kg seed/ha fertilized with recommended level of nutrients N:P₂O₅:K₂O:Si.e. 25:50:25:25 kg/ha. Mustard *var.* Pusa-Bold was sown at 30 cm using 5 kg seed/ha fertilized with recommended level of nutrients N:P₂O₅:K₂O:S i.e. 80:40:20:20 kg/ha. The experimental field was mainly infested with *Eleusine indica, Echinocloa* spp. *Commelina* spp., *Alternanthra sessilis and Cyperus* species. Two hand weeding at 25 & 45 DAS recorded maximum nutrient N, P & K uptake by grain (46.62, 6.40 & 19.23 kg/ha) & straw (32.68, 1.88 & 28.97 kg/ha) of black gram crop and minimum removal by weeds (29.42, 7.27 & 27.43 kg/ha, respectively).

Keywords: Blackgram, Nutrient Uptake, Nutrient Removal, Weed flora

Abstract- PSRM-4/NCAPSR/004

BIOREMEDIATION OF POLLUTED POND WATER BY HETEROTROPHIC AND AUTOTROPHIC BACTERIA (NITRIFYING) IN SIMULATED AQUACULTURE SYSTEM

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The present investigation was carried out at the department of Agricultural Microbiology, College of Agriculture Raipur, Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.) during the year 2017-2019 on bioremediation of polluted pond water for increasing fish production. In all, 8 treatments were replicated three times and used with Completed Randomized Design (CRD) was inoculation of the fish aquarium with the autotrophic and heterotrophic bacteria from the polluted fish ponds, i.e., T_1 (Control), T_2 Organic source of N (Urea 2 ppm) + No inoculums, T_3 Organic source of N (Urea 2 ppm) + Composite

culture of heterotrophic bacteria, T_4 Organic source of N (Urea 2 ppm) + It was a mixture of the composite culture of autotrophic and heterotrophic bacteria, T_5 Organic source of N (Urea 8 ppm) + No inoculums, T_6 Organic source of N (Urea 8 ppm) + Composite culture of heterotrophic bacteria, T_7 Organic source of N (Urea 8 ppm) + It was a mixture of the composite culture of autotrophic and heterotrophic bacteria and T_8 Organic source of N (Urea 12 ppm) + Composite culture of heterotrophic bacteria. This study was carried out in twenty-four aquariums (volume 75x45x30

cm³) containing 70.00 liter water under greenhouse conditions. The soil and water samples from polluted pond water were taken for isolation of autotrophic and heterotrophic bacterial isolates, twenty-four samples from different locations of the Raipur area were collected. both combinations of inoculants i.e. I₁ (mixed culture of local bacterial isolates

 $N\it{itrosomonas}$ NS8 and $\it{Nitrobacter}$ NB8) and $\rm I_2$ (The mixed culture of local bacterial isolates N $\it{itrosomonas}$ NS8 and $\it{Nitrobacter}$ NB8 and PS5 $\it{Micrococcus}$ \it{Iuteus} CP001628 and PS16 $\it{Ochrobactrum}$ $\it{pituitosum}$ AM490609) were used and got better result of the $\rm I_2$ in the aquatic ecosystem.

Keywords: Aquatic Ecosystem, Inoculants, Isolation, Nitrosomonas, Nitrobacter

Abstract-PSRM-4/NCAPSR/005

ECONOMICS OF CROP BASED MODULE DESIGN FOR WESTERN RAJASTHAN UNDER FARMER FIRST PROGRAMME BY AGRICULTURE UNIVERSITY, JODHPUR Garbar Singh¹, Shilpa Kumar², Rajesh Kumar Serawat³ and Mahendra Kumar⁴

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The Farmer FIRST (Farm, Innovation, Resources Science and Technology) Programme aims at enriching farmer scientist interface with focus on technology assemblage, applications and feedback running in Agriculture University, Jodhpur under monitoring and funding by ICAR- Division of Extension and ICAR-ATARI Jodhpur. The technology resulted that the crop year 2020-21 mustard varieties NRCHB-101 & PM 26were found superior over local mustard as it gave average seed yield of 19.0& 18.0 g/ha which was 18.8 & 12.5 per cent higher over local variety. Similarly improved varieties of wheat Raj 4083 and Raj 4120 tolerant to heat stress during ripening stage recorded additional return of Rs 8,000/- &Rs 3,100/- ha, respectively over local wheat crop. As far as green gram variety MH 421 was found superior and produced seed yield of 10.8 g/ha closely followed by variety GaM -5 (9.5 g/ha). As well as pearl millet hybrids MPMH17 and MPMH 21 recorded net return of Rs. 20,400/- and Rs.14, 100/- per ha under rain fed condition and found safe from bird damage. Similarly moth bean is grown in light soils and under rainfed condition. Improved varieties RMO-435 & CAZRI Moth 2found superior over local by increasing the seed yield to the tune of 27.9 and 10.3 per cent, respectively. Likewise dwarf, branched and early maturing drought tolerant varieties of cluster bean are preferred by the farmers of Western Rajasthan. Variety RGC 1033 & RGC 1038 recorded higher seed yield (13.4 & 12.1 g/ha, respectively) over local cluster bean (8.5 q/ha)

Abstract- PSRM-4/NCAPSR/006

EFFECT OF DIFFERENT SOURCES OF NUTRIENT AND NUTRIENT LEVELS ON PRODUCTIVITY AND QUALITY OF WHEAT AND SOIL HEALTH PARAMETERS IN A VERTISOL Megha Vishwakarma and P.S. Kulhare

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Field experiments were conducted during *Rabi* season of 2018-19 and 2019-20 with three sources of nutrient *viz.*, inorganic, organics (FYM, VC and biofertilizers) and integrated source (50% inorganic + 50% organics) as main treatments and five levels viz. control (0-0-0 kg

NPK ha⁻¹), 100% NPK (120-60-40 kg ha⁻¹), 150% NPK (180-90-60 kg ha⁻¹), 200% (240-120-80 kg ha⁻¹) and Soil Test based (STV) NPK (149-176-33 kg ha⁻¹) in split plot design with three replications. The results showed that the application of inorganic source of nutrient

significantly increased the chlorophyll 'a', 'b' and SPAD value, dry matter weight, NPK content at all growth stages and in grain and straw, plant height, test weight and available N over organic source. While the application of inorganic and integrated sources of nutrient significantly increased the SPAD value at all growth stages, chlorophyll 'a' and N content at jointing and milking stage, total chlorophyll content tillering, jointing and milking stage, LAI and dry matter weight at CRI, tillering and jointing stage, number of tillers plant-1, length of spike, number of grains spike-1, grain and straw yield, NPK uptake by grain, straw and total uptake, agronomic efficiency (AE), recover efficiency (RE), factor productivity(FP) and electrical conductivity(EC) over organic source. However, the inorganic source was found significant over integrated source for SPAD value at CRI, tillering and milking stage, chlorophyll 'a' at jointing stage, chlorophyll 'b' at CRI, tillering and milking stage, total chlorophyll content at tillering, jointing and milking stage, dry matter weight at tillering and jointing stage, number of grains spike⁻¹, grain (3.44 t ha⁻¹) and straw (6.06 t ha⁻¹) yield, N content at jointing and milking stage, K content at tillering stage, N (73.80, 35.80 and 109.18 kg ha⁻¹), P (10.51, 3.97 and 14.45 kg ha⁻¹), K uptake (23.54, 154.87 and 178.42 kg ha⁻¹) by grain, straw and total uptake, RE, AE and FP. Whereas organic source of nutrient was found significant over inorganic source for available K, Soil Organic Carbon (SOC), very labile OC, labile OC, less labile OC, Soil Microbial Biomass Carbon (SMBC), CO₂ evolution, Azotobacter and PSB population. Physiological Efficiency significantly increased with integrated source of nutrient over inorganic source. Application of organic and integrated sources of nutrient were found significant over inorganic source for available Zn, Cu, Fe Mn, Dehydrogenase Activity(DHA) and CO₂ evolution. However, the integrated source was found significant over organic source for available Zn and Mn. While the organic source was found significant over integrated source for very labile OC and CO₂ evolution. Application of 150% NPK was found significant over 100% NPK for SPAD value at CRI and tillering stage, chlorophyll 'a' content at CRI, chlorophyll 'b' content at CRI, tillering and milking stage, total chlorophyll content at CRI and milking stage, leaf area index (LAI) at CRI,

tillering and jointing stage, dry matter weight at tillering, jointing and milking stage, N content at CRI, jointing and milking stage, P content at CRI, jointing stage and in straw, K content at CRI, milking stage and in straw, NPK uptake by grain, straw and total uptake by wheat, plant height, length of spike, number of grains spike⁻¹, grain and straw yield, RE, EC, available N, Zn, Cu, Fe, Mn, labile OC and less labile OC and PSB population. While application of 200% NPK was found significant over 100% NPK for chlorophyll 'a' content attillering and jointing stage N content at tillering stages and in grain and straw. P content at tillering stage, PE, pH, EC, SOC and Azotobacter population but the NPK levels were found at par for SOC. While AE, significantly increased with and FP 100%,150% and 200% NPK over STV based NPK except 200% NPK for FP. The maximum RE 55.03% was observed with 150% NPK which was found significant over 100% or 200% NPK. The maximum FP 11.5 kg kg⁻¹ nutrient was recorded with 100% NPK. While the maximum AE 5.22 kg kg⁻¹ yield increase kg⁻¹ nutrient applied was recorded with 150% NPK but it was found at par with 100% or 200% NPK. Whereas PE significantly increased with 200% NPK and STV based NPK over 100% or 150% NPK. The maximum PE 11.5 kg kg-1was observed with STV based NPK but it but it was found at par with 200% NPK. The application of 150% NPK with inorganic source was found significant over their 100% NPK for SPAD value at CRI and jointing stage, chlorophyll 'b' content at CRI, tillering and milking stage, total chlorophyll content at all growth stages, LAI at CRI, tillering and jointing stage, dry matter weight at tillering, jointing and milking stage and available N and P. While the 150% NPK with integrated source was also found significant over their 100% NPK at tillering and milking stage for SPAD value. The application of 200% NPK with inorganic and integrated sources were found significant over 100% NPK for chlorophyll 'a' content at tillering and jointing stage, P content at tillering stage, K content at tillering stage and in straw, plant height and number of tillers plant⁻¹. The application of 150% NPK with inorganic and integrated sources were found significant over 100% NPK for chlorophyll 'b' content at CRI, tillering and milking stage, N content at jointing stage, K content at CRI, NPK uptake by grain, straw and total uptake, EC and available Cu. While the application of 150% NPK with all sources were found significant over their 100% NPK for N content at jointing and milking stage except 150% NPK with inorganic and organic source at milking stage. Whereas the application of 200% NPK with inorganic source was found significant over 100 % NPK and STV based NPK for chlorophyll 'a' content at tillering and jointing stage. Application of NPK levels and STV based NPK level with inorganic and integrated sources were found significant over the same level of NPK with organic source for SPAD, LAI value,

dry matter weight and chlorophyll 'a', 'b' and total chlorophyll content at all growth stages, number of grains spike⁻¹, grain and straw yield, number of tillers⁻¹, N content at jointing and milking stage, P content at tillering, K content at CRI and tillering stage and in straw, NPK uptake by grain, straw and total uptake by wheat, RE, AE and FP. However, the inorganic source of nutrient was also found significant over integrated source for dry matter weight at tillering and jointing stage, NPK uptake, RE, AE and FP.

Key words- Inorganic source, organic source, INM, nutrient levels, Vertisol

Abstract-PSRM-4/NCAPSR/007

SURVEY ON THE OCCURRENCE OF BLIGHT OF TOMATO CAUSING BY ALTERNARIA ALTERNATE IN PUNJAB, INDIA

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Early blight is widespread in most areas where potatoes or tomatoes are grown, but is particularly prevalent in tropical and temperate zones. Tomato crop is damaged due to severe infection of *A. solani*every year in India. In India, tomato is grown on large acerage which cover about 760 thousand hectares with production of 18399 thousand metric tonnes, mainly cultivated in Uttar Pradesh, Karnataka, Maharashtra, Haryana, Punjab, Bihar and Himachal Pradesh. It is also one of the commonest causes of seedling blight or damping off in tomato causing dark lesion in rootlets. To access the magnitude Alternarialeaf spot of tomato at different locations viz., Ropar, Chandigarh, Fatehgarh Sahib, Patiala and Ludhiana districts of Punjab located at different altitudes ranging between

300m on above mean sea level (a.m.s.l), survey were carried out during normal tomato growing season January during 2018. The data on prevalence of disease was recorded as incidence and severity in the tomato field. The incidence of Alternarialeaf spot of tomato was maximum (31.45%) at Bhaddal followed by Ghanauli (28.45%) whereas it was minimum at Alamgir (8.90%) followed by Ranjan (10.80%) districts of Punjab. The diseases was recorded maximum (18.45%) at Bhaddal of Ropar district followed by Ghanauli (16.28%), whereas it was minimum at Alamgir (2.39%) followed by Ranjan (1.24%) districts of Punjab. The incidence and severity of leaf spot range from 8.90-31.45 and 1.24-18.45 per cent, respectively during 2018 year of survey in tomato growing districts of Punjab

Abstract-PSRM-4/NCAPSR/008

GIS AND REMOTE SENSING: A POTENTIAL APPROACH IN PEST MANAGEMENT Ankit Yadav and Manisha Yadav

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Monitoring pests and their natural enemies is an important part of pest management. The collection of remotely sensed data is a part of the Geographic Information System and remote sensing. A geographic information system (GIS) is a framework for capturing and evaluating

spatial and geographic data. Monitoring, predicting, managing, and combating the spread of pests and diseases can all be done with the use of GIS. It may be used to predict disease transmission, take appropriate action with bio control agents, offer input into risk assessment

models, and quantify shifting pest and disease thresholds due to climate change. It also lowers production costs and serves as a tool in precision farming. There are three components in remote sensing: the signal, sensor and sensing. The signal is the reflected radiation from an object's surface and sensor detects the signal. The techniques used in remote sensing includes aerial photography in which pest damage is photographed using panchromatic infrared or black and white infrared films and the other technique includes satellite based multispectral scanning in which satellites gather data in the visible and infrared ranges of electromagnetic spectrum.In remote and inaccessible places, remote sensing has been

utilized to provide vital information on crop status and the detection of insect population development. Its goal is to fill in gaps in existing systems by ensuring a consistent flow of information regarding areas afflicted by insect pests, diseases and other yield-reducing factors across the country. Insect pest forecasting in the agro-ecosystem allows farmers to be informed about potential outages, allowing them to be prepared and take appropriate actions. As a result, recent breakthroughs in the field of remote sensing open up a lot of possibilities for using this technology in agriculture for pest monitoring, detection and prompt, precise management.

Key words- GIS And Remote Sensing, Pest Management, Precision Farming, Pest Assessment Models, Pest Monitoring, Aerial Photography, Agro-ecosystem.

Abstract-PSRM-4/NCAPSR/009

SEED HARDENING TECHNIQUES: A TOOL FOR DROUGHT RESISTANCE Anita Trivedi

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The low productivity under rain fed condition is due to soil moisture deficit, low and erratic rainfall, use of poor quality seeds, poor crop establishment and improper crop management. Seed hardening is a practice adopted to alleviate the moisture stress or making the plant resistance to moisture stress through proper germination and crop establishment. Seed hardening is physiological preconditioning of the seed by hydration to with stand drought under rain fed condition. Hardening of seeds is one of the method of pre-sowing treatments which results in modifying the physiological and biochemical nature of seed. A number of physiochemical changes occur that modify the protoplasmic characters and increasing physiological activity of embryo and associated structure. Simple method to alter physiological and biochemical nature of the seed in order to induce the factors responsible for drought resistance (Henckel, 1964). The main objective of seed hardening is to improve the quality of seed and enables the plant to withstand under the stress condition. Manjunath et al., (2011) investigated the effect of seed

hardening with various chemicals on biochemical components and vield in chickpea. (Cicer arietinum. L), under rain fed conditions. They found higher seed yield in seed hardening with CaCl₂-2% (26.32 g/ha) followed by Cycocel -1000ppm (23.54 g/ha) and succinic acid 20 ppm (23.44 g/ha) as compare to control (19.04 q/ha). The increased seed yield withCaCl2 may be attributed to increase in the chlorophyll, proline content and others Patil et al., (2010) studied the effect of seed hardening with different chemicals viz. CCC, CaCl2, ZnSO4, KNO_{3,,} water soaking and untreated (unsoaked) control on drought tolerance in Bt cotton hybrid. They found that, hardening of cotton seeds with CaCl₂ (2%) or CCC 100 ppm or CCC 150 ppm significantly more yield recorded compared to water soaking and untreated control. There are several rainfed areas where drought is major problem that prevent the crop or plants growth under such condition and cause reduction in germination and yield. So seed hardening is one of the best technique to overcome these problemsand enhances germination and seed yield.

WEEDS INVASION AT UTTARKASHI DISTRICT OF UTTARAKHAND STATE DUE TO CLIMATE CHANGE Mahendra Pal Singh Parmar¹ and Prerana Pokhriyal²

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The term "weed" was firstly used by Jethrotull. Weed is such undesirable plant grown in association with crop which snatches major parts of nutrients, water, light, place & CO2 available to the crops due to tough competition crop suffers adversely & the production reduction is reduced Four factors are especially important: density, timing, size and chemistry. For instance, at very high densities, green foxtail plants tend to compete strongly with each other and thus remain very small. These small plants probably have little competitive effect on the crop even when there are many of them. At medium densities, green foxtail plants grow larger and can severely reduce crop yields. In this example, a reduction in weed numbers may actually increase the weed problem. Timing competition is important. weed-crop Ecologists have defined a critical period of weed competition. This is the time when the weed reduces crop yield. Weeds that are removed before the critical period, or that emerge after the critical period do not cause any appreciable yield loss. The exact timing of this period is not an "inherent property of the crop" and varies for different crops, for different weed species, and

under different conditions such as year or location. In general, weeds should be removed at early crop growth stages. Early weed removal was found necessary to protect field yield. Relative timing of crop and weed emergence is very important in determining the magnitude of yield loss from weed competition (Singh et.al.) When it comes to plant competition, generally the first one out of the ground wins. Competition from wild oat resulted in a 17% yield loss in barley when it emerged five days before the crop compared to a 3% yield loss when wild oat emerged five days after crop emergence. More weeds are generally a larger problem than few weeds, but weed density is not the only concern. For instance, at very high densities, green foxtail plants tend to compete strongly with each other and thus remain very small. These small plants probably have little competitive effect on the crop even when there are many of them. At medium densities, green foxtail plants grow larger and can severely reduce crop yields. In this example, a reduction in weed numbers may actually increase the weed problem.

Key Words: Weeds, Climate Change, nomadic grazing, introduction of new weeds, fertilizers, fungicides

Abstract- PSRM-4/NCAPSR/011

ZERO BUDGET NATURAL FARMING AND ITS IMPACT ON ENVIRONMEN Pallavi Chauhan

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Recently, there has been huge advancements in the field of agriculture and many modern techniques have developed that help agriculture to be done in a more sustainable wayand environment- friendly and also reducing the usage of chemical pesticides and fertilizers. One such technique is the Zero Budget Natural Farming, also known as the Subhas Palekar's Natural Farming which is a completely natural method of farming and uses natural ingredients for agriculture instead of chemical pesticides and fertilizers. This method helps the environment by reducing the soil pollution, improves soil quality and texture and also decreases the intake of chemical induced crops by humans , increases crop productivity ,

enhances farm bio- diversity and ecosystem services . The following review is therefore an initiative to give a broader survey to the prospects, features, advantages and disadvantages on the environment, economic viability and current progress of ZBNF in India, especially in the state of Andhra Pradesh.

Key words: Zero Budgets, ecosystem services, Natural Farming etc.

Abstract- PSRM-4/NCAPSR/012

ENTREPRENEURSHIP AS A TOOL FOR RURAL SOCIO-ECONOMIC DEVELOPMENT Y.S. Bagal and Pallavi Ghosh

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Entrepreneurship is gaining traction as the present economic scenario necessitates employment providers playing a larger part in the economy of the country, as India struggles to offer job and income stability to its population. Entrepreneurship plays an important role in the global and local economies by industrialising rural and backward areas, supplying input to huge companies, and generating jobs. It is a significant driver in the transformation of an agriculture-based economy to an industry-based one, which is especially essential for India because 69 percent of the population lives in rural regions that lack basic facilities, causing people to migrate from rural to urban areas. Entrepreneurship is the current era's social and economic trademark. It's the key to both economic and social progress. In the setting of a growing country like India, where substantial socioeconomic issues exist, entrepreneurship plays a critical role. Agriculture makes a significant contribution to the national economy, and agriculture employs around 75 percent of our people, either directly or indirectly. As a result, any development in agriculture will eventually result in a better national economy. This may be accomplished by integrating agriculture and industry properly. The farm must be seen as a separate commercial entity. "If the villages vanish, India will perish as well," Mahatma Gandhi stated. India will cease to exist. Her own personal mission in the world will be misplaced." He emphasised local industry and envisioned the village as a self-contained, self-sufficient, and fully functional element of Indian society. The realisation of his vision, as well as many of the

issues that have emerged as a result of a lack of job possibilities in rural regions, may be successfully addressed if village industries are created and agriculture is transformed from a way of life to an agribusiness. Agriculture should be connected with village industries so that agricultural products can be used by village industries. These can also create items that can be employed in agricultural activities. As a result, a cycle can be established in which agro businesses use agricultural produce while also producing goods that farmers can use. This is also a pressing requirement at a time when the country is undergoing economic liberalisation and globalisation. It is necessary to convert job into employment seekers producers generators. All of this will require development of entrepreneurship farmers in particular and the rural people in general. To turn a farm into an enterprise, the individual in charge must change his or her title from farmer to farm business operator or entrepreneur (De, 1986). Any technological improvement will never yield good results until and until farmers become entrepreneurs. Farmers are encouraged to be entrepreneurial as a result of agricultural innovation, rather than following the traditional and hereditary occupational structure. Gujarat, for example, has become a national leader in bringing the white revolution to the country as a result of farmers' entrepreneurial behaviour in shifting from traditional forms of dairy management to procedures systematic of management and adopting new technologies of milk production and processing.

EVALUATION OF SELECTED FUNGICIDES AND PLANT OILS AGAINST *ALTERNARIA ALTERNATE* CAUSING BLIGHT OF TOMATO IN PUNJAB, INDIA

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Tomato (SolanumlycopersicumL.) belongs to Solanaceae family and is one of the most widely grown vegetables in the world and second most important solanaceous vegetable crop after potato. Among the fungal diseases, Alternarialeaf spot of tomato which is caused by Alternariasolaniis the most damaging disease that causes reduction in quantity and quality of the crop. Although the disease is called early blight, but it can occur on the plant at all the stages of development. It is particularly destructive in temperate humid climate. In vitro evaluation of five different fungicides systemic and non-systemic viz., Avtar, Dithane M-45, Bavistin, Roko and Antracol @ 50, 100 and 150 ppm and eight essential oils like CymbopogonnardusL., Cymbogopon martini OreganumvulgareL., Roxb., Rosmarinusofficinalis L., AzadirachtaindicaL.,

Eucalyptus globules L., Brassica juncea L. and Oleo europaeaL. were evaluated against Alternaria isolate by Poisoned Food Technique. The data on mycelial growth was revealed that Avtargave complete inhibition of A. solaniunder in vitro condition followed by Dithane M- 45(89.88%) and Roko (64.08%). However, Antracol was least effective. However, in case of plant oils theper cent growth inhibition was significantly maximum (100%) in Cymbopogonnardus, Cymbogopon martini Roxb. and OreganumvulgareL., respectively with no mycelial growth in all tested concentrations. Plant oils from *Rosmarinusofficinalis*L. *Azadirachtaindica*L. showed 48.33% 33.34% growth inhibition, respectively, whereas no growth inhibition was found in Eucalyptus globules L., Brassica junceaL. and Oleo europaea.

Abstract- PSRM-4/NCAPSR/014

EFFECT OF CONJOINT FOLIAR APPLICATION OF CHEMICALS ON QUALITY OF POMEGRANATE (PUNICA GRANATUM L.) IN HASTA BAHAR

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Effect of conjoint foliar application of chemicals on quality of pomegranate (Punica granatum L.) in hasta bahar" was carried out at farmers field during the year 2020-21. The field experiment was laid out in Randomized Block Design with eleven treatments and three replications. The experiment consisted of eleven treatment combinations viz., T₁-Cycocel1500ppm+0.2% acid,T2-Cvcocel ZnSO₄+0.2% boric 2000 ZnSO₄+0.2% boric acid, ppm+0.2% T₃-Nitrobenzene 5ml/lit+0.2% ZnSO₄+0.2% boric acid, T₄-Nitrobenzene 7.5ml/lit+0.2% ZnSO₄+0.2% boric acid, T₅-Salicylic acid 100 ppm +0.2% ZnSO₄+0.2% boric acid, T₆-Salicylic acid 200 ppm+0.2% ZnSO₄+0.2% boric acid, T₇-Ethrel 2%+0.2% ZnSO₄+0.2% boric

acid, T₈-Ethrel 3%+0.2% ZnSO₄+0.2% boric T₉-Potassium nitrate acid, 2%+0.2% ZnSO₄+0.2% boric acid,T₁₀-Potassium nitrate 3%+0.2%ZnSO₄+0.2% boric acid.T₁₁- control. The treatments were imposed through foliar application which was sprayed three times. The result obtained for quality attributes had significantly influenced due to foliar application of different chemicals over control. Regarding quality parameters viz., Total soluble solids (15.8 %), reducing sugar (10.71 %), non-reducing sugar (2.57 %), total sugar (13.28 %), total soluble solids (14.21 %) and minimum titrable acidity (0.29%), of pomegranate fruit were recorded by treatment T₁₀-Potassium nitrate Boric 3%+0.2% ZnSO₄+0.2% acid.

Key words: *Quality, chemicals, pomegranate*

AGRO-TOURISM SCOPE AND OPPORTUNITIES FOR THE FARMERS Dipesh Kumar Yadav

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Agriculture is an important profession in all of the states. Farmers are losing money these days owing to a lack of irrigation and monsoon failure. There are several implications that farmers find difficult to deal with. As a result, new technology and innovation must be deployed to help our primary industry. Our Green Revolution has modernised our agro-food business, and new agricultural technologies have yielded excellent results. Short-term plants and high-yield cultivars have revolutionised the agricultural sector to meet the demands of the current situation. Agriculture tourism, or tourism on farms, is a relatively new notion in our nation. In this situation, the traveller has the opportunity to get up up and personal with a

farm home. Most adults and children living in metros and cities have limited knowledge of agriculture and rural life as a result of urbanisation, and agricultural tourism fills this gap. Farmers, on the other hand, must manage and grow their agribusiness abilities. In terms of commercial factors, this study illustrates the importance of agriculture tourism for the benefit of economic growth. Thus, this research paper identifies the barriers that stand in the way of the successful development and management of agricultural tourism in India, and concludes that if managed and developed successfully, the agriculture tourism industry in India has a lot of potential to improve the standard of living of develop farmers and rural India.

Abstract- PSRM-4/NCAPSR/016

IMPORTANCE OF ORGANIC FARMING IN MODERN AGRICULTURE Purnananda Sorokhaibam And Aniska Nongthombam

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Organic farming is an agricultural system that mainly uses fertilizers of organic origin such as compost manure, green manure, and bone meal and places emphasis on techniques such as crop rotation and companion planting. The two vitals factors i.e Food quality and safety that have attained constant attention in common people. In recent years, organic farming as a cultivation process is gaining increasing popularity. Organically grown foods have become one of the best choices for both consumers and farmers. The main principle and practices of organic food production are to inspire and enhance biological cycles in the farming system, keep and enhance biological cycles in the farming system, keep and enhance deep rooted soil fertility, reduce all types of pollution, evade

the application of pesticides and synthetic fertilizers, conserve genetic diversity in food, consider the vast socio ecological impact of food production, and produce high quality food in sufficient quantity. According to a study conducted by AFSSA organically grown foods especially leafy vegetables and tubers have higher dry matter as compared to conventionally grown foods. Organic farming has a protective role in environmental conservation. In organic farming, the maintenance of soil fertility is achieved through the recycling of organic material with the help of soil microorganisms. The quantity of organic farming product is less as compared to conventional farming, but its quality is best for our health as well as our environment.

Preparation of fibre enriched apple juice from apple pomace fibre *Kanika Issar*

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The suitability of utilization of apple pomace fibre for the preparation of fibre enriched apple juice was evaluated. To the apple juice, varying proportions of pomace fibre i.e. 2, 4 and 6% was added and evaluated for its mixing properties. In order to improve the appearance of the beverage, the suitability of adding carboxymethylcellulose (CMC) at different proportions (0.6, 1.2, 1.8, 2.4 and 3.0%) was optimized. Similarly, suitability of adding isabgol (*Plantago ovata*) fibre was evaluated as a source of fibre in the apple beverage. Out of three different proportions of 0.5, 1 and 1.5%, a beverage containing 0.5% isabgol was found

equivalent to an apple beverage containing 4% pomace fibre with respect to appearance and consistency. For the preparation of fibre enriched apple beverage, a proportion of 4% apple pomace fibre alongwith 1.8% carboxymethylcellulose at a TSS of 130B was optimised for preparation of fibre enriched apple beverage on account of good appearance and better mixing properties. Thus, 0.5% isabgol (Plantago ovata) fibre concentration was found to be equivalent to 4% apple fibre for preparation of isabgol fibre enriched apple beverage.

Keywords: pomace, fibre, isabgol, concentration, optimized

Abstract- PSRM-4/NCAPSR/018

Soil Erosion *Himani*

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Soil erosion is the displacement of the upper layer of soil; it is a form of soil degradation. This natural process is caused by the dynamic activity of erosive agents, that is, water, ice, snow, air, plants, animals, and humans. Soil erosion may be a slow process that continues relatively unnoticed, or it may occur at an alarming rate causing a serious loss of topsoil. The loss of soil from farmland may be reflected in reduced crop production potential, lower surface water quality and damaged drainage erosion could networks. Soil cause sinkholes. The various factors of soil erosion are: 1- Wind. When strong winds blow, the topsoil along with the organic matter is carried away by the wind, 2- Water. When it rains in the hilly areas, the soil gets washed away towards the plains, 3- Overgrazing, 4-Deforestation, 5- Afforestation, 6- Crop Rotation, 7- Terrace Farming, 8- Building dams. Rainfall, and the surface runoff which may result from rainfall, produces four main types of soil erosion: splash erosion, sheet erosion, rill

erosion, and gully erosion. If the soil is saturated, or if the rainfall rate is greater than the rate at which water can infiltrate into the soil, surface runoff occurs. Soil erosion prevention or control methods: Following are some methods of soil erosion prevention: 1-Plant trees on barren lands to limit erosion of soil, 2- Afforestation should be done and deforestation should be stopped, 3- Agroforestry should be adopted because trees have deep root system that help to hold soil from getting eroded either due to wind or water or due to human destruction activities or animals. 4- Add mulch and rocks to prevent the plants and grass underneath to prevent soil erosion, 5- Mulch matting can be used to reduce erosion on the slopes, 6- Put a series of fibre logs to prevent any water or soil from washing away, 7- A wall at the base of the slope can help in preventing the soil from eroding, 8- Every household should have a proper drainage system so that water flows down into proper water collecting systems.

SURVEY ON THE OCCURRENCE OF GREEN MOULD AND WET BUBBLE OF BUTTON MUSHROOM CAUSED BY *TRICHODERMA* SP. AND *MYCOGYNE PERNICIOSA*IN PUNJAB, INDIA

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Button Mushroom (Agaricus bisporus) belonging to Basidiomycetes and family Agaricaceae is the most popular mushroom variety grown and consumed by the world over such as in Europe (mainly Western part), North America (USA, Canada) and S.E. Asia (China, Korea, Indonesia, Taiwan and India).In India the major producing states are Himachal Pradesh, Punjab, Haryana, Maharashtra, Andhra Pradesh, Tamil Nadu and Karnataka. In button mushroom many diseases Green observed viz., were by mould (Trichoderma sp.), Plaster mould (Papulaspora Truffle disease (*Pseudobalsamia* byssina), microspora), Dry bubble (Verticillium fungicola), Ink caps (Coprinus atramentarius), Olive green

mould (Chaetomium olivaceum), Wet bubble (Mycogone perniciosa) etc. The disease incidence of green mould and wet bubble ranged from 14.83 to 64.92 and 2.98 to 33.33 percent, respectively during 2019-2020 years of survey. The survey studies revealed that the average incidence of green mould and wet bubble in two year (2019- 2020)was maximum at Haibowal Kalan (Ludhiana) and Amloh (Fatehgarh Sahib)(15.57 % and 22.33 %)and minimum at Haibowal Kalan (Ludhiana) and (Fatehgarh Sahib)(11.00% 18.80%)in button mushroom growing farm districts of Punjab.

Absract- PSRM-4/NCAPSR/020

EXOTIC VEGETABLES AND THEIR IMPORTANCE IN NUTRITIONAL SECURITY Simaranpreet Kaur and Sachin Kishor

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Vegetables are an essential part of a wellbalanced human diet, as well as the primary drivers of global nutritional security through supplying nutrients, vitamins, and minerals. The development of superior varieties/hybrids/production and protection methods through systematic research, along with large-scale adoption by farmers, has resulted in a phenomenal increase in vegetable production. Many exotic leafy vegetables like lettuce (Lactuca sativa L.), green cabbage (Brassica oleracea), and red cabbage (B. oleracea var. capitata)] are thought to contain an immense variety of antioxidants, which may provide nutritional and health benefits. As a result, eating these green vegetables, which contain a variety of antioxidant components, may help to strengthen the immune system.

Because of their purported health benefits, consumers' awareness and interest in leafy vegetables has grown in recent years. ELVs have long been known to be a rich source of nutrient-dense vital nutrients. They generate minerals includina iron, calcium, phosphorus, as well as nonenzymatic and enzymatic antioxidants like beta carotene, ascorbic acid, folic acid, and riboflavin, SOD, CAT, and APX. In addition to providing basic nutrients, the vegetables include a large number antioxidants phytochemicals. of and Antioxidants vitamins like ascorbic acids and phenols are significant in human nutrition because they operate as anticancer, antiinflammatory, anti-atherosclerotic, antitumor, antimutagenic, antibacterial, and antiviral agents.

MICROPROPAGATION OF CERTAIN UNDERUTILIZED FRUIT CROPS: AN OVERVIEW *Anshu Kamboj and Sachin Kishor*

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Micropropagation the true-to-type is propagation of selected genotype using in vitro culture techniques. Most often micropropagation is also associated with mass production at competitive price. Micropropagation is a true method for growing millions of identical plants in a controlled and aseptic environment, regardless of the season. Nowadays micropropagation is the most widely and successfully used technology by private companies for the mass production of horticultural plants: ornamental, vegetables, plantation crops and spices. It not only saves time and space, but it also increases productivity and allows for more disease-free

propagules to be developed. Indian gooseberry (Emblica officinalis Gaertn), bael (Aegle marmelos iackfruit (Artocarpus Corr.), hetrophyllus L.), tamarind (Tamarindus indica L.), and jamun or black plum (Syzygium cuminii L. Skeels.) are only a few of the significant but underutilized fruit crops native to India. The majorities of these plants are therapeutic in nature and can be grown in a variety of environments. Because of a scarcity of good planting material, commercial production of these crops is limited. Micropropagation can help these fruit crops grow new varieties quickly.

Abstract- PSRM-4/NCAPSR/022

ORGANIC FARMING FOR SUSTAINABLE AGRICULTURE Sunidhi Dihman

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The most pressing concern in India since independence has been producing enough food to feed an expanding population. As a result, high-yielding types are used, along with irrigation water, fertilisers, and pesticides. This mix of high-yielding production techniques has helped the country generate a food surplus while also raising worries about soil health, pollution, pesticide toxicity, and agricultural production sustainability. As a result, scientists and policymakers are rethinking agricultural systems that rely heavily on biological inputs rather than chemical fertilisers and pesticides. Organic farming can provide high-quality food

without compromising the health of the land or the environment; nevertheless, it is unclear if large-scale organic farming would be able to feed India's vast population. India produces certified organic items such as basmati rice, pulses, honey, tea, spices, coffee, oilseeds, fruits, cereals, herbal medicines, and their value-added products. Cotton, textiles, cosmetics, functional food products, body care products, and other non-edible organic products examples. In northern India, development of these organic crops products is examined in terms of sustainable agriculture.

PROSPECTS, CONSTRAINTS, OPPORTUNITIES AND STRATEGIES OF DIRECT SEEDED RICE CULTIVATION METHOD

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Rice is frequently produced by transplanting seedlings into puddled soil, which is not only water heavy but also inconvenient and time consuming. Fresh water scarcity, pollution, competition for water use, population growth, rising food demand, climate change and global warming, rice cultivation's water-intensive nature, and rising labour costs have all endangered the puddled transplanted rice system. Excessive use of natural resource bases, combined with changing climate, has resulted in a downward yield trend and a plateauing of rice output. Water productivity in rice farming can be increased using conservation agriculturebased effective and environmentally acceptable alternative management strategies. seeded rice (DSR) is an alternative aerobic rice establishment method that helps to maintain rice vield while also conserving natural

resources. Aerobic rice is a proposed sustainable rice production technology that can reduce rice production water use and produce more rice with less water. Under an aerobic rice production system, it provides certain benefits such as less labour, less water requirement, less drudgery, early crop maturity, low production cost, proper seed and fertiliser placement, increased fertiliser use efficiency, improved soil health for crops, and reduced methane emission. However, dedicated study is needed to overcome the barriers to obtaining potential yield in an aerobic system; only then can we make aerobic rice a potentially viable alternative to direct seeded rice (DSR). Direct seeded rice can be obtained by using a variety of packages and methods along with scientific intervention to boost rice productivity and profitability.

Abstract- PSRM-4/NCAPSR/24

RECENT PERSPECTIVE AND CHALLENGES OF NANOTECHNOLOGY IN THE FIELD OF AGROFORESTRY Ahuja Ruhi, Raj Nikita

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Nanoparticles believed to be the tiniest particles in the world it ranges from 1 to few 100 nm in size. Nanoscience is widely spread topic and is not also had advanced researches in the areas of display devices, energy storage devices, light emitting devices, but also in food and agroforestry researches has been reported . However it is not as common as in other areas. The use of Nanotechnology is in today's era has became the wide topic for the scientist and researchers in the field of technology, we already know the use of Nanotechnology is not limited to a particular sector, it has been used in controlling pest population , increasing the productivity in agriculture sector, used in cosmetic industries ,used in processing , product development , Nanofertilizers

pesticide detection , Food Packaging ,Plant growth& Crop protection .Nanoparticles have different properties in chemical, optical, electrical ,magnetic,thermal, mechanical, acoustic and other properties company with bulk materials. And you know what recent researches shows that nanoparticles are used for corona virus detection too. Actually using nanoparticles reduces so much of waste , specially the Nanotechnology is also playing an important role in eliminating environmental issues caused by industries and factories such as water pollution, air pollution and waste that get spilled out on the land and causes serious health problem and deteriorating the fertile land and Metal nanoparticles are currently used as drug carriers which has their widespread use in cell toxicity remediation are being extensively explored . Gold nanoparticles are used in medicines rather in pesticides and fertilisers too. Nanoparticles such as gold , silver, titanium dioxoide, , copper , chitosan can be used as protectants . Silica , Chitosan , solid lipid ,

layered double hydroxide act as carriers in insecticides , fungicides, herbicides, RNA-Interferances. Benefits of using Nanoparticles in plants ca increase shelf-life , site-specific uptake, increase solubility , also decrease soil leaching , and toxicity.

Abstract- PSRM-4/NCAPSR/025

RISK MANAGEMENT IN AGRICULTURE Sulabh Bikram Silwal

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Agriculture is an important profession in all of the states. Farmers are losing money these days owing to a lack of irrigation and monsoon failure. There are several implications that farmers find difficult to deal with. As a result, new technology and innovation must be deployed to help our primary industry. Our Green Revolution has modernized our agro food business, and new agricultural technologies have yielded excellent results. Short-term plants and high-yield cultivars have revolutionized the agricultural sector to meet the demands of the current situation. Agriculture tourism, or tourism on farms, is a relatively new notion in our nation. In this situation, the traveler has the opportunity to get up up and personal with a farm home.

Most adults and children living in metros and cities have limited knowledge of agriculture and rural life as a result of urbanization, and agricultural tourism fills this gap. Farmers, on the other hand, must manage and grow their agribusiness abilities. In terms of commercial factors, this study illustrates the importance of agriculture tourism for the benefit of economic growth. Thus, this research paper identifies the barriers that stand in the way of the successful development and management of agricultural tourism in India, and concludes that if managed and developed successfully, the agriculture tourism industry in India has a lot of potential to improve the standard of living of farmers and to develop India. rural

Abstract- PSRM-4/NCAPSR/026

QUALITY OF VEGETABLES PRODUCED UNDER ORGANIC CONDITIONS Priya and Y.S. Bagal

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Consumers' faith in food quality has plummeted in the previous decade, owing to increased environmental awareness and multiple food scandals. Intensive conventional agriculture has been proven to introduce pollutants into the food chain. Consumers have begun to seek for vegetables that are safer and more tightly managed, as well as those that are produced in more environmentally friendly, authentic, and local methods. Organically grown vegetables are usually thought to meet these requirements, resulting in fewer environmental impact and increased nutritional value. So vet,

investigations have only partially backed up this assertion. Organic vegetables have fewer nitrates, nitrites, and pesticide residues than conventional crops, but they also have greater dry matter, vitamin C, phenolic compounds, essential amino acids, and total sugars. Organic vegetables typically have higher sensory and long-term storage properties and contain statistically more mineral components. However, there are significant drawbacks: vegetables grown in organic systems often produce 20% lower yields than conventionally grown crops. Several major issues must be addressed in the

next years, including environmental contamination of organic vegetables, bacterial and fungal contamination of organic vegetables,

and, most importantly, the influence of organic vegetable consumption on animal and human health.

Abstract-PSRM-4/NCAPSR/027

ENDANGERED PLANTS SPECIES OF THE HIMALAYAS WITH MEDICINAL VALUE Janani Kalai

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During the last few decades, human driven activities led to indiscriminate habitat destruction and exploitation of many plant species in the Himalayas. The flora of Himalayas is of immense aesthetic and medicinal value, as well as propitious to maintenance of delicate and intricate mutual balance through subtle interplay of roles in the spirited Valley's Environmental framework. But indigenousness of various Himalayan plant presuppose a sense of responsibility towards the Earth and entire human civilisation in general to conserve aesthetic specimen and are alarmingly susceptible to cataclysms, vagaries and vagrancies. A total of 112 plants species were documented of which 19 species were found to be in critically endangered and vulnerable as per ICUN. Here are some endangered Himalayan plant known for medicinal values are: Himalayan Yew (Taxus wallichiana) - It's a source of the chemical precursors to the anticancer drug paclitaxel; Snow lotus (Saussurea laniceps)-It cure a wide range of maladies from altitude sickness to dysentery and gastric ulcers, and cold to fatigue and rheumatoid arthritis; Papra (Podophyllum hexandrum)- Its rhizomes are said to have traditional curative usage towards a variety of maladies including typhoid fever, jaundice, dysentery, hepatitis, skin disease and even treat tumours and cancer; Phen Kamal (Sauaaureagossypiphora)- The wool of this herb is applied to cuts, where it sticks compactly, seals the wound, and stops the bleeding.

Abstract- PSRM-4/NCAPSR/028

SHIFTING CULTIVATION- "ECOLOGY IS DISTURBED AND DISTORED WHICHNEVER RESTORED" Kondur Sai Krishna

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Shifting cultivation is in transitionacross the world. It is a traditional land practices that people move from one place to another Place. Population pressure, inadequate land for cultivation, low education levels, policy planning and implementation without local participation are all factors influence farmers decision to continue shifting cultivation. The most common form of shifting cultivation is slashing and burn culture, that is practised all over the world. Shifting cultivation is often practised by primitive tribes in the forest areas. Arable land provided to the tribal people by government for the welfare. The main benefits are small investment, simple growing, and eco-friendly. The main drawbacks are result in loss of Flora and Fauna, leads to deforestation, leads to soil erosion.

Key Words- Shifting cultivation, Primitive tribes , Flora and Fauna, Deforestation, Soil erosion, Arable land, Slash and burn culture.

THE PERCEPTION AND AWARENESS AMONG FARMERS IN VIEW OF USING ELECTRONIC SYSTEMS LIKE E-NAM

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The study was conducted with the objectives of to find out the awareness among farmers regarding benefits of e-nam, to analyze the perception about e-nam process among farmers, to examine the value addition of e-nam among farmers, to understand farmers view in using electronic systems like e-auction and epayments. The research was conducted to analysis certain parameters including awareness of e-nam, necessity of assaying for trade ,better prices for commodity through assaying, competitiveness and transparency of e-nam with respect to e-auction, accuracy and transparency of e-nam with respect to e-weighment, competitive and transparent payment in the enam trade, price comparison between traditional system and e-nam, access to wider market area through e-nam, access to large number of buyer through online auction, safeguarding payment through e-auctioning system, better saving for future through e-payment, viability of farmers choice to accept or reject quote during ebidding. The farmers sample was taken from six APMCs i.e Andhra Pradesh, Chattisgarh, MadhyaPradesh, Maharastra, Rajasthan and Telengana. The study based on primary data with 50 farmers samples and a structured schedule was used as a research tool to collect the required information to fullfill the objective of the research study. The outcomes of the study ware complete assaying apparatus and eweighing system should be made compulsory to al; Imandis, governmeshould try to involve processing company directly in the e-nam auction and government should strategize to form FPOs/FPCs and connect them to micro finance.

Key word: e*-nam, electronic systems, Farmer, etc.*

Abstract- PSRM-4/NCAPSR/030

CROP REGULATION IN HIGH DENSITY GUAVA PLANTATION THROUGH PRUNING Shivani Thakur and Sachin Kishor

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Guava botanically known as *Psidium guajava* L. belongs to family *Myrtaceae* and originated from Tropical America. High density plantation and crop regulation are two important aspects in guava cultivation. To find out the economic yield of guava the high density planting and crop regulation is important practices. It is bearing fruits three times in a year *viz*. Mrig Bahar, Hast Bahar and Ambe Bahar. The fruits produced during the rainy season are rough, insipid and poor in quality, while winter fruits are superior in quality with high market value; hence crop regulation for manipulating winter crop is required for making guava cultivation profitable.

There are several pruning technique are practicing to regulate guava crop *viz.* FBT-flower bud thinning, RLFO- removal of leaves and flowers buds, RLF- removal of all leaves and flowers, FSP - full shoot pruning, OLPF- one leaf pair pruning of fruited shoots, such practices are carried out to regulate the crop for a different intervals. Out of above techniques OLPF (one leaf pair pruning of fruited shoots) found profitable. This technique is cheaper and fruits obtained are good in quality with high yield. In guava maximum number of fruits in winter crop was obtained from tress in which three-fourth shoot length was pruned in the month of May.

The practice is popularly known as elicit treatment and is achieved by root exposure and root pruning to hot sun before the onset of monsoon. The pruning favored the production of more flowers in July-August flush thereby

more fruits in winter season. The guava cv. L-45 (Sardar) produced 50% flower when it is pruned by shoot pruning during the May month and also give the highest fruit yield.

Key words: Ambe *Bahar, Guava, Hast Bahar, Myrtaceae and Mrig Bahar.*

ABSTRACT- PSRM-4/NCAPSR/031

POTENTIAL AND PROSPECTS OF GEOINFORMATICS, NANOTECHNOLOGY AND PRECISION FARMING Savita Tyagi

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Agriculture is one of the most important sectors of the Indian economy, employing more than half of the country's population. This is the backbone of our economy, quaranteeing food security. Agriculture was the only industry that emerged as a silver lining for India's economic recovery with over 3.5 percent growth in the quarter of 2020-21, when the Indian economy posted 23.9 percent negative arowth. Agriculture becomes the most important sector in the country as a result. Because agriculture is such an important part of the country's economy and plays such a significant role, it must be protected and extended in order to ensure its long-term viability. To start a new revolution and make the most money from this sector, we need to improve our way of thinking and modernise it through the use of new techniques and technology in order to maximise profit use resources sustainably. and Geoinformatics, nanotechnology, and, eventually, precision farming, have the potential to drastically alter the farming system's production and economic security. Geoinformatics Informatics technology is mostly used in precision farming since it deals with

many GPS-based applications, such as farm planning, field mapping, tractor navigation, and variable rate applications (automated precise applications of pesticides fertilisers and etc.) Farmers can use GPS to work in low-visibility fields such as rain, mist, fog, and night. Different technological aspects such as GPS receivers, DGPS (differential global positioning systems), GIS, remote sensing and variable rate applicators, combine harvesters with vield monitor, and much more are included in geo informatics. The study of nanotechnology is also a major concept in precision farming, and it plays a vital role with different concentrations of, which affect the process of germination and growth of the plant. There are various concepts such as Nano capsulation, which also plays a useful role in environmental protection by reducing leaching and evaporation of harmful substances, among other things. Precision farming is the future for better scope in agriculture and agriculture economy, and we may increase our way off of planting and affecting the future agriculture with all of these modern aspects.

PLANT ANTIMICROBIAL PEPTIDES: A NATURAL ALTERNATIVE TO CHEMICAL PESTICIDES. Loveleen Arora

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Plant diseases are of major concern in agriculture so eco-friendly methods of disease control is required. In order to sustain healthy crops, antimicrobial peptides are nowadays more preferred over chemical pesticidesdue to its broad-spectrum antimicrobial activity. These are multifunctional by nature as they exhibit anti-bacterial. anti-viral. anti-fungal, parasitic, anti-infective, anti-cancer, wound healing, immunomodulatory effects. expeditious rise in prevalence of antibiotic tolerance is of major concern which reflects the need of urgent novel antimicrobials therapeutic agents. These bioactive peptides are an important natural defense of living organisms against many pathogens. Cys-rich AMPs are explored as the major class of peptides consisting of multiple disulfide enabling compact structure conferring chemical resistance. In addition toit's antimicrobial activity, AMPs are very potent in regulating plant growth and also used as food additives in food industries which is a big boom in agricultural productivity.

Abstract- PSRM-4/NCAPSR/033

FUTURE CHALLENGES OF FOOD AND AGRICULTURE Deepak Kumar Sharma

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The future agriculture of food and agricultural trend and alternatives road to 2050 offers a forward-looking perspective on the evolution of the global and regional food and agriculture systems. This development, as well as the difficulty it poses, will be determined by the underlying long-term supply and demand pattern that will continue to define global food and agriculture. By 2050, the world's population is expected to reach about 10 billion people, expanding agriculture demand by 50% over 2013 in a scenario of modest economic growth. Income growth in low- and middle-income nations would speed a dietary change toward higher consumption of meat, fruits, and vegetables, which is linked to the cerelas, necessitating comparable output shifts and putting pressure on natural resources. Increased population affluence and urbanisation all

increase food demand, causing people's dietary preferences to shift toward more resourceintensive animal products and processed foods. Climate change exacerbates food insecurity by threatening crop and livestock productivity, as well as fisheries stocks and fisheries. Intensified competition for natural resources, greater greenhouse gas emissions, and additional deforestation and large degradation are all possible outcomes of meeting rising agricultural demands with current farming practises. Governments of countries with poor and intermediate incomes, tiny agriculture farm lands, and other origins start and create new while with trends, countries abundant agriculture and natural resources start and develop new technologies for future agriculture benefits.

BIO- CERAMICS: USE OF ECO-SENSITIVE AGRO-WASTE AND LOW-COST MATERIAL Rashmi Yadav and Sachin

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Based on NPMCP (2019), the generation of crop residues is highest in the state of Uttar Pradesh (60MT) followed by Punjab (51MT) and Maharashtra (48 MT) with a total of 500 MT/vear out of which 92 MT is burned. Among different crop residues burned, a major contribution was (43%) of rice, followed by wheat (21%), sugarcane (19%) (Bhuneshwari et al., 2019) Due to the negative environmental impact of stubble burning and mismanagement of agricultural waste, air quality is deterring drastically every year. The WHO standard for permissible levels of PM 2.5 in the air is 10 µ g m-3 and according to India's National Ambient Air Quality Standard, the permissible level for PM 2.5 is set at 40 μ g m-3. However, the National Capital Region of Delhi recorded a mean value of 48 μ g m-3 which is approximate twice the Indian Standard and ten times higher than the WHO standard (Zehra, 2017). This research tries to highlight the use of alternative materials other than china & stoneware and how they can be modulated to suit the Indian

ceramic industry. The global ceramics Market size was expected to reach USD267.8 billion in 2020. Researchers have developed various stubble-based high-quality tableware which is sustainable, durable & cost-effective. The unused straw of paddy fields and bagasse can be used as raw material for tableware, ceramic production. Rice husk contains cellulose, lignin, hemicelluloses, holocellulose, and silicon dioxide. These compounds vary temperature, type of treatment. Quality burning, time of burning & chemical treatment of rice husk & bagasse will remove cellulose as rice husk and bagasse have cellulosic structure and pozzolanic reactivity capacity of silicate gives highly porous structure to the material. The use of agro-waste in eco-sensitive ceramic raw material gives material durability, porosity, low risk of disintegration. The agriculture waste ash can be used as input in making tableware, masonry structure, pots, decorative household products.

Keywords: Stubble-based tableware, eco-sensitive, agro-waste, pozzolannic reactivity

Abstract- PSRM-4/NCAPSR/035

PROSPECTS PROTECTED CULTIVATION Sahil Awasthi

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Agriculture is an important profession in all of the states. Farmers are losing money these days owing to a lack of irrigation and monsoon failure. There are several implications that farmers find difficult to deal with. As a result, new technology and innovation must be deployed to help our primary industry. Our Green Revolution has modernized our agrofood business, and new agricultural technologies have yielded excellent results. Short-term plants and high-yield cultivars have revolutionized the agricultural sector to meet the demands of the current situation. Agriculture tourism, or tourism

on farms, is a relatively new notion in our nation. In this situation, the traveler has the opportunity to get up up and personal with a farm home. Most adults and children living in metros and cities have limited knowledge of agriculture and rural life as a result of urbanization, and agricultural tourism fills this gap. Farmers, on the other hand, must manage and grow their agribusiness abilities. In terms of commercial factors, this study illustrates the importance of agriculture tourism for the benefit of economic growth. Thus, this research paper identifies the barriers that stand in the way of

the successful development and management of

the successful development and management of agricultural tourism in India, and concludes that if managed and developed successfully, the agriculture tourism industry in India has a lot of potential to improve the standard of living of farmers and to develop rural India.

ABSTRACT- PSRM-4/NCAPSR/036

FORMULATION AND APPLICATION OF NOVEL INSECTICIDE Nandini Neman

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Conventional insecticides causes harmful and serious issue on human and animal health. Bioinsecticide is eco-friendly plant based natural extracts and are effective alternative to conventional insecticides. Present study evaluated the effectiveness of innovative natural plant based insecticide formulation against

insect pests for the control of oleander hawk moth, common Mormon, mealy bugs sp. and termites. The formulations made using plant extarcts, buttermilk, jaggery, garlic and cow urine was successful against the studied insects. This formulation can be alternative for hazardous chemical insectides.

Keywords: Bioinsecticides, cow urine, garlic, mealy bugs, termite, etc.

Abstract- PSRM-4/NCAPSR/037

FPLANT BASED GROWTH PROMOTERS AS NATURAL BIOSTIMULANT Purva Phatak

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Biostimulants are products that reduce the need for fertilizers and increase plant growth, resistance to water and abiotic stresses. In the present attempt biostimulant was prepared using botanical extracts and natural resources. The bioformulations made with the combinations of coconut water, Aloe vera, cow urine and beetle leaf extracts significantly increases germination (%) and germination rate index (GRI) in the crop plants ragi and wheat. The aqueous plant extracts with coconut water and cow urine significantly stimulated the growth and biomass of root and shoot in all test crops. These studies have reported stimulatory effect on germination and seedling growth. Thus the formulation may serve as natural source of growth hormone.

Keywords: Aloe vera, Biostimulant, Coconut water, seed germination, etc.

Abstract- PSRM-4/NCAPSR/038

BUTTERFLIES DIVERSITY IN SOUTH KONKAN AND ITS CONSERVATION Karishma Mohite

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South konkan comprises two districts Ratnagiri and Sindhudurg. The region is characterized by the coastal areas and ranges of Western Ghat. Due to such geographical settings, the region has great plant and animal diversity. Butterflies are part of life on earth and an important component of rich biodiversity. Butterflies in all stages of their life cycle play an important role in nature. Butterflies are indicators of a healthy

environment and healthy ecosystems. Areas rich in butterflies are often rich in fauna too. These all together provide a wide range of environmental benefits, like pollination and natural pest control. Butterflies are an important element of the food chain and are prey for birds, lizards and other insectivorous animals as well as insects. In this region, total 227 species from 90 genus and from 5 families have been

recorded. In konkan region, Predation, parasitism and fungal infestation are the main cause of heavy population losses. Sudden climate changes, hostile environment have an

effect too. A great number of butterflies are in danger of extinction. This is mainly due to habitat destruction.

Keywords: Butterflies, Conservation, diversity, Konkan, etc.

Abstract- PSRM-4/NCAPSR/039

PHYTOCHEMICAL ANALYSIS OF METHANOLIC EXTRACT OF FRUITS OF GARCINIA INDICA AND G. TALBOTII BY GCMS. GC-MS ANALYSIS OF BIO-ACTIVE COMPOUNDS IN METHANOLIC EXTRACT OF FRUITS OF GARCINIA INDICA AND G. TALBOTII

Amol A. Kambleand Manasi S. Patil

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The presence of phytochemical constitutes has been reported from methanolic extract of fruits of Garciniaindica and G. talbotii. Objective: The present study was designed todetermine the bioactive components in the unripe and ripened fruits methanol extract of G. indica and G. talbotii.Materials and Methods: Phytochemical screening of methanolic extract ofunripe and ripened fruits of *G. indica* and *G. talbotii*revealed the presence of some bio-active components. Gas chromatography-mass spectrometry (GC-MS) analysis of the methanolic extract of unripe and ripened fruits was performed on GC-MS equipment (Thermo Scientific Co.) Thermo GC-TRACE ultra ver.:5.0, Thermo MS DSQ II. Results:Genus *Garcinia* is known for its various

biomolecular contents and pharmacognostic importance. However, there has been not much information available on bioactive components of both these underutilized fruit species. The GC-MS study has revealed the presence of distinct phytochemical compounds in the methanolic extract of unripe and ripened fruits of G. indica and G. talbotii. A total of 34 compounds wereidentified from both species, 9 bioactive components were present in both the species while,21 components were present singlyeither in unripe or in ripened fruit extract. Conclusion: From the results, it is evident that both these species contain various bioactive components and are recommended as plants of phytopharmaceutical significance.

Keywords: GC-MS analysis, Garcinia indica, Garcinia talbotii, phytochemical screening, whole plant methanol extract.

Abstract- PSRM-4/NCAPSR/040

Green Synthesis of Silver and Zinc Oxide Nanoparticles from Cyathocline Purpurea (Don) O. Kuntze and Its Efficacy against MCF-7 Cancer Cell Line Sandip Ingale¹, Balasaheb Gaykar²

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The utilization and manufacture of silver and zinc oxide nanoparticles from *Cyathocline Purpurea* has a wide range of applications in research and technology. The goal of this research was to synthesize silver and zinc oxide nanoparticles and investigate their biological applications. UV-Visible Spectroscopy, Scanning

Electron Microscopy (SEM), X-ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), High Resonance Transmission Electron Microscopy (HR-TEM), and Zeta potential were used to characterize the produced nanoparticles. MTT assay (3-(4, 5-dimethylthiazolyl-2)-2, 5-diphenyltetrazolium bromide), Annexin V

apoptosis assay by flow cytometry, Caspases-3 expression by flow cytometry, and Cell senescence assay were used to test the anticancer activity of silver and zinc oxide nanoparticles. In conclusion, both silver and zinc

oxide nanoparticles had powerful anticancer activity against the MCF-7 breast cancer cell line, but in a comparative study, silver nanoparticles were found to have more potent anticancer activity than zinc oxide nanoparticles.

Key words: Nanoparticles, Cyathocline purpurea, anticancer activity,

Abstract- PSRM-4/NCAPSR/041

EVALUATION ANTICANCER ACTIVITIES OF DELONIX REGIA ON DIFFERENT CELL LINES. *Manisha salunkhe, Ankita Kolekar, Chirag Narayankar, Dr. D.K. Gaikwad*

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The anticancer potential of ethanolic extract of Delonix regia petals was evaluated against skin cancer cell line A-431, Blood cancer cell line NC-K562, Delonix regia pods was evaluated against kidney cancer cell line NC-A498, Stomach cancer cell line NC-AGS. It was noticed that IC 50 value

of Delonix regia petals extract on skin carcinoma was $36.31 \, \mu l/ml$, leukemia blood cancer $23.85 \, \mu l/ml$ and pods extract was kidney cancer $9.19 \, \mu l/ml$, stomach cancer $58.29 \, \mu l/ml$. Thus, Delonix regia Petals and Pods extract might be used as potent anticancer source.

Keywords: - Delonix regia, Blood cancer, Skin cancer, Stomach cancer, Kidney cancer.

Abstract- PSRM-4/NCAPSR/042

EVALUATION OF ANTIBACTERIAL AND ANTIOXIDANT ACTIVITIES OF POMEGRANATE PEEL Bagal S.N. and Patil Manasi S. 2

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The present study evaluated the antioxidant and antibacterial activities of methanolic extract of Pomegranate (*Punica granatum* L.) peel. The antibacterial activity of a Pomegranate peel was assessed against a bacterial strain, *Streptomycin sp.*, during this investigation. The results showed that a healthy peel of Pomegranate showed maximum inhibition 35.59 % as

compare to premature peel 6.41% and infected peel 11.32 %. The DPPH analysis was conducted to assess the antioxidant activity of pomegranate peel. The results indicate that healthy pomegranate peels had an optimum inhibition of 77.34 %., compared to 69.53 %.in infected peels and 47.26 %. in premature peels.

Keywords: Punica granatum, DPPH, Antibacterial activity, Antioxidant activity

PASSIFLORA: A PROMISING MEDICINAL PLANT

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In nature, herbs are extensively studied for their large therapeutical interests and benefits. Plants, which are a source of phytochemicals with strong antioxidant activity, have attracted a great deal of attention in recent years. The *Passiflora* belongs to family *Passiflora*ceae has been used in diet as well as in medicine by a number of traditional medicine practitioners. In *Passiflora* species, the number of secondary metabolites, organic acids, and volatile

components have been recorded as the significant constituents. A number of *Passiflora* species have been used to treat a wide variety of disorders. Following the analysis of the acquired data, it was determined that the genus *Passiflora* has potential for further study. To determine the nutritional value and medicinally relevant phytoconstituents that will aid in the treatment of various disorders.

Key words: Passiflora, Secondary metabolites, organic acids, volatile components

Abstract- PSRM-4/NCAPSR/044

QUALITATIVE AND QUANTITATIVE ANALYSIS OF PHYTOCHEMICALS AND COMPOSITION OF SOME INORGANIC MINERALS IN COMPOSITE BIOPRODUCTS: AGNIASTRA, BRAMHASTRA, DASHPARNI, NEEMASTRA, JEEVAMRUTH, PANCHGAVYA AND BIJAMRUTH.

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Composite bioproducts such as Agniastra, Bramhastra, Dashparni, Neemastra, Jeevamruth, Panchgavya and Bijamruth can be used as alternative source for synthetic pesticide, growth hormone and fertilizers in agricultural practices. These bioproducts was prepared from locally available waste resources such as cow dung, cow urine, cow milk and plant sources etc. These bioproducts shows presence of phytochemicals such as Polyphenol, Flavanoid, Tannin, Xanthoprotien, Coumarin, Fixed oil, Saponin, Glycosides, Terpenoids. Panchgavya shows maximum amount of total polyphenols 19.46 ± 0.004 mg/100 ml and total flavanoids 27.53 $0.002 \pm \text{mg}/100 \text{ ml.}$ Composition of inorganic minerals present in this bioproducts is necessary before using in agriculture practices. Inorganic

minerals such as sodium, potassium are analysed by flame photometer. nitrogen, phosphorus, sulphur and boron was analysed by UV visible single beam spectrophotometer. Agniastra shows maximum amount of sodium 431 ± 0.7 mg/100 ml, Neemastra shows maximum potassium 155.6 \pm 1.1 mg/100 ml, Bramhastra shows maximum total nitrogen 61 mg/100 ml, Panchgavya shows maximum phosphorus and sulphur i.e. 59.04 ± 0.007 mg/100 ml, 101.3 ± 0.07 mg/100 ml, Jeevamruth shows maximum amount of boron 58.62 ± 0.01 mg/100 ml. Composite bioproducts shows presence of phytochemicals, total phenolics, total flavanoids and some inorganic minerals. These bio-products can be used as alternative for synthetic pesticides and insecticides or as fertilizers.

NEED AND REQUIREMENT OF ORGANIC FARMING Aarti Kharb

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Agriculture was performed without the use of artificial chemicals in ancient times. Artificial chemicals, such as fertilizers and pesticides, were first used in the mid-nineteenth century. The environment was being harmed by this type of agricultural technique. Organic farming emerged in the twentieth century as a result of rapid changes in farming practises. It used environmentally friendly ways to raise crops, avoiding the use of artificial pesticides and instead relying on organic matter. Organic food is good for people's health, and organic farming helps to keep the environment clean. Agriculture has become a high-investing, low-yielding industry as a result of the unrestricted use of synthetic chemicals that are harming the ecology. To protect our environment, organic farming is widely performed without the use of toxic chemicals, which are substituted with biofertilizers, bio-pesticides, and other natural alternatives. This also helps to preserve soil fertility; artificial fertilisers destroy beneficial soil organisms, but organic farming can help to keep soil organisms alive and produce high yields. Organic agriculture has a tumultuous past and is viewed as an ineffective method of food production by some. Organic foods and beverages, on the other hand, are a fast expanding section of the global food industry. We look at organic farming's performance in terms of four major sustainability indicators: productivity, environmental impact, economic viability, and social well-being. Furthermore, preliminary evidence suggests that organic farming systems provide better environmental socioeconomic advantages. agriculture has an enormous role to play in the development of sustainable farming systems, but no single technique will be able to feed the world safely. Instead, a combination of organic and other new farming practises is required. However, there are significant obstacles to these systems' adoption, and a variety of policy instruments will be needed to promote their development and implementation. Organic agriculture combines modernism, tradition, and science to manage the shared environment, promoting fairness and a high quality of life for all parties concerned.

Abstract- PSRM-4/NCAPSR/046

MACROLICHEN SPECIES AND TRAITS AS INDICATORS OF PHOROPHYTES AND ENVIRONMENT: A CASE STUDY FROM KUMAUN HIMALAYA

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Lichens are sensitive organisms to environmental changes and play a putative roles in any forest ecosystem. They also have been identified as best and sensitive bioindicators or early warming indicators of forest health and ecological continuity as well as atmospheric pollution in various regions across the globe, but studies pertaining to their traits as indicators of vegetation is not known till now from India. The information on this topic is guite fundamental for understanding the ecology of structurally dependent lichens. Hence in the present study

we are trying to show and clarify the trait and phorophyte relationship. The macrolichen community composition and species richness within ecologically informative lichen trait groups were analysed in Kumaun Himalaya along with environmental and vascular vegetation gradients. The present study revealed that macrolichens differed significantly frommicrohabitat microhabitat and the differences in the species composition can be visualized in the Principal Component Ordination plot as separation of eachmicrohabitat type.Trait richness differed among microhabitat types and revealed that

some traits are good indicator of microhabitat type. Vegetation types differed significantly in macrolichen species composition and richness and trait richness; characteristic suites of lichen species and traits are associated with the particular vegetation types in the Kumaun Himalaya.

Keywords: *Indicators; Kumaun Himalaya; Macrolichens; phorophytes; traits.*

Abstract- PSRM-4/NCAPSR/047

STRATEGY TO ENHANCE NITROGEN USE EFFICIENCIES(NUES) OF CEREALS Jaiswal Ankit¹, Darshi Divyank²

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The prospective aim of this article is to present a strategy to improve nitrogen use efficiencies of cereals. Agriculture, being one of the biggest sectors of the world especially India has failed to achieve any milestone in feeding the immense population growth as demand for food is constantly rising globally due to rapid population growth. Cereals like rice, wheat, maize, and sorghum are the most important part of our staple diet as well as human nutrition but its basic fundamental element is nitrogen without which it cannot drive proper growth as well as quality yield. So, nitrogen use efficiency may play a relevant role which is the percentage of fertilizer used by the different components of the crop from the total applied quantity of fertilizer. Since large amounts of N fertilizers are needed to cereals to produce maximum grain yields, the NUE has been estimated to be less than 50%. The Remaining percentage of fertilizer is lost in the form of either leaching via N dissolution in water, immobilization, clay fixation, denitrification by anaerobic bacteria or volatilization of ammonia. Even after drastically increasing the use of nitrogenous fertilizer, the world cereals production is very less as per requirement as crops recover on an average of 33% of total

applied N fertilizer only. Nitrogen present in the form of nitrate is not absorbed by plants, takes other nutrients like magnesium (Mg) and calcium (Ca) with it and leaches out and causes increase in phytoavailability of the nitrogen which results into the eutrophication and acidification of soil. The eutrophication of marine ecosystems and freshwater examples of such an impact of leaching of nitrogen. Therefore, the upcoming future generations are likely to agonize over the incredible pressure of worldwide hunger with the rise in per capita consumption due to lessening of agricultural lands. But, going through genetic or molecular approaches may take longer time (about 10-12 years to develop nitrogen efficient varieties), high cost and skill as well. Many scientists and researchers have worked and many of them are working but failed to find an effective way to sustain the population which is increasing at quite alarming rate. Thus, this article will focus on the strategy of improving NUE in a way that will take hardly 3-4 years and will be much more effective for farmers as it will cut the cost of fertilizers, reduce land infertility and increase grain yield production.

Keywords: *nitrogen, NUE, cereals.*

A REVIEW ON HYDROPONICS: AN INNOVATIVE WAY OF FARMING Nazneen Oureshi

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Aquaculture, nutriculture, soilless culture, and tank farming are all terms used to describe hydroponics. Plants are grown in nutrient-rich water with or without the use of an inert media such as sand or gravel for mechanical support. Hydroponics is made up of two Greek words: hydro, which means water, and ponos, which means work. It is a method of producing plants, mainly crops, that does not require the use of soil. Plants are grown in this way on water that is rich in critical nutrients. Plants cultivated hydroponically develop faster and healthier than plants grown in soil, according to research, since they receive essential nutrients directly from water to roots. Nutrients are dissolved in the water that surrounds the root, making it easier for plants to get the nutrition they require. Throughout history, many different civilizations have adopted hydroponic gardening techniques; examples include the hanging garden of Bablon and the floating garden of Aztess in Mexico. Because of the numerous advantages, scientists and horticulturists are experimenting with various methods of hydroponics. NASA has also integrated hydroponics into their space programme, as they consider the feasibility of growing food in long-term space missions. It allows plants to grow 50 percent faster than they would on soil throughout the year. It produces a larger yield, reduces the need of excessive pesticides, consumes just 10% of the water, and can be reused. It's also a fantastic solution for those who don't have access to land or yard area for gardening.

Abstract- PSRM-4/NCAPSR/049

EFFECT OF IFGTB DEVELOPEDBIOFERTILIZERS ON GROWTH IMPROVEMENT OF *MELIADUBIA*CAV. SEEDLINGS

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Bio-fertilizers are more economical and ecofriendly as compared to chemical fertilizers. Many bio-fertilizer products are available for agriculture crops but there are no such certified bio-fertilizers for forestry crops. Institute of Forest Genetics & Tree Breeding (IFGTB) has developed some potential bio-fertilizers viz., Vesicular arbuscularmycorrhizal(VAM) fungi, Azospirillumlipoferum, Azotobacterchroococcum, Phosphobacteria and Potash mobilizers. These IFGTB developed Bio-fertilizers in different combinations were tested for growth and yield improvement of Meliadubia species. The experiment was setup with 2 month old seedlings through CRD design in which 12 treatments were given. Data was collectedfor each treatment at 180 days after inoculation. Treatment 3(Azospirillum) showed maximum growth in shoot length (94.83±1.76) and seedling expansion (54.3±4.73) whereascollar diameter (8.96±0.72) was highest in treatment 4(Azotobacter). Maximum dry shoot weight (11.82±3.06) and root weight(3.96±2.65) was observed in treatment 6 (Potash mobilizer) and treatment 8 (AM+Azotobacter) respectively. Further studies will include the effect of these biofertilizers against biocontrol of pathogens and their effectivity as compared to commercial biofertilizers.

Keywords: *Azospirillumlipoferum, Azotobacterchroococcum,* Phosphobacteria, Potash mobilizers, Vesicular arbuscularmycorrhizal fungi.

Abstract- PSRM-4/NCAPSR/050

HYDROPONICS: AN INNOVATIVE WAY TO GROW CROPS Jagandeep Singh¹* and Sapna Chaudhary¹

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Hydroponics is concerned with the growth of plants in water or other medium other than soil. It is derived from the Greek words hydro, which means "water," and ponos, which means "labor." Soilless Culture is another name for hydroponics. The aqueous solution surrounding the roots provides the necessary nutrients for development and growth. The father of hydroponics is William Frederick Gericke. The origins can be traced back to Babylon, an ancient metropolis. Julius von Schaps and Wilhelm Knop developed the first standardised nutritional solution in the 18th century. All plants, as we know, require oxygen, hydrogen, and carbon from either air or water to survive. Plants also require 13 essential elements, which they generally obtain from the soil. These chemical elements are delivered to the plants in hydroponics cultivation by adding salts to the solution around the roots, which contain all of the micro and macro nutrients. In 2012, India embarked on an experiment involving hydroponics. Hydroponics is an agricultural

method that relies on nutrient-rich water rather than soil. Process-induced Eutrophication is made possible by the reuse of nutrient water supplies (excessive plant growth due to overabundant nutrients). Pesticides are not used in this method, and it uses less water and area than typical agriculture. This is especially useful in cities, where space is limited and population density is high. A self-sustaining city-based food system means less reliance on faraway farms. During the projection period of 2017-22, the global hydroponics market is expected to increase at a CAGR of 6.7 percent, from USD XX million in 2016 to USD 31436.7 million in 2022. Hydroponics, a sub-segment of hydroculture, is a method of growing plants in water without soil using mineral nutrient solutions. From 2015 to 2020, the global hydroponic market is expected to develop at a CAGR of 16.8%, reaching USD 395.2 million. From 2015 to 2020, the global hydroponics crop market is expected to increase at a CAGR of 6.39 percent, from USD 18.8 billion to USD 27.29 billion.

Abstract- PSRM-4/NCAPSR/051

SCREENING OF INDIGENOUS CYANOBACTERIA AS BIOFERTILIZER FOR GARLIC CULTIVATION IN GARHWALHIMALAYA

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Garlic is an important spice used for consumption in our day to day life since ancient times asit imparts a number of health benefits. It has antioxidant, anti-carcinogenic, antitumorigenic, anti-inflammatory, cholesterol-lowering properties. It is cultivated as one of the major spices in almost across the country including Uttarakhand. The recommended dose of fertilization for garlic cultivation is 100:50:50:50 kg NPKS. Microbial biofertilizers can be used as an alternative to the chemical fertilizers for sustainable cultivation of garlic.

Cyanobacteria, the oxygenic photosynthetic prokaryotic organisms with multiple plant growth promoting traits, have rarely been explored as biofertilizer for garlic crop. Hence, the present study has been carried out to evaluate the impact of cyanobacterial extract on the growth parameters of garlicplant in-vitro. A indiaenous of 15 cvanobacterial morphotypes were isolated from four garlic field of Tehri and Pauri districts of Uttarakhand. The isolates were screened for plant growth promoting traits like IAA production, Siderophore production and Nitrogen fixation. Further, the selected isolate, *Nostoc* sp. GT-03 with multiple plant growth promoting traits was evaluated for its garlic plant growth promotion ability in vitro. For the purpose, aqueous extract (1, 2 and 3%) were prepared from the exponential phase biomass of the selected isolate and theimpact of the same was visualized on germination of seeds and growth of seedlings. The control group was treated with same amount of sterilized distilled water. Significant

differences were observed in root length and fresh weight of treated and control group. Thus, the present study concludes that the crude extract of *Nostoc* sp. GT-03 can be used as biofertilizer for garlic cultivation. However, the same has to be studied in vivo too for confirmation of the results. This will serve the dual purpose of meeting growing human needs along with the term and condition of sustainable agriculture.

Keywords: Cyanobacteria . Biofertilizer . Plant growth . Garlic

Abstract- PSRM-4/NCAPSR/052

BIOREMEDIATION OF HEXAVALENT CHROMIUM BY CHROMIUM RESISTANT BACTERIA ISOLATED FROM EFFLUENT WATER

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Chromium (Cr VI) contamination has become a serious concern worldwide. In this study, Cr (VI) resistant bacterial strains were isolated from the effluent water and evaluated for the plant growth promoting traits (PGPR's) such as siderophore production, phosphate solublization, IAA production and Cr (VI) reduction potential. Assessment of different parameters revealed that among 16 bacterial isolates BHR1, BHR5 and BHR6 served as efficient plant growth promoters with 88.3%, 76.1% and 61.4% Cr

(VI) reduction potential respectively after 4d incubation. In-vitro seed germination experiment was performed to study the phytotoxicity effect of chromium using maize seeds as a test crop. The results revealed that Cr (VI) toxicity reduce the germination rate, shoot and root length of maize. However, the inoculation of bacterial isolates showed the amelioration of Cr (VI) stress and suggests the possible application of isolates for the bioremediation of Cr (VI) in soil.

Abstract- PSRM-4/NCAPSR/053

EFFECT OF ROW-SPACINGS AND MICRONUTRIENTS ON SEED YIELD AND QUALITY OF PALAK (BETA VULGARIS VAR. BENGALENSIS L.)

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The present investigation entitled "Effect of row-spacings and micronutrients on seed yield and quality of palak (*Beta vulgaris* var. *bengalensis* L.)" was conducted during *Rabi* (October-March) season of 2020-21 at Vegetable Research Farm of College of Horticulture, Banda University of Agriculture and Technology, Banda. The experiment was laid out in a Factorial Randomize Block Design with two factors *viz.*, row-spacings (S) and micronutrient applications

(M). The first factor *i.e.* row-spacings included 30x10 cm (S1), 40x10 cm (S2) & 50x10 cm (S3) whereas, the second factor i.e. micronutrient application included four treatments *viz.*, without micronutrients (M0), Zink Sulphate Monohydrate (33% Zn+15% S) @ 20kg/ha (M1), Disodium Octaborate Tetrahydrate (20% B) @ 20kg/ha (M2) and equal quantity of each Zink Sulphate Monohydrate (33% Zn+15% S), Disodium Octaborate Tetrahydrate (20% B) and a

commercial formulation containing 6.0% Zn, 3.0% Fe, 0.5% Cu and 1.5% Mn @10kg/ha (M3) in variety of 'All Green'. The treatments under both the factors were applied in all possible combinations in three replications. The data were recorded on plant height (cm), number of leaves per plant, leaf area (cm2), dry weight of plants (g) days to 50 per cent flowering (days after sowing, DAS) number of spikes per plant, spike length (cm), spikelet length (cm), 100 seed weight (g), seed yield (q/ha) germination seedling shoot length (cm), percentage, seedling root length (cm), total seedling length (cm), seedling dry weight (mg), seedling vigour index I and seedling vigour index II. Results indicated that row-spacing of 50×10 cm recorded maximum values for plant height, number of leaves per plant, dry weight of plants, days to 50% of flowering, number of spikes per plant, spike length, spikelet length, 100 seed weight, seedling shoot length, seedling root length, total seedling length, seedling dry weight, seedling vigour index-I and seedling vigour index-II. Maximum seed yield was found in closest row-spacing of 30x10 cm. Germination percentage was noted at 40x10 cm and 50x10 cm row-spacings which was significantly higher than that in 30x10 cm row-

the micronutrients, spacing. Amona registered maximum values for plant height, dry weight of plants, leaf area, days to 50% of flowering, number of spikes per plant, spike and spikelet length, seed yield and germination percentage. The treatment M3 showed second highest germination percentage and highest seedling shoot length, seedling root length, total seedling length, seedling dry weight, seedling vigour index I and seedling vigour index II. In the view of high seed yield and seed quality parameters simultaneously, promising treatment combinations were S2M1, S2M2 and S3M3. Correlation coefficient values indicated that seed yield showed either negative or non-significant positive correlation with all the plant growth, seed yield and seed quality parameters. Contrarily, the principal seed quality parameter germination percentage exhibited significant and positive correlation with most of characters viz., plant height, dry weight of plants and days to 50% flowering, number of spikes per plant, spike length, spikelet length and 100 seed weight, seedling shoot length, seedling root length, total seedling length, seedling dry weight, seedling vigour index-I and seedling vigour index-II.

Abstract- PSRM-4/NCAPSR/054

MUSHROOMS: NUTRITIONAL VALUE AND HEALTH BENEFITS Asra Firdose and Pallvi

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Protein, vitamins, minerals, and antioxidants are all found in mushrooms. These may provide a variety of health benefits. Antioxidants, for example, are molecules that aid in the elimination of free radicals in the body. Free radicals are dangerous byproducts metabolism and other biological functions. They can build up in the body, causing oxidative stress if there are too many. This can destroy the body's cells and cause a variety of health problems. Among the antioxidant agents in mushrooms are selenium, vitamin C and choline. According to the National Cancer Institute, mushrooms' antioxidant content may help prevent lung, prostate, breast, and other types of cancer. Mushrooms have a minor amount of

vitamin D in them as well. Vitamin D supplementation has been shown to help prevent or treat certain types of cancer. It's important to note that taking a nutrient as a supplement is not the same as eating it. Dietary fibre may aid in the management of a variety of health problems, including type 2 diabetes. According to a 2018 meta-analysis, those who consume a lot of fibre had a decreased chance of acquiring type 2 diabetes. Fiber may aid in the reduction of blood glucose levels in people who already have it. Mushrooms contain fibre, potassium, and vitamin C, which may help with cardiovascular health. Potassium can aid in blood pressure regulation, perhaps lowering the risk of hypertension and cardiovascular disease. The American Heart Association (AHA) recommends cutting back on added salt and increasing potassium-rich foods in the diet. There is some evidence that eating betaglucans, a type of fibre, can help lower blood cholesterol levels. Many varieties of mushrooms have beta-glucans in their cell walls. Many pregnant women take folic acid, or folate, tablets to help their foetuses thrive, but mushrooms can also offer folate. B vitamins are abundant in mushrooms. B vitamins assist the

body in obtaining energy from meals and in the formation of red blood cells. A variety of B vitamins appear to be vital for brain health. Mushrooms include choline, which aids muscle movement, learning, and memory, as well as playing a role in nerve impulse transmission. Mushrooms are also the only non-fortified vegan vitamin D source. Other minerals, such as selenium, potassium, copper, iron, and phosphorus, that are difficult to come by in a vegan diet can be found in mushrooms.

Abstract- PSRM-4/NCAPSR/055

EX-SITU CONSERVATION AND PROMOTION OF HERBAL GARDEN AT FOREST COLLEGE AND RESEARCH INSTITUTE, TELANGANA CH. Saiteja¹, A. Divya²

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Herbal Garden play an important role in the exsitu conservation and propagation of commonly available and frequently used medicinal and aromatic plants to create awareness about traditional usage of medicinal plants among the Institutional Herbal various stakeholders. Garden established at Forest College and Research Institute (FCRI), Telangana provides information on traditional and modern uses and propagation of medicinal plants. More than 150 species of medicinal plants belonging tomore than 50 Families Viz., Fabaceae, Euphorbiaceae, Asteraceae, Amaranthaceae, Solanaceae, Zingiberaceae, Lamiaceae, Acanthaceae etc. have been planted, established and maintained in the Institutional Herbal Garden at FCRI, Telangana during 2019-2020 with the support of National Medicinal Plants Board, New Delhi. India has an abundant heritage of valuable indigenous plants with recognized medicinal value. The importance of medicinal plants have been ascribed to their ancient therapeutic uses, as well as relevance to human culture and nutrition (chen et al 2016). A vast number of medicinal plants have been studied regarding their phytochemical constituents (Egamberdieva

et al 2017), including those commonly used in the treatment of specific diseases and considered to play a beneficial role in healthcare. Over harvesting and habitat loss of medicinal and aromatic plants has reduced its population in the wild and threatened the sustainability of species (Negi et al 2018). This calls for an urgent attention for promotion of importance of medicinal and aromatic plants among the various stakeholders and sensitize the public about traditional knowledge by conserving the medicinal and aromatic plants (Lakshman 2016 & Pandey et al 2021). Conservation aims at management of human use of the biodiversity to yield greatest sustainable benefit to present generation while maintaining its potential to meet the needs and aspirations of future generations. Conservation of medicinal and aromatic plants and their genetic resources can be undertaken by in-situ and ex-situ conservation. Ex-situ conservation involves conservation of medicinal and aromatic plants outside their natural habitats used to safeguard them from destruction, replacement deterioration. or

Key Words: Herbal Garden, Medicinal and Aromatic plants, Ex-situ conservation.

Abstract- PSRM-4/NCAPSR/057

APPLICATION OF VARIOUS CLONING TECHNIQUES IN TROPICAL TREES CH. Saiteja¹, A. Divya²

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Trees are an essential component of biodiversity and a crucial aspect of human life. Forest trees, in particular, provide sustainable food, fodder, fuel wood, lumber, and other non-timber items. With a growing global popullation and increased demand for tree products, particularly wood, there is a greater need to produce more timber by planting more forest with higher quality stock. Tropical trees have evolved to thrive in hot, humid climates or in areas that may be quite dry. Tropical forests are home to some of the world's most diverse and species-rich ecosystems. This tree species are significant natural solutions for climate change mitigation and other key activities and services, such as biodiversity protection and wood production, since they play a major part in global carbon storage and sequestration. Enhancing wood output will be a major goal of forest breeding. Traditional propagation and enhancement methods have been used in the past to maintain and sustain forest vegetation. Superior trees are more likely to come from a variety of places. To

begin, forest trees can be picked from natural populations and cloned using macropropagation procedures similar to those being tested for fruit tree rootstocks. In vitro propagation might be achieved by micropropagation or continuous somatic embryogenesis, with the somatic embryos encapsulated to produce artificial seeds. Increased plant breeding might improve tree quality, and it's possible that information acquired in the breeding of fruit species would be valuable in developing techniques for forest trees. It is now possible to investigate the application of tissue culture technologies to enhance tree quality since the discovery of procedures to regenerate woody plants from explant tissues, cells, and protoplasts. The development of somaclonal and protoclonal variation, the formation of haploids, triploids, and polyploids, somatic hybrids and cyhrids, and introduction of foreign DNA transformation have all been successful for tree species.

Key Words: Tropical trees, Macropropagation, Micropropagation, DNA

Abstract- PSRM-4/NCAPSR/058

EVM ENCOUNTERING AMR

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With the advancement of Ethnoveterinary Medicine (EVM) and technology, antimicrobial resistance (AMR) has also been increasing due to huge and injudicious use of antimicrobials in humans, livestock and agriculture leading to untimely deaths among human beings and livestock. According to Center for Disease Dynamics, Economics & Policy, Washington D.C. & New Delhi, one million Indian children die in the first four week of their life each year, of which 190000 die from bacterial infection alone,

and 59319 of these are due to AMR. According to a joint report published in 2017 by the ECDC, EFSA and EMA, the average antimicrobial consumption in humans and animals in 2014 was estimated at 124 and 152 mg/kg, respectively. Global consumption of antimicrobial in veterinary medicine was 93309 tons in 2017, which is projected to increase to 104079 tons by 2030. At the same time, the possibility of increasing AMR cannot be ignored. Many of the ailments like mastitis, infectious or

non-infectious wounds, fever, diarrhoea, endoectoparsitism, gynaecological disorders livestock which have been successfully treated with medicinal and aromatic plants and their byproducts. The fresh leaves of Aloe vera, *Azadirachta indica, Ocimum sanctum,* O. basilicum, Moringa oleifera, Murraya koenigii, Piper betle and Lantana camara; the seeds of Cuminum cyminum, Trigonella foenumgraecum, Papaver somniferum, A. indica, Coriandrum sativum and Piper nigrum; roots or tubers of Raphanus sativus, Curcuma longa, Zingiber officinale, and Acorus calamus; stems of Cissus quadrangularis; Allium sativum and A. cepa bulbs; fruits of Solanum melongena,

Abelmoschus esculentus, and Citrus limon; the resin of Ferula assa-foetida and Cinnamomum camphora; oils of Cocos nucifera and Sesamum indicum seeds; butter prepared from milk; the hanging root of *Ficus benghalensis* tree and triphala powder, have been successfully used and documented in EVM. All these ingredients are readily available at home, farm land or nearby in the market. Both the Ayurveda and EVM preparations used in veterinary practices have been validated successfully in livestock ailments without any adverse affects and fear of AMR. Conclusively, EVM may be considered as beneficial to combat the AMR among livestock.

Keywords: AMR, Deaths, Livestock ailments, Medicinal Plants, EVM

Abstract- PSRM-4/NCAPSR/059

HOMEMADE ECONOMICAL GALACTAGOGUE FOR CATTLE AND BUFFALOES K.L. Dahiya

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Galactopoiesis is a normal phenomenon in every females and produced milk is a complete food for her newborn. Milk is a basic commodity of dairy sector. Every dairy farmer well fed their milch animals to maximize the production. Though, many of the galactagogues, that increases the milk production, are available in the market but their cost is very high and thus tends to increase cost of production. In this study, homemade economical galatagogue were administered to milch cows and buffaloes with good results. Commonly and readily available ingredients, viz. sodium bicarbonate, table salt, ginger, jaggery and garlic are taken, in each of 10 g quantity. All are grinded and mixed them

thoroughly and administered orally twice a day for 10 days. Mixed ingredients can also be fed along with feed already given in routine. In all the lactating cows and buffaloes, there was an increase in milk production from 1.25 to 3.9 kg per day. On an average, there was an increase of daily milk production of 2.655 and 1.730 kg in cows (n=10) and buffaloes (n=5) respectively and averaged 2.347 kg (n=15). Further, improvement in health status of milch animals has also been observed. Hence, it is concluded that homemade preparations can increase milk yield in lactating dairy cows and buffaloes with very low cost.

Key word : Galactopoiesis, Lactating cows, Lactating buffaloes, Homemade Galatagogue, Economical

Abstract- PSRM-4/NCAPSR/060

TRIPHALA DECOCTION: MYCOTIC WOUND HEALING OF TEATS IN BUFFALO K.L. Dahiya

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Teats are major excretory parts of mammary gland to nourish their newborn. Milk produced is consumed by the family or sold in the market for sustain their livelihood by majority of the people in the society. But any problem in teats not only hampers the milk production, it also causes pain the lactating animal. In the present case, a lactating buffalo affected with a mycotic wound at junction of right hind teat and mammary gland and cracked teats (right fore and hind) since 10 days, was treated with Triphala (a combination of crushed dried fruits of *Terminalia chebula, Terminalia bellirica* and *Phyllanthus emblica*) decoction. 100 g of Triphala powder was boiled in 400 ml of clean water till it remained half. Then, it was filtered with the help of muslin cloth and filtrate was collected and stored in a pot. Before applying the decoction, the wounds were thoroughly rinsed with clean water for 10 minutes and formed crush over the wound removed

manually. After cleansing, filtrate prepared with triphala decoction was applied and filtrate soaked bandage was also applied twice a day after every milking, i.e. morning and evening for eight days. On ninth day, the wounds and cracks were completely healed and thereafter, there was no need of any treatment. The teats of the buffalo were completely recovered from mycotic wounds. Moreover, the buffalo was observed for next one week for recurrence of any mycotic infection. Conclusively, it can be established from this study that wound healing can be achieved by Triphala decoction without administration and application of modern available antiseptics antibiotics. or

Keywords: *Mammary gland, Teat, Buffalo, Wound, Triphala.*

Abstract- PSRM-4/NCAPSR/061

HOMEMADE HERBAL HOT BEVERAGES: THE MOST POTENT ANTISTRESSOR K.L. Dahiya¹, Sheetal Mahadik Singla² & Abha³

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Stress is a part of our daily life. Stress plays an important role in the pathogenesis of the metabolic disorders such as diabetes mellitus, atherosclerosis, and even the cancer. Hot beverages particularly the hot tea and coffee are the part of daily life consumption as stress reliever. It may not be wrongly said that now, we are addicted to tea. There is also an increasing tendency to sip the hot herbal tea but it costs high from the market. Herbal tea can be prepared at home with the use of one leaf holy basil (Ocimum sanctum), small piece of ginger (Zingiber officinale) rhizome, 1-2 seeds of black pepper (Piper nigrum), one piece of clove (Syzygium aromaticum), little piece of lemon grass (*Cymbopogon citratus*) leaf, 2-3 leaves each of Brahmi (Bacopa monnieri), and Creeping Wood Sorrel (Oxalis corniculata). If whole of the ingredients are not available then green tea can also be prepared by using individual plant i.e. lemon grass leaf or creeping wood sorrel. Similarly, hot herbal coffee can also be prepared from roasted and grinded seeds of Kasmard (Cassia auriculata), or seeds of Chakarmard (Cassia tora) respectively. The sweetener can be added as per the taste of individual. The phytochemical constituents particularly the flavonoids, terpenoids and essential oil present in these plants or produce have antioxidative properties and their role in stress management. All these ingredients have an aromatic as well as pleasant effect in accordance of consumer. Hence, the tea or coffee may be prepared at home at a very little cost, from the herbal plants and can be used to combat stress in modern era of the fast growing world.

Keywords: Stress, metabolic disorders, Hot beverages, Tea, Coffee, Antioxidative.

Abstract- PSRM-4/NCAPSR/062

SCREENING OF RICE GENOTYPES FOR PHOSPHORUS UPTAKE AND PHOSPHORUS UTILIZATION EFFICIENCIES

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Nitrogen (N), phosphorus (P) and potassium (K) are three major macronutrients for growth and development of rice. Among these nutrients, P limitation is an important nutritional constraint to rice production. Our objective was to evaluate 24 rice genotypes for P uptake and P utilization efficiencies. Soil without P was taken as control (P0) whereas 30 kg P₂O₅ ha⁻¹ recommended dose was used as treatment (P30). Morpho-physiological parameters like plant length, plant dry biomass, root angle and phosphorus contents of plant were recorded at 50% flowering stage while yield parameters were measured at the time of harvest. P-

uptakeand P-utilization efficiencies were calculated by using standard equations. This study found wide variations among genotypes for their response towards P0 but genotypes in general reduced P-uptake and increasedP use efficiencies underP0compared to P30. Some genotypes reduced growth while others promoted growth under Po compared to P30. Yield parameters were mostly statistically nonsignificant between P0 and P30. However, correlation analysis showed that P-uptake and P use efficiencies related positively to grain yield under P0 compared to P30.

Abstract- PSRM-4/NCAPSR/063

STUDIES ON THE EFFECT OF IBA AND NAA ON GROWTH, ROOTING, AND SURVIVAL OF HARDWOOD CUTTINGS OF FIG (*FICUS CARICA* L.) UNDER DIFFERENT GROWING CONDITIONS *Ajay Kumar* ¹, *Nidhika Thakur*², *Imamuddin Shah* ³

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An investigation was conducted to know the influence of growth hormones on growth, rooting and survival of hardwood cuttings of fig (Ficus carica L.) under different growing conditionsat Instructional farm, Department of Fruit Science, Banda University of Agriculture and Technology, Bandaduring 2020-2021. The experiment was set up in RBD (factorial) having thirty cuttings with three replications which were treated with different concentrations of growth hormones *i.e.*T₁ (IBA 1000 ppm), T₂ (IBA 2000 ppm), T₃ (NAA 1000 ppm), T₄ (NAA 2000 ppm), T_5 (IBA 1000 ppm + NAA 1000 ppm), T_6 (IBA 2000 ppm + NAA 2000 ppm) and T₇ (control) and planted under C1 (open field), C2 (shade house) and C₃ (polyhouse) conditions. Among the shoot parameters, the earliest sprouting was

recorded with T₆ (IBA 2000 ppm + NAA 2000 ppm) under C₁ (open field), while maximum shoot diameter, shoot length, number of leaves, fresh weight of shoot and dry weight of shoots recorded with T₆ (IBA 2000 ppm + NAA 2000 ppm) under C2 (shade house). The maximum values of root growth parameters viz., longest root length, number of roots, fresh weight of roots and dry weight of roots and the highest survival percentage were also recorded with the treatment T₆ (IBA 2000 ppm + NAA 2000 ppm) under C₂ (shade house). On the basis of results for fig propagation under Bundelkhand region of Uttar Pradesh, fig hardwood cuttings treatment with IBA 2000 ppm + NAA 2000 ppm under the shade house conditions can be recommended to nursery growers and researchers to obtain

maximum shoot growth, root growth and

highest survival

percentage.

Abstract- PSRM-4/NCAPSR/064

A REPORT ON THE INFESTATION OF PAUROPSYLLA TUBERCULATA ON ALSTONIA SCHOLARIS TREE FROM UDALGURI DISTRICT OF ASSAM Khanjan Das¹ and Dr. Prathana Rajkumari²

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Infestation of leaf galls can be seen on plants. One such incidence of many infestation has been observed from the various localities of Udalguri district Assam, where the galls were prominently seen on the leaves of Alstonia scholaris tree. The whole study is based on the infestation of gall fly, Scientific Name (Pauropsylla tuberculata) on the Alstonia tree. Alstonia scholaris in Udalguri districts are found mostly on road sides. They are basically used in the manufacturing

pencils because of their rapid growth. The observations and identification of the gall fly was based on the survey of various places of Udalguri district to get a better idea about its prominence and population density. The study includes the observation and identification of the infestation done by the fly, its feeding habitats, various life stages and various morphological characters as well. The gall fly has been considered a pest because of the huge loss to the plant incurred by this pest's infestation.

Abstract- PSRM-4/NCAPSR/065

ADVANCES IN PLANT SCIENCE RESEARCH Shruti Bahuguna

GBPIET, Ghurdauri

Plant biotechnology is an emerging field that has led to various researches which has given numerous benefit to mankind such as development of an endangered specie of a plant or expansion of various food yielding crops or increasing nutritional values in crops such as golden rice which is rich in Beta-carotene. Some plants has even emerged as essential elements for treatment of various diseases such as Nettle sting the leaves of this plant inhibits Adenosine

Deaminase Activity in tissues with abnormal growth causing prostate cancer in males. With increase in the trend of organic food production using plants in laboratory has increased in comparison to chemical and microbial synthesis. This review paper provides a brief introduction to all the major researches that has been conducted on plants with their benefits and various researches that are in consideration.

Abstract- PSRM-4/NCAPSR/066

STUDY OF SOIL MICROBIALDIVERSITY FROM TWO DIFFERENT FOREST REGIONS OF KARNATAKA *Manjunath Somapur, Jayadev K.*

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Soil is the biologically active, porous medium that has developed in the uppermost layer of <u>Earth's</u> crust. <u>Soil</u> is one of the principal substrata of life on Earth, serving as a reservoir of <u>water</u> and nutrients, as a medium for the filtration and breakdown of injurious wastes, and as a participant in the cycling of <u>carbon</u> and

other elements through the global <u>ecosystem</u>. It has evolved through weathering processes driven by biological, climatic, geologic, and topographic influences. The study of the soil microbial diversity is important in understanding the microbial community consisting of beneficial microbes which help in the soil nutrition

management, soil fertility etc. There are many ways for soil analysis and soil testing. Shotgun Metagenomic sequencing is one of such method of analysis for the identification the soil microbial diversity/community. The soil organic matter (SOM) such as organic minerals,

vitamins, amino acids, alkaloids, acids, salts etc. are all balanced based on the soil microbial diversity, based on the soil component study the soil can be enriched with the required nutrients which helps in the Agriculture.

Keywords: Soil Microbial diversity, Metagenomic sequencing, Soil organic matter,

Abstract- PSRM-4/NCAPSR/067

INTEGRATED ORGANIC FARMING FORSOLANACEOUS VEGETABLEPRODUCTION Khyati Singh*, T.P. Malik, Sumit Deshwal, Makhan Majoka

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The modern agriculture includes the excessive use of agro-chemicals not only has negative hold on agricultural resources but also affects thehuman and animals lives in many ways. With ever-growing population, the demand of food and raw material for industries is also rising at greater pace. Vegetables are important part of balanced diet for their high nutritive value. Solanaceous vegetable are consumed worldwide, potato being staple food, tomato, brinjal and chilli consumed widely across the globe. India is the second largest producer of vegetable and needs to focus on sustainability of crop production. Since its inception, organic farming has come a long way. It has been able to positively impact productivity and generate surplus for exports. It is an eco-friendly alternative to chemical-based agriculture which damage soil health, environment and food quality. It aims at optimization of resources viz., land, water, etc. to achieve sustainable crop

production and create a lucrative rise in market value resulting in increased income of vegetable growers as organic products are sold at 10-50% higher prices than their inorganic counterparts. Adoption of beneficial cropping system, plant-based mulching, manuring, green bulky compost, manures, vermicompost, biofertilizers and good management strategies can contribute in improving soil health and quality of produce. As complete substitution of inorganic cultivation of vegetable is not feasible considering the current state of Indian agriculture, an integrated system of inorganic cultivation withorganic farming can provide ways to reduce harmful impacts of chemicalbased cultivation. Several studies have revealed the signification of partial adoption of organic farming alongside modern agriculture practices for sustainable crop production and also improve farm income.

Keywords: Organic farming, Modern agriculture, Agro-chemicals, Vermicompost, Biofertilizers

Abstract- PSRM-4/NCAPSR/068

BIOLOGICAL CONTROL OF PHYTOPTHORA CAPSICI OF CAPSICUM ANNUUM BY DIFFERENT TYPES OF WEED LEAVES EXTRACT.

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Herbal fungicides are mostly used to control plant disease because of their ecofriendly nature and cost effectiveness. The present

investigation focuses on the antifungal activity of some weed extracts viz., Achyranthes aspera, Parthenium hysterophorus, Cannabis sativa, Calotropis gigantean, Chenopodium album, Canada thistle, Phalaris minor, Cynoden dactylon, Argemone maxicana, Ageratum conyzoides, and Lantana camera against soilborne phytopathogenic fungi causing different types of diseases. Out of 11 weed tested, the extracts of Cannabis sativa, Ageratum

conyzoides and Argemone maxicana, Parthenium

hysterophorus were found most effective against phytopathogenic fungi, Phytopthora capsici & Fusarium. methanol extracts of Cannabis sativa, Argemone maxicana, and acetone extract of Ageratum conyzoides, can be used for the development of novel broad spectrum herbal fungicidal formulations after in vivo and field trial. Which is in progress.

Keywords: Fungicides, Weed leaves extract, Phytopthora capsici, Fusarium.

Abstract- PSRM-4/NCAPSR/069

SCREENING OF SOME *DIOSCOREA* SPECIES FOR ANTI-OBESITY EFFECT BY DOWN-REGULATING ADIPOGENIC GENES IN 3T3 L1 CELLS.

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Obesity is the major problem now days. It is a serious chronic disease with associated increased risk of insulin resistance, type 2 diabetes, cardiovascular disease, gallstones, fatty liver disease, osteoarthritis, oxidative stress and inflammation based pathologies in human population. There are some species of *Dioscorea* were studied for the anti-obesity potential. In the present study four Dioscorea species were screened for the antiadipogenic activity. 3T3-L1 pre adipocytes was treated with the methanolic and aqueous whole plant extract of *D. alata, D. bulbifera, D.* pentaphylla and D. oppositifolia. On the basis of inhibition of lipid accumulation in the cells both the extracts of the *D. pentaphylla (40%)* and *D.*

oppositifolia (53%) was carry forward for the gene expression study. mRNA was isolated from treated and non-treated cells for gene expression study. The methanolic and aqueous extracts of D. *oppositifolia*helps adipocyte differentiation by suppressing m RNA expression of peroxisome proliferator-activated receptor (PPAR) y, CCAAT/enhancer binding protein (C/EBP) a,sterol regulatory elementbinding protein (SREBP-1), and fatty acid synthase(FASN). It also stimulate the carnitine palmitoyltransferase-1 (CPT 1) gene which help in the lipid degradation. The results obtained indicates that *D. oppositifolia* has anti-obesity potential by controlling adipogenic activity that helps to control the obesity.

Keywords: anti-obesity, Dioscorea oppositifolia, gene expression

Abstract- PSRM-4/NCAPSR/070

GREEN SYNTHESIS OF SILVER NANOPARTICLES USING A COMMON WEED *AMARANTHUS SPINOSUS S.S. Chougale; D.K. Gaikwad*

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An environment-friendly approach for silver nanoparticles synthesis is demonstrated in the present study using *Amaranthus spinosus*a spiny pigweed. The potential of *Amaranthus spinosus*leaf extract to aid the synthesis of silver

nanoparticles is evaluated in a simple way. After mixing the leaf extract of *Amaranthus spinosus* with silver nitrate solution, the formation of silver nanoparticles was observed. Synthesized particles were characterized by

using UV-Visible spectroscopy, EDAX, DLS and TEM analysis. UV-Vis spectrum of the solution containing silver nanoparticles demonstrated a peak at 425nm. The energy-dispersive X-ray spectroscopy of the synthesized particles demonstrated a peak at 3KeV and silver as a

major elemental composition(89.83%). The DLS analysis for particle size provided the Z-average (d.nm) 76.05 with polydispersity index 0.378. The TEM analysis revealed that the particles were in the range of 1-100nm and mostly spherical.

Keywords: Nanotechnology, Green synthesis, Silver Nanoparticles, Amaranthus spinosus.

Abstract- PSRM-4/NCAPSR/071

AGRICULTURE WASTE: INCOME FROM TRASH

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Agricultural wastes are the residues from the production and processing of agricultural waste that may having less economic values. They mainly consist of organic wastes such as animal excreta, FYM, soiled water, crop waste, vegetables and fruits. Estimated that about 998 million tons of agricultural waste is produced yearly and up to 80% of total soiled wastes generated in farm. Recycling, reprocessing and utilization of agricultural wastes in positive manner offers possibility of beneficial use then simply disposal. Agricultural wastes can be used to produce large value added products such as Bio- bricks from sugarcane bagasse. Basic

method for utilizing agricultural wastes has been to return them to land so that the land application cost may be decline. Main solution for agricultural waste management is reduction via developing cultivation strategies, minimal chemical fertilizers, use increasing environmental awareness and education, reuse in bio-energy production, direct combustion, animal feed, recycling through civil construction and composting approaches. These strategies are reported in the literature for stimulating agricultural waste management in the India and South Asiaregion.

Keywords : Agricultural Waste, Production, Management.

Abstract- PSRM-4/NCAPSR/072

EVALUATION OF SUITABLE STRAWBERRY VARIETY UNDER SUBTROPICAL REGION- REVIEW Sonam

Horticulture fruit science from Lovely Professional University

Strawberry (Fragaria × ananassa Duch.) is an extremely pleasing fruit for its good flavor, extraordinary taste, attractiveness in color, cosmic medicinal value, and high nutritional properties.suitable cultivar for a Specific region is helpful for the increase in production, improve the quality of fruit, related to good market acceptability and well-growing habit.In-state of Punjab and Haryana mostly winter down, camarosa and chandler are well grown in this region. The strawberry fruit plant is fibrousrooted, herbaceous in nature, long petiole length, trifoliate leaf with runner producing a shoot. Being a surface feeder, strawberry

requires optimum moisture and temperature conditions especially in the upper layer of the soil. The growing environment influences morphology, composition, and quality of strawberry fruits. Which indicates that both types of environmental conditions are favorable for strawberries. It was demonstrated that genotype is the main source of variation and the single most important factor that influenced the growth, yield, and quality of fruit. It is grown extensively in plastic greenhouses, Net houses, and low tunnels for good production, higher productivity. In a Protracted structure, fruits are

of good quality and have good market acceptability.

Keywords: Variety, Greenhouse, Growth, Poly house, Strawberry, Yield

Abstract- PSRM-4/NCAPSR/073

EFFECT OF ETHREL AND BANANA PSEUDOSTEM JUICE SPRAY ON WINTER GUAVA (*PSIDIUM GUAJAVA*) CV. HISAR SAFEDA *Ankush*

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The present research study was conducted to enhance the post-harvest quality of guava fruits by treating them with pre-harvest treatments. Guava (Psidium quajava L.) is a tropical fruit, belongs to the family- Myrtaceae. It is one of the most common and major fruits of India and is popularly known as "Apple of Tropics" due to its particular dessert and culinary usages. The increase in its consumption, both as a table fruit and as a natural juice, has been a worldwide trend. It contains a considerable amount of iron but 80 percent of which remains in the seed. The fruit is also an excellent source of vitamin C containing 2-5 times more than oranges. The high amount of pectin in guava lowers blood cholesterol. Rainy season crops are poor in quality while the winter crop is superior in quality, free from fruit fly infestation, and fetches higher price as compared to rainy season crops. the fruits of the winter season crop remain hard and do not ripe properly on the tree due to low temperature. The present

research study revealed that the treatment of Ethrel 400 ppm+ BPS* juice @2% pre-harvest spray could effectively enhance the post-harvest quality of quava fruits cv. Hisar Safeda. Based on the result obtained it is concluded that the treatment of Ethrel 400 ppm+ BPS* juice @2% is effective in maintaining the post-harvest quality parameters and early ripening of guava fruits cv. Hisar Safeda. it may be recorded that parameters of the fruit physical firmness(3.18kg/cm2), fruit weight(231.6gm), and palatable rating(7.56) were retained best in Ethrel 400 ppm+ BPS* juice @2% while the minimum PLW(1.24) was recorded in the same treatment. Regarding biochemical characters viz., acidity(.31%), TSS(11.23), Ascorbic acid (221.33mg/100gm pulp), total sugar(7.39), reducing sugar(4.76), and non-reducing sugar (2.63) were shown with improved retained values in the same treatment. Above all, only T2 (Ethrel 400 ppm+ BPS* juice @2%) was found superior in all treatments.

Key word: Ethrel, Banana Pseudo-steam juice, Guava, Shelf life.

Abstract- PSRM-4/NCAPSR/074

ANDROGRAPHIS PANICULATA: A PANACEA FOR THE CONTROLLING OF MULTIFARIOUS DISEASES IN PHARMACOLOGY

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Andrographis paniculata (Burm.f.) Wall. ex Nees., (FamilyAcanthaceae) (English name-King of Bitters, Tamil name-Nilavempu) is an annual herbaceous plant and is extensively cultivated in Southern Asia, India, China and some parts of Europe. In traditional medicine, *A. paniculata* is widely used to get rid of body heat, dispel toxins from the body; prevent common cold, upper respiratory tract infections including sinusitis

and fever and as an antidote against poisons of snakes and insects. The plant has been reported to exhibit various mode of biological activities in vivo as well as in vitro viz., antibacterial, antiviral, anti-inflammatory, anti HIV (Human immunodeficiency virus), immunomodulating/immunostimulatory and anticancer. The plant showed potential therapeutic action in curing liver disorders, common cough and colds in

human. The characteristic secondary metabolites encountered in this plant have considerably enhanced its importance in the arena of medicinal plants. Botanical description Andrographis paniculata is an annual, branched, herbaceous plant erecting to a height of 30-110 cm in moist shady places. The stem is acutely quadrangular; much branched and can be broken easily due to its fragile texture. Leaves are simple, opposite, glabrous, lanceolate, 2-12 cm long, 1-3 cm wide with acute entire margin. Inflorescence is terminal and axillary in panicle, 10-30 mm long with small bract and short pedicel. The flowers possess calyx with 5 sepals which are small and linear. Corolla tubes are narrow, about 6 mm long, bilabiate, upper lip oblong, white with a yellowish top, whereas the lower tips are broadly cuneate, 3-lobed, white with violet markings. Stamens 2, inserted in the throat, anther basally bearded. Ovary superior, 2-celled with exerted style. Capsule of the herb erect, linear-oblong, 1-2 cm compressed, longitudinally furrowed on broad faces with thin glandular hairs. Seeds are very small. Traditional uses Andrographis paniculata, a traditional medicinal plant, has been used for centuries to successfully treat respiratory diseases, skin infections, herpes, dysentery,

fever, sore throat, lower urinary tract infections, to reduce inflammation and to stop diarrhoea. Clinically, the use of this herb is reported in contemporary and ancient Indian literature writings. In Traditional Indian Medicine, Andrographis paniculata is a bitter and 'cold property' herb. It is used in the treatment of 'hot' conditions such as acute infections and fever, including throat infection, pneumonia, tonsillitis, gastroenteritis dysentery, pyelonephritis. It is also prescribed for snakebite. It is used in Malaysian folk medicine for diabetes and hypertension. A. paniculata had pharmacological properties which include antibacterial, immunological, antivenomous and antithrombotic properties. More recently, A. paniculata has been used in the treatment of chronic bronchitis, administered aquapuncture, i.e. the injection of an infusion into acupuncture points. In Ayurvedic medicine, it is used as a bitter tonic and stomachic, for diabetes. debility, hepatitis and anthelmintic. A. paniculata extract has been used in different forms, such as tablet or injection. In Bundelkhand region, A. paniculata is being cultivated and grown naturally due to well suited congenial condition and would be very good source income for farmers.

Abstract- PSRM-4/NCAPSR/075

EFFECT OF CROP INTENSIFICATION AND ESTABLISHMENT TECHNIQUES ON ECONOMICS OF DIFFERENT CROPPING SYSTEM

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The field experiments were conducted during 2015-16 and 2016-17 to study intensification and establishment techniques of rice- wheat system and influence on economics. Among various cropping systems the maximum cost involvement was registered in Rice (DSR) − Potato − Cowpea sequence. The maximum values of gross return, and net return were obtained in [Rice (DSR) − Potato − Cowpea]. However, the benefit: cost ratio was found to be the highest (3.25 and 3.37) in [Rice (DSR) − vegetable pea − maize (cob+ fodder)] during 2015-16 and 2016-17, respectively. During 2015-16 the maximum system profitability (1192 ₹/ha/day) was recorded in Rice (DSR) −

Potato – Cowpea sequence, while, during 2016-17, [Maize (Bed) (cob + fodder) + Cowpea (vegetable) (Bed) +Sesbania (Furrow)-2:1:2 -Vegetable pea Toria-3:1 Groundnut+Mentha-3:1(Broad bed furrow 105cm x 30 cm)] recorded the maximum value (1245 ₹/ha/day) being at par with Rice (DSR) -Potato – Cowpea seguence. The highest crop profitability was recorded in Rice (DSR) - Potato - Cowpea sequence with 992.64 and 1036.26 ₹/ha/day during 2015-16 and 2016-17 respectively. The highest relative economic efficiency was noticed in [Rice (DSR) - Potato -Cowpea] cropping system during 2015-16 and 2016-17, respectively. Rice (DSR) - Potato -

Cowpea sequence was found economically efficient in overall treatments.

Key words: intensification, establishment techniques, rice-wheat and economics

Abstract- PSRM-4/NCAPSR/076

STRATEGIES FOR ENHANCEMENT OF SURVIVAL RATE OF MICROPROPAGATED PLANTS Sakshi Bhatt, Richa Rawat, Nishesh Sharma

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Micropropagation a technical term for plant tissue culture has been successfully utilized for mass propagation of numerous plan species. challenging The most aspect micropropagation process is successful transfer of tissue cultured plants from laboratory conditions to natural conditions. Transfer of micropropagated plants from laboratory to natural environment is known as hardening or acclimatization. Plants raised through tissue culture process exhibit several characteristic variations such as heterotropic / mixotropic nutrition, absence of leaf hair, reduced epicuticular wax or no cuticle, non functional

stomata regulation, etc. Micropropagation process provides a controlled environment including high humidity, low light, and controlled temperature alongwith nutrient enriched culture medium. When micropropagated plants are transferred to natural conditions substantial number of plants fails to survive under natural conditions. Ex vitro rooting, optimization of composition of planting / potting mixture implementing hydroponics technique, photoautotrophic acclimatization and biotizationhave also been reported to enhance plants after transplantation. survival of

Key words: Micropropagation, acclimatization, hydroponics, ex vitro rooting, biotization

Abstract- PSRM-4/NCAPSR/077

IN VITRO ANALYSIS OF BIOLOGICAL ACTIVITIES OF CICHORIUM INTYBUS Deepak Kumar¹ and Nishesh Sharma²

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Cichorium intybus is a Well-known medicinal plant commonly known as "Kasni". The plant is found in North West India up to 6000 ft in regions of Punjab, Kashmir, Andhra Pradesh, Karnataka and Maharashtra. Other countries which produce chicory are Baluchistan, Belgium, Europe, France, Germany, Persia, Netherlands, UK, West Asia. And is utilize in the treatment of Jaundice, spleen problems, gastrointestinal problems like digestive difficulties, gastritis and lack of appetite, sinus problems, cuts and bruises. In Unani system of medicine Kasni is

used as Hepatoprotective and Nephroprotective. leaves juice and tea are used as lithotriptic, elimination of internal mucus and production of bile. In the present study extract of leaves and roots of the plant were prepared through soxhlet assembly and the extract were subjected to analysis of their respective antioxidant and anti- inflammatory potential. Both leaves as well as root extract exhibited inherent antioxidant and anti- inflammatory potential which suggest the plants to be utilize in the treatment of various related ailments.

Key words: Cichorium intybus, leaf, root, antioxidant, anti – inflammatory

Abstract- PSRM-4/NCAPSR/078

EXTRACTION OF PECTIN FROM MOSAMBI PEELS Ambika Gaur and Nishesh Sharma

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Huge volume of agricultural food waste in generated across the globe annually. Scientific studies have been conducted to utilize the waste for various purposes in eco-friendly way. A common approach is extraction of structural components from organic waste and processing of the same for various purposes. Among such target components pectin is a component of great potential. Pectin is an important structural

component of plant cell wall. Structurally it is acidic heteropolysaccharide found to be present in primary and middle lamella and cell walls of plants. In the present study Mosambi peels wereutilized as substrate for extraction of pectin. Light yellow pectin was extracted. The extracted pectin can be further utilized in production and processing of food products and biodegradable products.

Key words: food waste, mosambi peels, pectin

Abstract- PSRM-4/NCAPSR/079

FTIR ANALYSIS OF OIL OF MEDICINAL PLANT WITHANIACOAGULANS Priya Raghav and Nishesh Sharma

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Withaniacoagulans is an important medicinal plant commonly known as doda paneer. The common name is attributed to milk coagulating property of the plant. The plant has been reported to possess several medicinal and biological activities but still the plan remains to be underutilized due to extremely poor germination rate and slow propagation rate in nature. In the present study oil was extracted

from seeds of the Withaniacoagulans and subjected to FTIR analysis. The interpretation of data obtained from FTIR study revealed presence of wide range of organic compounds as components of extracted oil. The findings of the study support further studies to explore and optimize utilization of oi of Withaniacoagulans for medicinal and other purposes.

Key words: Withaniacoagulans, seeds, oil, FTIR

Abstract-PSRM-4/NCAPSR/80

INTEGRATION OF ALGAE CULTIVATION WITH FOOD WASTE TREATMENT Priyvartand Nishesh Sharma

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Large volume of food waste produced worldwide which has been recognized as a concern to be managed and disposed in a way that no environmental pollution is caused. Conventional food waste treatment methods such as composting and landfilling often results in either emission of greenhouses gases or disposal of leachate into water bodies. Anerobic digestion is associated with problems such as acidification, foaming and other issues Pretreatment of food waste to obtain food waste hydrolysate (FWH)

and utilization of same as suitable feedstock for cultivation of microalgae species has been recognized as suitable alternative as along with waste treatment, economic cultivation of microalgae is simultaneously achieved. Effluent derived from anaerobic digestion can also be utilized as medium for algae cultivation. Algae biomass can be further processed for several applications such as production of biofuel and biofertilizer.

Key words: Food waste, anaerobic digestion, microalgae cultivation

Abstract- PSRM-4/NCAPSR/81

SMALL MILLETS' CULTIVATION IN MID HILLS OF UTTARAKHAND UNDER ORGANIC FARMING FRAMEWORK: PRESENT STATUS AND CHALLENGES

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India is the largest producer of small millets which are often referred to as coarse cereals. Among rainfed crops, small millets as a group figure prominently. In India, these crops are grown in diverse soils, varying rainfall regimes and in area widely differing in thermoand photo-periods. In state Uttarakhand, these crops are being grown by poor, marginal and tribal farmers since time immemorial. The resilience exhibited by these crops is helpful in their adjustment to different kinds of ecological niches and have made them quite indispensable to rainfed, tribal and hill agriculture where crop substitution is difficult. Although, Small millets are known to cope up with biotic and abiotic nevertheless, under stresses, vulnerable conditions some of the diseases cause heavy losses and can damage entire crop. Among the seven small millets that are grown in India, finger millet and barnyard millet are grown extensively in Uttarakhand at present whereas foxtail millet and proso millet are grown in some patches as catch crop. Based on the study conducted during 2012 to 2020, Cercospora leaf spot (Cercosporaeleusinis) and blast (Pyricularia

arisea) of finger millet, grain smut (Ustilagopanici-frumentacea), sheath blight (Rhizoctonia solani) and leaf blight (Helminthosporium monoceros) of barnyard millet, blast (Pyriculariasetariae) and leaf blight (Cochliobolussetariae) of foxtail millet, leaf spot or blight (Bipolaris-panici-miliacei) of proso millet have been recorded as major biotic constraints in reducing the production and productivity of these crops in state Uttarakhand. These crops are cultivated under organic farming framework in marginal and degraded soils with little cash inputs and chemical fertilizers and pesticides are generally not adopted by small and marginal farmers in hills Uttarakhand. Therefore the present investigation was planned with an objective to ascertain the status of economically important major prevailing diseases associated with small millets and also to record the outbreak of any new emerging diseases with time along with to determinethe available sources for biomanagement of any biotic problem interfering small millets production.

Key words: Small millets, finger millet, barnyard millet, biotic stresses, pesticides andbiomanagement

Abstract- PSRM-4/NCAPSR/082

HYDROPONIC: ISSUES AND OPPORTUNITIES IN SMART AGRICULTURE

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Aquaponics, also known as nutriculture, soilless culture, or tank farming, is a type of

hydroponics. Plants are grown in nutrient-rich water with or without the use of an inert media

such as sand or gravel for mechanical support. This method of culture was adopted by early commercial hydroponics from Greek (hydro, "water," and ponos, "labour"). Plants have been grown with their roots immersed in water and fertiliser solutions for scientific research of their nutrition for a long time. There are systems that will monitor the quantity of nutrients, pH, water temperature, and even the amount of light the plants are receiving in today's hydroponic systems. A nutrition film technique, an Ebb and Flow System, and a Wick system are the three basic types of hydroponic systems. There are numerous benefits to adopting any of these hydroponic systems. First, because there is no soil, there is no need to worry about having a plot of land, weeds, dirt-borne pathogens, or pesticides on the crops. The nutrient reservoir

also saves a lot of water because the same water may be reused over and over. This technique of farming has the potential to transform agriculture by utilising less water and other resources all around the planet. Gravel may be used to successfully cultivate a wide range of vegetables and flower crops. The main benefit is that automatic watering and fertilising saves time and effort. High installation costs and the necessity to test the system often are the downsides. The yields are similar to those of soil-grown crops. While hydroponic technology will never completely replace traditional farming, it is disrupting the food production paradigm; we may see a new generation of modern farmers construct green walls inside their homes or community centres to feed their families with fresh vegetables grown all year.

Abstract- PSRM-4/NCAPSR/083

ORGANIC FARMING FUTURE SCOPE IN INDIA Sheelendra M Bhatt

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Menace of heavy use of fertilizers by famers going to impactat large scale in indian state like Punjab hariyana Rajasthan and other state. They not only creating water pollution but also killing living organism in surrounding ecosystem. Better alternative suggested by the use of organic fertilizers but its management is quite difficult and result is slow. With failure of zero

budget farming farmers are now looking for NGO Govt. agencies alternatively success of organic farming creates new marketing boom where advanced based contract farming is giving new hope. Few scientist are working over the problematic aspects but integrating various management practices like Biogas production with fertilizer production.

Key Words: Organic farming, zero budget farming, ecosystem.

Abstract- PSRM-4/NCAPSR/084

EFFECT OF SOWING DATES AND BOTANICAL SEED PELLETING ON PLANT GROWTH, BULB YIELD AND QUALITY OF ONION (ALLIUM CEPA L.)

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The present investigation was conducted in the field of Department of Seed Science and Technology, Dr. Y. S. Parmar University of

Horticulture and Forestry, Nauni, Solan during seasons of 2016-17 and 2017-18. This experiment comprised of pelleted seeds with

different botanicals carried out to determine the effect of sowing dates and seed pelleting and their interactions on plant growth, yield and quality of bulb crop. All the factors in the experiment as well as their interactions showed significant influence on plant growth, yield and yield contributing characters in onion. The seeds pelleted with *Azadirechta indica* leaf powder + clay and *Melia azedarach* leaf powder + clay sown directly showed maximum values w.r.t. emergence (91.50 %), plant height at 60 days after sowing (35.35 cm), average leaf length (38.43cm), number of leaves per plant (8.67),

number of days to harvesting (233.49). polar diameter (46.72 mm), equatorial diameter (57.77 mm), bulb size index (2699.74), neck thickness (12.12 mm), number of bulb per plot (89.00) average bulb weight (75.24 g), bulb yield (6.67 kg per plot or 400.01 q per ha), plant height before neck fall stage (58.55 cm). From the present studies, it can be concluded that onion seeds pelleted with *Azadirechta indica* leaf powder + clay and *Melia azedarach* leaf powder + clay showed significant effects for enhancing bulb quality, growth, quality and yield of bulb crop raised through direct seeding.

Key words: Botanicals, Clay, Gum Arabica, Onion, Pelleting, Seed quality

Abstract- PSRM-4/NCAPSR/085

MILLETS OF UTTARAKHAND: A NUTRACEUTICALS PERSPECTIVE Vinay Prakash and Hemlata Bisht

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Millets are small-grained climate resilient cereal crops with hiah nutraceuticals grownglobally with little input mostly under unfavorable agricultural situations and may play an important role in reducing greenhouse gases by mitigating emission of nitrous oxide into the environment. Millets are one of the traditional staple food crops of Uttarakhand and possess higher nutritional as well as pharmaceutical value than the common food crops. It is also a very good source of nutrients, vitamins, minerals, and organic compounds that can significantly boost human health in various ways. Additionally, since millet does not contain gluten, it is a wonderful grain alternative for people who are gluten-sensitive celiac sufferers. Despite these values production and utilization of these crops are restricted to particular region but there is an urgent need to explore the value and cultivation of these future crops in high scale. Moreover, millets considered 'Shridhanya', have great potential to be the future crop as the common crop wheat is highly heat sensitive and increasing global temperature affects its production in very near future and the rice is high water demanding in this age of water scarcity. Millets are mainly grown in

developing countries but its ability to grow in relatively harsh, arid, and dry environments with minimum water demand and low maintenance makes it an ideal crop for many countries so can be used as alternative food sources of frequently used cereal like wheat, rice and security.This maize to maintain food transformation also contributes for ecological balance and encourages the conservation of this conventional crop system alongwith restoration of left over lands of Uttarakhand villages too. Considering the nutraceuticals value and cultivation potential of the millets, this chapter articulated review discussnutraceuticals analysis, distribution pattern, production status, consumption pattern as well as the challenges and possibilities of promotion, cultivation, conservation, adoption and marketing of millets of Uttarakhand in modern day global agriculture pattern. To extend and encourage the adoption of these disappeared, neglected but nutraceuticals rich traditional food crops in agrosystem support the idea to conserve, promote, adopt, and cultivate traditional food crops system in Uttarakhand to nutritional security ensure alongwith the pharmaceutical benefits.

Keywords: Nutraceuticals, millets, traditional food, nutritional security, future crop

Abstract- PSRM-4/NCAPSR/086

EXTENT OF HETEROSIS FOR YIELD AND CONTRIBUTING TRAITS IN YELLOW SARSON (B. RAPA VAR. YELLOW SARSON)

Sameer Chaturvedi¹, Neha Dahiya¹, Naveen Chandra², Preeti Lohni¹, and Usha Pant¹

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The experimental materials for the present investigation consisted of 40 F1's, 10 lines as female and 4 testers as males. Data were subjected to appropriate statistical methods. Results revealed that heterosis for days to NDYS-2018×NDYS-113 (12.21**) maturity, showed maximum better parent heterosis. Highest relative heterosis was noticed in NDYS-2018 \times Pusa Gold (-11.62**) whereas, B-9 \times PPS-1(-8.65**) expressed maximum economic heterosis. NDYS-115 × Pusa Gold (-15.69**, -15.85**) possessed highest estimates of heterobeltiosis and mid parent heterosis while NDYS-2018×NRCYS-05-01 (-9.65**) was the best cross in respect of economic heterosis for

plant height. For seed yield cross Jhumka × NDYS-113 (52.36**, 65.34**) maximum heterobeltiosis and relative heterosis while maximum economic heterosis was registered in NDYS-128 \times PPS-1 (41.54**). In test weight maximum heterosis over better parent was found in NDYS-128 × NDYS-113 (24.47**) and highest estimates of relative and economic heterosis was possessed by NDYS-NDYS-113 (25.18**, 132 22.29**) respectively. A single cross YS-166 × NDYS-113 (7.57**, 7.74**, 8.40**) showed maximum heterobeltiosis, relative heterosis and economic heterosis for oil content.

Abstract- PSRM-4/NCAPSR/087

PLANT REGENERATION VIA SOMATIC EMBRYOGENESIS IN *VIOLA CANESCENS* WALL. EX. ROXB.: A THREATENED HIMALAYAN HERB *Arun Kumar Khajuria*^{1,2}, *N S Bisht*¹

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Viola canescens Wall. ex. Roxb is an important threatened medicinal herb found at 1,500-2,400 meters amsl in Himalayas. Over exploitation and habitat preference put the plant under serious threat. In present work an efficient in vitro propagation protocol for endangered herb Viola canescens has been achieved through somatic embryogenesis. Friable calli were derived from leaf explants on a MS basal medium supplemented with growth regulators was use as callus source for present work. The results revealed that plant can be regenerated successfully through somatic embryogenesis using leaf derived calli. Maximum average

number of somatic embryos (19.15±2.66) were induced on medium having 0.15+0.05 mgl⁻¹ of 2,4-D and Kn respectively and this medium was used as control. To enhance the somatic embryo induction, control MS medium was supplemented with L-glutamine (200-400 mgl⁻¹) and casein hydrolysate (1-4%). Maximum average number of somatic embryos (27.66±2.67) with average mature somatic embryos (13.16±3.48) was reported on medium having 2 % L-glutamine and 50 mgl⁻¹casein hydrolysate. The induced somatic embryos were asynchronous. So to foster their maturation, culture medium (free from growth regulators)

was supplemented with abscisic acid (ABA). Maximum average number (35.96±3.68) of mature somatic embryos was reported on MS medium supplemented with 1.5 mgl⁻¹ ABA. The development of somatic embryos into plantlets was significant with conversion rate of 83.33 %

on medium having 0.20 mgl⁻¹BAP. The plantlets thus produced acclimatized in growth chamber before transferring them to field which showed 89.89% survival rate. The regenerated plants were morphologically similar to mother plant with successful flowering.

Key words: Callus; Somatic embryogenesis; Casein hydrolysate; Abscisic acid; Cytokinin; Regeneration; Survival percentage.

Abstract- PSRM-4/NCAPSR/088

ORGANIC FARMING INCREASES PROTEIN CONTENT IN WHEAT (*TRITICUM AESTIVUM* L.) *Amitabh Singh*^{1*}, *Udai Pratap Singh*² and *Rama Shankar Dubey*³

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Wheat (*Triticum aestivum*) isa very important crop grown all over the world. It is an essential component of human food which is consumed in a variety of ways. Nutritionally, it provides carbohydrates and protein. Protein is one of the most important ingredients of human health. Normally wheat contains 140 mg / g when

grown in organically. But in the present experiment when wheat was grown in a soil supplemented with several uncommon components of organic materials, in addition to traditional organic manure, the protein content increased in comparison to inorganically grown wheat.

Abstract- PSRM-4/NCAPSR/089

THE PERCEPTION AND AWARENESS AMONG FARMERS IN VIEW OF USINGELECTRONIC SYSTEMS LIKE E-NAM

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The study was conducted with the objectives of to find out the awareness among farmers regarding benefits of e-nam, to analyze the perception about e-nam processamong farmers, to examine the value addition of e-nam among farmers, to understand farmers view in using electronic systems like e-auction and epayments. The research was conducted to analysis certain parameters including awareness of e-nam, necessity of assaying for trade ,better prices for commodity through assaying, competitiveness and transparency of e-nam with eauction, respect to accuracy transparency of e-nam with respect to eweighment, competitive and transparent payment in the e-nam trade, price comparison betweentraditional system and e-nam, access to wider market area through e-nam, access to large number of buyer through online auction, safeguarding payment through e- auctioning system, better saving for future through epayment, viability of farmers choice to accept or reject quote during e-bidding. The farmers sample was taken from six APMCs i.e Andhra Pradesh, Chattisgarh, MadhyaPradesh, Maharastra, Rajasthan and Telengana. The study based on primary data with 50 farmers samples and a structured schedule was used as a research tool to collect the required information to fullfill the objective of the research study. The outcomes of the study ware complete assaying apparatus and eweighing system should be made compulsory to al;Imandis, governmeshould try to involve processing company directly in the e-nam auction and government should strategize to

form FPOs/FPCs and connect them to micro

finance.

Key word: *e-nam, electronic systems, Farmer, etc.*

Abstract- PSRM-4/NCAPSR/090

USE AND CONSERVATION OF MARINE BIODIVERSITY FOR FOOD AND HEALTH Sonam Tandy and Pankaj Srivastava

ITM University, Gwalior and Professor Agriculture, SAGE University, Bhopal

Population Reference Bureau indicated in 2020 world population data sheet that world population will increase from 7.8 billion in 2020 to 9.9 billion by 2050 and India will be the highest populated country in the world. More population will demand more food. Food and Agriculture Organization revealed that 60 % more food will be required in 2050 to feed the increasing population of the world. Although India ranks second in food production; still the future agriculture is under pressure and facing a lot of challenges like climatic change and land degradation. Therefore, complete the dependency for food on agriculture will not solve the purpose and it needs to explore the alternate source of food, i.e. marine biodiversity. Peninsular India is surrounded by Arabian sea, Indian Ocean and Bay of bangal. Globally India is the second largest fish producer. Government

of India has prioritized the goal of making India the world's top seafood producer and exporters. Seafood is a good source of protein and has immense health benefits. India's coastal ecosystems extend to 42,808 km and consist of mudflats, sandy beaches, estuaries, creeks, mangroves, coral reefs, marshes, lagoons, sea grasses beds, and sandy and rocky beaches. Known for their high biological productivity, they provide a wide range of habitat for a multitude of aquatic flora and fauna. Over 13,000 species are estimated to be in the coastal and marine ecosystems. Marine biodiversity in India has immense potential to be explored but at the same time biodiversity conservation should be practices by reducing bycatch, entanglement in fishing gear and leaving the breeding area as marine population are also under threats due to anthropogenic activities.

Abstract- PSRM-4/NCAPSR/91

ANTIOXIDANTS ACTIVITY OF GREEN TEA Kumari Munni and Himani Badoni

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Antioxidants are substances that can prevent or slow damage to cells caused by free radicle , they are sometimes called free radicles scavengers .green tea contain a catechin called epigallocatechin-3-gallate (EGCG) . Antioxidants in water and methanol as a solvent treated with extract of green teas of different brand. 1mg/ml on peroxidation of linoleic acid were evaluated by thiocyanate method.Antioxidants properties

are estimated by ABTS, FRAP, AND DPPH method assay. The content of thiamine, caffeine, catechin, (GCG epigallocatechein gallate). The highest antioxidants activity observed by relatively older leafs. The cist – catechin contents were the key factor affecting the antioxidants activity in all assay. (ABTS r=0.731, p<0.05)FRAP(r=0.68 p<0.01) DPPH (r=0.077, p<0.01).

Keywords: DPPH –(2,2 –diphenyl-1-picryl-hydrazyl-hydrate), ABTS= (2,2,- azino –bis(3-ethylbenzothiazoline-6-sulfonic acid) FRAP- ferric reducing antioxidants power assay.

Abstract- PSRM-4/NCAPSR/092

CELLULAR RESPONSE AND ADAPTATION OF PLANTS AGAINST ABIOTIC STRESS Nishesh Sharma

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Stress refers to any external condition or factor which negatively affects physiological processes of plants leading to impairment of normal growth and productivity. Stress can be either biotic (caused by other living organisms, that can cause disease or damage) or abiotic (due to unfavourable environmental conditions). Damage caused to plants due to stress depends upon the type of stress, its severity, duration of stress and number of times the plant has been subjected to stress. Depending upon the nature of stress, kind of plant species, genotype and developmental stage of plant, plants may be sensitive or resistant to a particular stress. stress arises from unfavourable Abiotic environmental conditions. Sources environmental stress can be classified as physical or chemical temperature drought, radiation, light intensity are grouped under abiotic stress, whereas physical compounds (fertilizers, herbicides, pesticides, etc) utilized for various agricultural purposes

comprises chemical stress. On exposure to an environmental stress, a number of responsive mechanisms are triggered in the plants to resist or decrease the damage caused by stress. The resistance mechanisms are mainly of two types, avoidance mechanism in which exposure to stress is prevented and tolerance mechanism allows the plant to withstand which stress.Responses like alteration in gene expression, changes in cellular metabolism ultimately resulting in changed growth rate and altered crop yield are commonly observed durina stressful conditions. Adaptations exhibited by plants in accordance with the environmental changing conditions and evolutionary changes are referred to as constitutive resistance mechanism which become functional before actual exposure to stress. Under stressful conditions plants may also alter or modify their physiological processes which help them to acclimatize to prevailing stress.

Keywords: Abiotic stress, Resistance mechanism, acclimatization

Abstract- PSRM-4/NCAPSR/093

EFFECT OF POST- HARVEST TREATMENTS IN APPLE FRUITS CV. FANNY BY USING VARIOUS BOTANICAL EXTRACTS

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The post-harvest treatment of apple fruits with different botanical extracts was studied and found to be effective in increasing the shelf life of fruits as it helps in decreasing the PLW (Physiological Loss in Weight) and rotting percentage of fruits and also helps in increasing the physico-chemical characteristics of the fruits. apple fruits of cultivar Fanny was selected at random from the whole lot and analysed for various physico-chemical characteristics with treatments viz, T₁ (Bael @ 15%), T₂ (Bael @ 25%), T₃ (Turmeric powder @15%), T₄ (Turmeric powder @ 25%), T₅ (Drake @ 15%),

 T_6 (Drake @ 25%), T_7 (Mint @ 15%), T_8 (Mint @25%), T_9 (Neem @ 15%), T_{10} (Neem @ 25%), T_{11} (Guar gum wax @ 2%), and T_{12} (Control). Among various treatments overall scores was found to be maximum in T_9 (Neem leaves @ 15%). Among the different botanical extracts the coating of fruits with neem leaves extracts @15% resulted in highest fruits firmness, TSS (Total Soluble Solids) content and overall acceptability of the fruits was found to be at par with the treatments having lowest physiological loss in weight, rotting percentage and highest total sugars. Thus the post-harvest dipping of

fruits in neem leaves extracts @ 15% was more effective in increasing the storage behavior of

apple fruits cultivar Fanny.

Abstract- PSRM-4/NCAPSR/094

BEEKEEPING IN INDIA LaishramSivananda Singh

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Beekeeping is the maintenance of honey bee colonies commonly in hives. Bees accommodated in artificial hives where they live comfortably within easy reach of the beekeeper for examination of surplus honey. Honey is a product of bees, which gather sugar containing nectar from flowers. Honey should be processes as soon as possible after removal from the hive. The main uses of honey are in cooking, baking, as a spread on breads and as a sweetener in commercial beverages. Honey is also used in medicines. A number of small scale industries depend upon bees and bee products. Honey and bees products finds use in several industries which are under pharmaceuticals, bee wax in industries, bee venom, royal jelly, equipment and bee hives, etc. There is considerable demand for the honey and other

product. After independence, launched a massive programme of rapid industrialization with the belief that the benefit would percolate down to the masses. Although honey and honey bees are known to human beings since time immemorial. Still beekeeping is not a strictly traditional industry in India. Efforts were made to introduced Apismellifera in India since 1880. In new world, beekeeping is generally a means of livelihood and average honey yield in most of the countries range from 10-20kg/colony. The average yield in best beekeeping districts range from 100-150kg or even 200kg. The most predominant species of hive honey bee in the world is Apismellifera, which races can be divided into three that is European races, Oriental races and African races.

Abstract- PSRM-4/NCAPSR/095

RESPONSE OF LATE SOWN WHEAT (*Triticum aestivumL*.) TO NITROGEN LEVELS UNDER DIFFERENT SOWING METHODS

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A field experiment was conducted during the rabi season of 2020 at Agriculture Research Farm of School of Agricultural Sciences and Technology, RIMT University, Gobindgarh, Punjab to study the response of late sown wheat (Triticum aestivum L.) to nitrogen levels under different sowing methods. The experiment was laid out in a randomized complete block design (RCBD) in three replications. The treatments comprised of three sowing methods viz. conventional sowing, bidirectional sowing and bed planting; and three nitrogen levels viz. 75, 100 and 125% of recommended dose of nitrogen (RDN). All the vield attributing arowth and characters significantly increased in bed planting and bidirectional sowing over conventional except ear length. The grain yield was significantly higher in bi-directional (44.9 q ha⁻¹) and bed planting (47.7 g ha⁻¹) over conventional method (35.4 g ha⁻¹). The magnitude of increase in grain yield in bed planting and bi-directional sowing over conventional sowing was 23 and 31 per cent, respectively. But the differences in grain yield between bed planting and bi-directional was non-significant. Straw yield also followed the same trend but harvest index was not influenced significantly by sowing methods. The application of 125 and 100% RDNrecorded significantly higher growth and yield attributes over 75% RDN except ear length. The 125% RDN recorded significant higher grain yield (47.4 q ha⁻¹) over 75% RDN (36.8 q ha⁻¹) but was at par with 100% RDN (42.0 q ha⁻¹). The differences in grain yield between 75 and 100% RDN was also non-significant. The application of 125% RDN recorded 29.1 and 12.8 percent higher grain yield of late sown wheat over 75

and 100% RDN, respectively. Straw yield also followed the same trend but harvest index was not influenced significantly by nitrogen levels. Interaction between sowing methods and nitrogen levels was found non-significant in allthe parameters.

Key words: Nitrogen level, Sowing methods, growth parameters, yield attributes and yield.

Abstract- PSRM-4/NCAPSR/096

ISSR MARKERS IS PROMISING TOOL FOR GENETIC ANALYSIS OF GENETIC RELATIONSHIP OF WILD AND CULTIVAR CHICKPEA ACCESSIONS

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The ISSR markers have been applied to determine the genetic diversity and relationships in a number of crop species. The present study was carried out to illustrate the utility of the ISSR approach in determination of intra- and interspecies genetic diversity and relationships among the accessions. Six dinucleotide, ten trinucleotide and fourtetranucleotide primers together with theiranchored repeat primers were evaluated for their potential use in determination of genetic relationships in wild and cultivar chickpea. 20 ISSR primers were tested out of them 08 primer on an average produced 126 bands across 20 genotype, of

which 64 were polymorphic accounting for 53.8%. The percentage polymorphism, as shown by these ISSR primer, range from 7.89% by primer (CCT)₆ to 100% by (TCC)₆ and (ACT)₆ primer, thus show abundant polymorphism. The dendrogram based on similarity coefficient was constructed using unweighted pair group of arithmetic mean. Twenty accessions clustered into two distinct groups. The similarity coefficient values for the cultivated chickpea lines in this UPGMA dendrogram ranged between 0.60 and 1.00. Therefore, some of wild and Cultivar originating from a common genetic background showed closer genetic relationship.

Keywords: Chickpea, Cicer, Cultivar, ISSR, Polymorphism, UPGMA

Abstract- PSRM-4/NCAPSR/097

ROLE OF AGRICULTURE IN ECONOMIC DEVELOPMENT Ajeet Singh

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Agriculture is an important sector of Indian economy as it contributes about 17% to the total GDP and provides employment to over 60% of the population. Indian agriculture has registered impressive growth over last few decades. Agriculture plays a crucial role in the economy of developing countries, and provides the main source of food, income and employment to their rural populations. However, improvements in agriculture and land use are fundamental to achieving food security, poverty

alleviation and overall sustainable development. Increase in agricultural production and the rise in the per-capita income of the rural community, together with the industrialisation and urbanisation, lead to an increased demand in industrial production" It is seen that increased agricultural output and productivity tend to contribute substantially to an overall economic development of the country, it will be rational and appropriate to place greater emphasis on further development of the agricultural sector.

According to FAO (2000), it has been established that the share of the agricultural population in the total populace is 67% that agriculture accounts for 39.4% of the GDP and that 43% of all exports consist of agricultural goods. It has become increasingly evident in the last few years that the conception of both economist and policy- makers regarding the role of agriculture in economic development has undergone an important evolution. Agriculture

in India has played an important role in meeting almost the entire food needs of the people. The production of foodgrains in India has increased from 51 million tonnes in 1950-51 to 208.3 million tonnes in 2005-06. This has enabled the country to overcome the problems of food grain shortages. The country almost self sufficient in food grains & no longer depends on import of foodgrains.

Abstract- PSRM-4/NCAPSR/098

EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON DEVELOPMENT AND YIELD OF WHEAT (*Triticum Aestivum L*)

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A field experiment entitled "Effect of Integrated Nutrient Management on development and yield of wheat" was carried out during Rabi season of 2018-19 at the Research Farm of the Department of Agronomy of Alpine Institute of Management and Technology, Nanda ki Chowki, Premnagar, Dehradun, uttarakhand with the objective to evaluate the effect of integrated nutrient management on growth and yield attributes of wheat and to find out suitable integrated nutrient management practice for wheat. The experiment was laid out in the Randomized Block Design (RBD) with 5 treatments. The treatments were T1 (75% RDF+25%Vermicompost), T2(75% T3(75% RDF+25%Compost), RDF+50% Vermicompost), T4(75% RDF+50% Compost),

T5(Control) replicated four times having gross and net plot size 5.5m x 4.5m, $4.5m \times$ 4.1mrespectively. Variety 'PBW 550' of wheat was sown on 24th November, 2018 from the result it can be concluded that growth factors viz. effective tillers plant⁻¹, length of spike (cm) and yield attributing character viz. dry matter accumulation (g), number of grain spike-1, weight of grain plant⁻¹, test weight of wheat was recorded in highest in treatment T3(75% RDF+50% Vermicompost). The highest grain yield (55.92q ha⁻¹), straw yield (60.94q ha⁻¹) and biological yield (116.19g ha⁻¹) was recorded treatment T3(75% RDF+50% Vermicompost), whereas the lowest grain, straw, and biological yield recorded in treatment T5 (control).

Keywords: Integrated Nutrient Management (INM), Vermicompost, Compost.

Abstract- PSRM-4/NCAPSR/99

IMPACT OF DIFFERENT LEVELS OF NITROGEN FERTILIZER ON GROWTH AND PRODUCTIVITY OF WHEAT (*Triticum Aestivum L*)

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The present investigation entitled "Impact of Different Levels of Nitrogen Fertilizer on Growth

and Productivity of Wheat (*Triticumaestivum L)*" was carried out at Alpine agricultural Research

Farm, Dehradun during winter (Rabi) season of 2018-19. The experiment was laid out in random block plot design keeping 7 treatment combinations of NPK which was T₁- (control), T2- 25% N + RDF, P & K (30:60:60), T3- 50 % N+ RDF, P&K (60:60:60), T4- 75%N + RDF, P&K (90:60:60), T5-100%N + RDF, P&K T6-(120:60:60), 125%N RDF, P&K (150:60:60) and T7- 150%N + RDF, P&K (180:60:60) in sub plots and 3 replicated . A uniform dose of urea, single super phosphate and muriate of potash were used as source of phosphorus and potassium, respectively. 1/3 of nitrogen and full dose of phosphorus and potassium were applied at the time of sowing as per treatment. The remaining 2/3rd quantity of nitrogen was top dressed after 1st and 2nd irrigation in two split doses i.e., 1/3 and 1/3, respectively. Observations regarding effect of different NPK levels, on growth parameters, viz., plant height, was recorded at 30, 60 and 90 DAS and at harvest, Yield and attributing effective vield traits, νiz., tillers/plants, spike length, grains spike-1 and 100-grain weight were recorded at maturity. The application of NPK levels recorded significant

variation on growth parameters during the experimentation. The growth parameters of wheat viz., plant height, produced by 100% RDF proved significant superiority over 75% RDF and 50% RDF at all dates of observation. Application of 100% RDF significantly produced the maximum value of the yield attributing characters like number of effective tillers, spike length, grains spike-1 and 100-grain weight. Similarly, 100% RDF significantly increased grain yield (5.09 g/ ha-1) and straw yield (7.02 g ha-1) as compared to 75% RDF and 50% RDF. On the basis of economic analysis it is concluded that wheat cv. 'PBW- 550' treated by 100% recommended dose of fertilizer (120-60-60 kg NPK/ha) give the best results for all the growth and yield parameters with compare by the other treatment. The results of all the growth parameters and yield parameters was indicating that application of NPK fertilizers up to 120-60-60 kg ha-1 were not economical and T5-100%N+RDF, P&K NPK @ 120:60:60 kg ha-1 would be an optimum rate for wheat, so far the all the growth and yield parameters is concerned.

Abstract- PSRM-4/NCAPSR/100

EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON GROWTH AND YIELD ATTRIBUTES OF WHEAT (*Triticum Aestivum L*)

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A field experiment entitled "Effect of Integrated Nutrient Management on growth and yield attributes of wheat" was carried out during Rabi season of 2018-19 at the Research Farm of the Department of Agronomy of Alpine Institute of Management and Technology, Nanda ki Chowki, Premnagar, Dehradun, uttarakhand with the objective to evaluate the effect of integrated nutrient management on growth and yield attributes of wheat and to find out suitable integrated nutrient management practice for wheat. The experiment was laid out in the Randomized Block Design (RBD) with 5 treatments. The treatments were T1 (75% RDF+25%Compost), RDF+25% T2(75% NADEP), T3(75% RDF+50% Compost), T4(75%

RDF+50% NADEP), T5(Control) replicated four times having gross and net plot size 5.5m x 4.5m, 4.5m× 4.1m respectively. Variety 'PBW550' of wheat was sown on 24th November, 2018 from the result it can be concluded that growth factors viz. effective tillers plant⁻¹, length of spike (cm) and yield attributing character viz. dry matter accumulation (g), number of grain spike-1, weight of grain plant-1, test weight of wheat was recorded in highest in treatment T3(75% RDF+50% Compost). The highest grain yield (50.12 q ha⁻¹), straw yield (57.58q ha⁻¹) and biological yield (107.71q ha⁻¹) was recorded in treatment T3(75% RDF+50% Compost), whereas the lowest grain, straw, and biological

yield recorded in treatment T1 (75% RDF+25%Compost).

Keywords: Integrated Nutrient Management (INM), NADEP, Compost

Abstract- PSRM-4/NCAPSR/101

RESPONSE OF VARIOUS ORGANIC SOURCES OF NUTRIENTS ON GROWTH AND YIELD OF POTATO (SOLANUM TUBEROSUM L.)IN DEHRADUN VALLEY(UTTARAKHAND)

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In order to investigate the response of Neem cake, Vermicompost, FYM, Vermiwash, Cow Urine, Neem cake, Bone meal, Rhizobium and control on growth ,yield and economics of Potato crop, Field experiment was carried out during winter season (2019-2020) at Research University, S.G.R.R. Dehradun Uttarakhand. The layout of experimental field was laid in completely randomized block design with 8 treatments and 3 replications. The result indicated that Treatment T₆ (Neem cake) overall was found best for farmer point of view with respect to plant height (45.23 cm), Tubers per plant accumulation (8) is highest in T₆ and lowest in $T_1(3.33)$, Number of Shoots (5.65) in $T_6@1250$ kg/ha), Dry Weight of haulm (31 gm)in $T_6@1250$ kg/ha, Tubers girth(16.43)in T_6 , @1250kg/ha Total tuber yield (18.99) in T_6 @1250kg/ha Total dry matter production (11.52) at harvest. Results also indicated that net return (94.0805.71 q per ha) at harvest. Results also indicated that net return (90125 Rs per ha) also good for farmer point of view. Based on present investigation, it can be concluded that Neem cake 4.5% improved growth, yield and economics of Potato crop under present agro-climatic conditions.

Keywords: Plant height, no of tubers per plant, tuber yield and tuber girth and Total dry matter production.

Abstract- PSRM-4/NCAPSR/102

THE EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON YIELD AND YIELD ATTRIBUTE OF WHEAT CROP (*Triticum Aestivum L*)

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The present investigation entitled "The Effect of Integrated Nutrient Management on Yield and Yield Attribute of Wheat Crop" under usual practice was carried out at the Research Farm of Alpine Group of Institution Nanda Ki Chowki, Premnagar, Dehradun Uttarakhand winter (Rabi) season (2018-2019). experiment was laid out Randomize Block Design keeping 18 treatment combinations of vermicompost, Nadep and NPK levels i.e. 75% RDF and 25% vermicompost, 75% RDF and 25% Nadep, 75% RDF and 50% Vermicompost, 75% RDF and 50% Nadep, 100% RDF in sub

plots, and replicated thrice. A uniform dose of urea, single super phosphate and murate of potash were used as source of nitrogen, phosphorus and potassium, respectively. One third of nitrogen and full dose of phosphorus and potassium were applied at the time of sowing as per treatment. The remaining two third quantity of nitrogen was top dressed after first and second irrigation in two split doses i.e., third and one third, respectively. one Observations regarding effect of INM on growth parameters plant height are recorded at 30, 60 and 90 DAS and at harvest. Yield and yield attributing traits, viz., spike length, grains per spike and 1000-grain weight were recorded at maturity. The application of 50% vermicompost with 75% RDF recorded significant variation on growth parameters during the experimentation. The growth parameters of wheat viz., plant height produced by 75% RDF+50% vermicompost proved significant superiority over other treatments. Application of 75% RDF+50% vermicompost significantly produced

maximum value of the yield attributing characters like spike length, grains per spike and 1000-grain weight. Similarly, 75% RDF+50% vermicompost significantly increased grain yield and straw yield as compared to others. The harvest index was also produced significantly higher under the application of 75% RDF+50% vermicompost as compared to others.

Keywords: Integrated Nutrient Management (INM), NADEP, Compost

Abstract- PSRM-4/NCAPSR/103

EVALUATION OF SELECTED BOTANICALS AND BIO-RESOURCES AGAINST *ALTERNARIASOLANI* CAUSING LEAF BLIGHT OF TOMATO IN PUNJAB, INDIA *Gurvinder Kaur¹ and Puja²*

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Alternaria leaf spot of tomato caused by Alternariasolaniis an important and widely distributed disease throughout the world and it occurs in mild to severe form in different parts of India. Tomato crop is damaged due to severe infection of A. solanievery year in India. Water extracts of different plants viz., leaves of Azadirachtaindica, Lantana camara, Bougainvillea glabraand cloves of Allium sativumwere separately evaluated under in vitro conditions against the test pathogen at 10, 15 and 20 per cent concentrations by Poisoned Food Technique. Among the four plant extracts evaluated at three concentrations,

Azadirachtaindicaextract was found best in mycelial inhibiting the growth of Α. solani(81.48%) and found significantly superior over all the other extracts and followed by Allium sativum (75.92%) and Lantana camaraL. (72.33%). The minimum inhibition of mycelial growth of A. solaniwas recorded in Bougainvillea glabra(68.02%). The data of three bio-products revealed that per cent growth inhibition was maximum in field formulation (75.77%) followed by cow urine (19.97%) and minimum inhibition of mycelial growth was recorded in butter milk (4.43%).

Abstract- PSRM-4/NCAPSR/104

A STUDY IN ECOSYSTEM SERVICES OF FOREST ECOSYSTEM IN UTTARAKHAND Shiwangi Nautiyal

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The importance of natural forest ecosystems to human well-being cannot be overstated. Forests provide raw materials for food, fuel and shelter. In forests, ecosystem components such as micro-organisms, soils and vegetative cover inter-act to purify air and water, regulate the climate and recycle nutrients and wastes. Without these and many other ecosystem goods and services, life as we know it would not be possible. Ecosystem services and the natural capital stocks of the Uttarakhand Himalaya make significant direct and indirect contributions to national economies and human welfare. Forests, both natural and planted, and including

trees spread across the terrain, have a critical role in the ecology, aesthetics and recreational benefits. The goods and services derived from forest ecosystem are categorized as provisional goods and services, regulating services, cultural services and supporting services. In this study forest area of Uttarakhand was calculated using supervised classification method Supervised image classification of Uttarakhand showed total forest cover is about 25325.7 km², out of which 16100.40 is ever green forest, 6150.58 is deciduous forest, and 3074.72. Total economic value (TEV) for Uttarakhand is 2776.8 billion Rs out of 51.01 % is regulating services, 40.03 %

is cultural services, 7.88 % is supporting services and 1.07 % is of provisional services **Keywords:** *Ecosystem services, economic valuation, Regulating, Supporting, Cultural and Provisional Services.*

Abstract- PSRM-4/NCAPSR/105

ASSESSMENT OF MICROBIOLOGICAL QUALITY OF INJERA SOLD IN BEDELE TOWN ETHIOPIA. Javed Ahamad Khan^{a*}, Rubina Gill^b, Javeed Akhtar^c, Misbahu Abdu^d and Mekonnen Begna^e

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'Injera' is a fermented food derived from teff flour. It is an important diet of human population and widely consumed throughout the Ethiopia. It is also act as an excellent medium for the growth of diversity of microorganisms and consequently it can act as a source of microbial infections in human population. Therefore it is very important to check the quality of this food available in local market. In the present study fifty injera samples were collected from local hotels in Bedele town. The

total aerobic plate count varied from log 2.5 to log 4.8 cfu g⁻¹. The total coliforms were observed between log 2.0 to log 3.8 cfu g⁻¹. The high total aerobic plate count and total coliforms in injera samples suggested cross contamination of microorganisms as a result of poor hygienic practices followed by food makers. Therefore good hygiene practices should be adopted by the food makers in the town to avoid the foodborne infections.

Keywords: Injera, microbiological quality, total aerobic count, total coliforms, food hygiene.

Abstract- PSRM-4/NCAPSR/106

ROLE OF WATER HARVESTING IN AGRICULTURE IN ETHIOPIA

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Ethiopia is a country with an area of 1.2 million square kilometer and located in the region that is known as the 'Horn of Africa'. Agriculture is the back bone of the country's economy and mainly practiced under rain-fed conditions. Ethiopia is the second most populated country in Africa with a total population estimated at 90 million with a growth rate of 2.6 percent. The majority of the population lives in the rural areas and depends on agriculture as primary source for their livelihood. In Ethiopia rain fed farming is existed and arid and semi-arid regions are suffering from drought stress which is a major limiting factor for successful crop production and results food insecurity. However surprisingly, Ethiopia is well-endowed with

water resources. The total annual runoff is estimated at 110 billion cubic meters. ground water reserves are estimated at 2.6 billion cubic meters. However this water is not available to human population due to lack of resources and awareness. Therefore, Rain Water Harvesting (RWH) is one option to use runoff by collecting and storing during the time period of water scarcity. The various methods bunds, viz. contour semicircular hoop, trapezoidal bunds, graded bunds, catchment, ground catchment, dugout ponds, irrigation dam, silt detention dam, high level pond, percolation dam, permeable rock dams, water spreading bunds and Qanat system are discussed for water harvesting.

Key words: Rain fed, rain water harvesting, ground water, flooding, catchment.

Abstract- PSRM-4/NCAPSR/107

CONSERVATION AND MANAGEMENT APPROACH OF TROPICAL VEGETATION IN ETHIOPIA. Tsegay Kide^a, Javed Ahamad Khan^{a*}, Rubina Gill^b, Misbahu Abdu^c and Mekonnen Begna^a

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Tropical forest and vegetations are the primitive living ecosystems of earth. These rainforests are one of the most diverse, productive ecosystems in the world due to the combination of multiple factors *viz.* stable environment, canopy structure, vertical stratification, habitat area and historical events. However rapid loss of these rainforest occurred and half of the total loss of rainforests has occurred in this century due to some local, national and international threats. Human activities for their livelihood such as timber, Non-timber forest products (NTFPs) and

livestock arrangements have affected these rainforest hugely. Due to rainforest deforestation yet total one thirty seven species disappeared from our world. However to overcome and decrease the losses of tropical vegetation in-situ and ex-situ conservation approaches and different management strategies are used which includes the International Biodiversity Program designed to increase the global knowledge of biodiversity through data collection worldwide among human population.

Key Words: Tropical rainforest, Non-timber forest products (NTFPs), in-situ conservation, ex-situ conservation.

Abstract- PSRM-4/NCAPSR/108

BENEFITS OF AGROFORESTRY IN LAND USE SYSTEM IN ETHIOPIA.

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Agroforestry is the intentional integration of agricultural and forestry-based land-use systems that provides multiple benefits through converting degraded lands, protecting sensitive lands, and diversifying farm production systems. It has been defined as a dynamic ecologically based natural resources management system that involves diversification and sustainable production for increasing social, economic and environmental benefits for land users at all levels, through the integration of trees on farms and in the agricultural landscape. Agroforestry is considered as a dynamic ecologically based natural resources management system that

diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels, through the integration of trees on farms and in the agricultural landscape. It is a unique land management approach for people who care about working lands and natural resources. It also provides opportunities to incorporate productivity and profitability with environmental stewardship. It results a healthy and sustainable agricultural systems that can be utilizable by future generations. Agroforestry practices has social, economical and environmental benefits that has been discuss in this review extensively and it

affects the human population directly or indirectly. The social benefits provides fosters realization, acceptance and the resolve to change, creates an enabling environment, make collaboration, networks and partnerships, fosters tree ownership, land tenure security for farmers, increases education, training, and empowerment for women, food security, health and resilience. Similarly, the economical benefits leads to increase in crop yield, livestock

production, energy savings and home heating, snow control and sequestration of atmospheric carbon. On the other side the environmental benefits are attributed with improvement and maintenance of air, water, soil quality, and wildlife habitat. Therefore in conclusion Agroforestry imparts a great role in providing the good quality of life which can be a transmittable process if human utilize it properly.

Keywords: Agroforestry, social benefits, economical benefits, ecological benefits.

Abstract- PSRM-4/NCAPSRM/109

FACTORS AND EFFECTS OF LAND DEGRADATION ON AGRICULTURAL LAND PRODUCTIVITY IN ETHIOPIA. Gatiek Gout Gatluak^a, Javed Ahamad Khan^{a*}, Rubina Gill^b, Misbahu Abduf and Mekonnen Begna^a

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Agriculture is the dominant sector of the Ethiopian economy, with 85% of the population living in the rural areas. Agriculture provides about 52% of GDP of country, 80% of its employment, and 90% of its export earnings. Land degradation is defined as a temporary or permanent decline in the productive capacity of land, or its potential for environmental management, has significantly contributed to the low yield of crops. Land degradation is either natural or human induced and it is a continuous process. However; it has become an important concern affecting food security and the wealth of nations and it has an impact on the livelihood of every person on our planet. Land degradation in Ethiopia can be seen as a direct result of past agricultural practices on the highlands. The dissected terrain, the extensive areas with slopes above 16%, and the high intensity of rainfall lead to accelerated soil erosion once deforestation occurs. degradation is one the most important environmental problem existing in Ethiopia. The loss of soil and the deterioration in fertility, moisture storage capacity, and structure of the remaining soils, all are reducing agricultural productivity of the country. Soil erosion is greatest on cultivated land, where the average annual loss is 42 tons/ha, compared with 5 tons/ha from pastures. As a result, almost half of the loss of soil comes from land under cultivation, even though these lands cover only 13% of the country. Not surprisingly the highest average rates of soil loss are from formerly cultivated lands, which are currently unproductive because of degradation and have very little vegetative cover to protect them. In conclusion land degradation can be defined as a temporary or permanent decline in the productive capacity of land, or its potential for environmental management that significantly contributed to the low yield of crops and livestock of a particular area or region. A number of direct and indirect factors are available which may cause land degradation process at miniature or huge level directly or indirectly. Different types of land degradation viz. soil erosion, chemical, biological and physical degradation are possible that can cause nutrient loss from soil, transportation of sown seed by runoff and wind. It can also lead to transportation of top soil by runoff and wind effect. Similarly it is increases evapotranspiration on crops by wind erosion, wilting of crops, and death of crops. Consequently, ultimately economical loss of the country in the form of loss of crops and agriculture lands is going on. Therefore here are the certain recommendations can be followed to avoid or reduce the land degradation process; (i) Avoid the excessive use or use of harmful chemicals in the soil (ii) Maintain the natural ecosystem of the land (iii) Educated and responsible people of the society should plant more plantation for maintaining the soil fertility and stop the land degradation (iv) Researchers should focus on new possible strategies to overcome the economic loss due to land degradation process (v) Awareness to the general people towards the maintenance of the soil and avoiding land degradation is needed.

Keywords: Land degradation, agriculture productivity, deforestation, overcultivation of crop land, overgrazing, population growth, soil erosion, biological land degradation, chemical land degradation, physical degradation of soil.

Abstract- PSRM-4/NCAPSR/110

ISOLATION AND CHARACTERIZATION OF *R. SOLANI* FROM INFECTED LEAF SAMPLES OF WEB BLIGHT OF URD BEAN AND ITS MANAGEMENT THROUGH BOTANICALS AND CHEMICALS UNDER *IN VITRO* CONDITIONS

Babli Verma

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Rhizoctonia solani is a multiphagous widely distributed plant pathogen. Web blight caused by Rhizoctoniasolani causes huge yield loses in urdbean (Vigna mungo). All the commercially grown varieties are susceptible. Being a typical soil borne fungus, its management through chemicals is expensive and not feasible, because of the physiological heterogenicity of the soil and other edaphic factors etc. which might prevent effective concentrations of the chemical reaching the pathogen. Integrated to approaches for the disease management are paving more attentiveness in terms of sustainability. Hence, the present investigation was undertaken with the objective of firstly to isolate and characterize R. solani from infected leaf samples of web blight of urd bean and secondly its management through botanicals and chemicals under in vitro conditions. Symptoms of web blight of urd bean appeared as small circular brown spot on the primary young leaves after two months of sowing and white mycelial fungal growth was seen under surface of infected leaves and young branches. Sclerotia were also seen as hard resting structure of the fungus on severely blighted leaves. R. solani showed complete Petri plate growth of 90 mm after 144 hrs of incubation on Potato dextrose agar medium. However, production of sclerotia started after 10 days of incubation. Among the four tested media for colony growth of R. solani from urd bean,

Richard's Agar medium was found most suitable and supported the growth of *R. solani*. However, Czapek's Dox Agar medium least supported the growth of R. solani. Further, it was observed that R. solani showed maximum radial growth at 25°C. The maximum radial growth of R. solani was recorded a pH 7.0 after different incubation period. Further, it was observed that neutral pH 7.0 and slightly alkaline pH favours the colony growth of R. solani in comparision to acidic pH. However, neutral pH 7.0 found most suitable for growth of R. solani. All the eight tested phyto-extracts evaluated for their efficacy in inhibiting R. solani at 10 % and 20 per cent concentrations under in-vitro conditions using poisoned technique, significantly inhibited the growth of R. solani. The maximum per cent inhibition in growth was recorded by onion and garlic bulb extracts.A set of six fungicides namely Azoxystrobin 23% SC, Propiconazole 25% EC, Difenoconazole 25% EC, Tebuconazole 25% EC, Carbendazim 12% WP and Copper oxy chloride 50% WP were tested for their efficacy against R. solani under in vitro conditions using Poisoned food technique at five different concentrations of respective fungicide (250 ppm, 500 ppm, 1000 ppm, 1500 ppm and 2000 ppm). Among the different fungicides, two fungicides namely Tebuconazole 25% EC and Carbendazim 12% WP completely inhibited the growth of test fungi R. solani even at 250 ppm

concentration and no mycelial growth of *R. solani* was recorded in these two treatment at

250 ppm concentration and above that.

Abstract- PSRM-4/NCAPSR/111

EFFECTOF VERMIWASH ON AGRICULTURAL CROP PRODUCTION Adit Singla¹ and Pardeep Singh²

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Now days due to indiscriminate use of chemicals fertilizers as well as pesticides, modern agriculture is totally affected, due to increasing demand of food there is no doubt it will be increased as per time. Soil, water, and inputs they are basics necessities for the successful crop production, by the introduction of green revolution production of food grains is easily achieved but not healthy food, farmers basically focusing on maximum output rather than quality, as I have studied many research work on different crops which shows organic manures can also increase the yield of various crops, actually not focusing on crop yield behind this it also ameliorate the soil properties along with quality of produce. I know there are various organic manures are available but I want to talk about the Vermiwash, which is basically ignored. There are several organic fertilizers in the form of Vermicompost and Farm yard manure that have been applied producing

phenomenal increase in yield and quality. Recently the use of Liquid fertilizers given in the form of foliar sprays has gained tremendous importance. The advantages of using the liquid fertilizer, has increased the need for the production of several such materials & to be used as foliar sprays. Vermiwash in a liquid fertilizer used in organic agriculture both as replacement and supplement for solids and for their unique capacity to provide effective and quick nutrientsVermiwash generally used as a foliar spray, is a liquid biofertilizer collected by the passage of water through a column of worm activation. In recent years many studies have reported that Vermiwash as foliar spray which was effective for growth. There are reports by Lalitha et.al. (2000), Zambare et al. (2007), Ansari and Ismail (2001)and Shiva Subramanian and Ganeshwar (2004) for the effectiveness of Vermiwash as a biofertilizer helping in organic farming.

Abstract- PSRM-4/NCAPSR/112

GENETIC STUDY OF EUCALYPTUS CLONES FOR GROWTH AND WOOD TRAITS Pavneet Kaur

RIMT University Mandi Gobindgarh

Eucalyptus is widely adopted by farmers of North-western India and provides raw material for plywood and paper industries. The present study entitled "Genetic study of Eucalyptus clones for growth and wood traits" was conducted at Department of Forestry & Natural Resources, Punjab Agricultural University, Ludhiana, to investigate variation among the clones for various growth and wood traits. From an established replicated clonal trial, data were recorded on growth traits of ten clones. Two trees from each of the four rotations were felled and wood samples at four heights base, 25, 50

and 75 % of total height for working out volume (over bark and under bark) of all logs. Data on bark thickness, heartwood content and log end splits were recorded. Specific gravity, fibre length, fibre width, holocellulose content were estimated following the established methods. Significant differences were found among the clones for all the growth and wood traits, the clone P-46 and P-23 were promising for growth traits. Per tree volume (over bark) ranged from 0.083 m³ to 0.247 m³. Specific gravity varied from 0.71 to 0.77 with the maximum value in clone 3021. The clone 2013 showed maximum

holocellulose (70.05%) followed by clone 413 and minimum percentage was recorded in clone 3021. Sampling height also had significant influence on bark thickness, softwood heartwood ratio, wood specific gravity, fibre traits and holocellulose content. All the traits witnessed significant reduction in values with the increase in the sampling height, except for softwood heartwood ratio and holocellulose

content which recorded significant increase with the bole height. Growth traits showed significant and highly positive correlation with diameter volume, bark thickness, split index and holocellulose content. The heritability varied from 0.44 (diameter) to 0.78 (volume over bark). Clone P-48 and P-46 ere promising ones on basis of index score analysis.

Key Words: Clonal Variation, Sampling Height, Correlation, Split Index.

Abstract- PSRM-4/NCAPSR/113

INFLUENCE OF VARIOUS NATURAL FARMING MODULES ON AVAILABLE NPK AND VIABLE MICROBIAL COUNT IN AFRICAN MARIGOLD (*TAGETES ERECTA* L.) CV. 'PUSA NARANGI GAINDA' Anjay Singh Bisht¹, BS Dilta¹, Manish Kumar Sharma¹, BP Sharma² and Pardeep Kumar

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A field study was carried out at the experimental farm of Department of Seed Science and Technology, Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan during 2018 and 2019. The treatment modules comprised different doses of Jeevamrit applied through drenching (25ml/m², 50ml/m², 75ml/m² and 100 ml/m²) and as foliar sprays (5%, 10%, 15% & 20%) at 15 days interval, alternatively + Brahmastra @ 2.5 % and Neemastra @ 2.5 % at 7 days interval, alternatively along with RDF and untreated control as well as organic module based on *Trichoderma viride*. The field

experiment was laid out in Randomized Block Design (RBD) with 19 treatments replicated thrice. The maximum values for available N, P and K (454.30 kg/ha, 87.54 kg/ha and 434.74 kg/ha, respectively) were found in M_{18} and were statistically comparable with the natural farming modules M_{16} . However, maximum load of viable microbial count of beneficial bacteria (119.17 × 10^5 cfu/g soil), fungi (17.33 × 10^3 cfu/g soil) and actinomycetes (14.00 × 10^2 cfu/g soil) was found in M_{16} . So, the M_{16} module was found to be more suitable for maximum beneficial microbial

Keywords: African marigold, available NPK, viable microbial count, natural farming, RDF

Abstract- PSRM-4/NCAPSR/114

GENETIC EVALUATION OF CHERRY TOMATO (*SOLANUM LYCOPERSICUM* VAR. *CERASIFORME*) GERMPLASM FOR YIELD AND QUALITY TRAITS.

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The present investigation entitled "Genetic evaluation of cherry tomato (*Solanum lycopersicum* var. *cerasifome*) germplasm for yield and quality traits" was conducted at the

experimental farm" was carried out at Vegetable Research Farm, Department of Vegetable Science, College of Horticulture and Forestry, Neri, Hamirpur (H.P) during season, 2020. Twenty three diverse genotypes of cherry tomato comprising of local collections along with two standard checks Punjab Kesar Cherry and Red Cherry were evaluated in Randomized Complete Block Design with three replications to ascertain extent of variability, heritability, genetic advance and correlation and path coefficient analysis for yield and other horticultural traits among the Analysis of variance revealed genotypes. significant differences among all the genotypes for all the characters under study. On the basis of overall performance, LC-CT-12-18, LC-CT-02-18 and LC-CT-15-18 were found superior for marketable fruit yield and other important horticultural traits. They could be the promising parents for utilization in further breeding programmes. The estimates of PCV and GCV were high for average fruit weight, number of flowers per cluster, number of fruits per cluster, pericarp thickness, number of locules per fruit, ascorbic acid and yield per plot. High heritability

estimates were observed for all the traits among all genotypes while high estimates of genetic gain were observed for average fruit weight, number of flowers per cluster, number of fruits per cluster, pericarp thickness, fruit length, ascorbic acid, number of locules per fruit, fruit yield per plot and shelf life. The correlation studies revealed that fruit yield per plot had positive and significant correlation with days to 50% flowering, first fruiting node, stem girth, number of flowers per cluster, number of fruits per cluster, percentage of fruit set, average fruit weight, fruit length, number of locules per fruit, pericarp thickness, shelf life, total soluble solids and number of seeds per fruits. The path coefficient analysis revealed that maximum positive direct effect towards fruit yield per plot was contributed by number of fruits per cluster followed by average fruit weight, pericarp thickness, number of seeds per fruit, number of locules per fruit, fruit length and percentage of fruit set.

Keywords: Evaluation, heritability, path coefficient and variability.

Abstract- PSRM-4/NCAPSR/115

A REVIEW ON GREEN SYNTHESIS OF NANOPARTICLES FROM PLANT EXTRACTS WITH THEIR POTENTIAL APPLICATIONS

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Green synthesis of nanoparticles has gained much interest because of their safe nature, environmentally benign, ease in manufacturing, and low production cost. Green synthesis of nanoparticles provided promising sustainable alternative approach to conventional synthesis approaches, green synthesis is regarded as an important tool to reduce the destructive effects associated with the traditional methods of synthesis for nanoparticles commonly utilized in laboratory and industry. The bio-synthesized metallic nanoparticles have a range of unlimited pharmaceutical applications including delivery of drugs or genes, detection of pathogens or proteins, and tissue engineering. This review provide various strategies to design and develop advance nanomaterials via greener approach. Current challenges, and future outlook of the green synthesis of nanoparticles and possibilities of their effectiveness for antimicrobial and antiviral applications.

Key words: *Green Synthesis, Nanoparticles.*

Abstract- PSRM-4/NCAPSR/116

NANOPARTICLES IN FOOD TECHNOLOGY

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Nanotechnology has revolutionised a number of scientific and industrial fields, including the food business. Food processing, food packaging, functional food development, food safety, detection of foodborne pathogens, and shelf-life extension of food and/or food products are just a few of the applications of nanotechnology that have emerged as a result of the growing need for nanoparticles in various fields of food science and food microbiology. The use of nanoparticles in food processing increases the shelf-life of various food materials and brings down the extent of wastage of food due to microbial infestation. Nanocarriers are now being used as delivery systems for food additives in food products that do not alter the basic morphology of the product. From better packaging material with improved mechanical strength, barrier properties, and antimicrobial films to nanosensing for pathogen detection and alerting consumers to the safety status of food, nano-based "smart" and "active" food packaging

offer several advantages over traditional packaging methods. Nanosensors nanobiosensors are used in food microbiology to detect pathogens in processing plants or food materials, quantify available food ingredients, and inform consumers and distributors about food safety. As nanobiotechnology advances, nanobiotechnology-based devices and materials grow smaller and more sensitive. Its use in the fields of food packaging and food safety is wellknown. Furthermore, promising findings have been obtained in the use of nanomaterials in food preservation, where they may protect the food from moisture, lipids, gases, off-flavors, and aromas. They provide effective delivery mechanisms for bioactive substances to target tissues. Although breakthroughs nanotechnology are carving new routes every day, there are still numerous problems and chances to improve present technology, as well as concerns about nanotechnology's implications that must be addressed.

Keywords: Nanoparticles, Nanosensors, Nanocarriers, Nanotechnology, Lipids.

Abstract- PSRM-4/NCAPSR/117

NITROGEN MANAGEMENT IN LATE SOWN WHEAT (Triticum aestivum L.) VARIETIES. Komal Sharma, Udham Singh Tiwana and Amandeep Kau**r**

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A field experiment was conducted during the *rabi* season of 2019 at Agriculture Research Farm of School of Agricultural Sciences and technology, RIMT University, Mandi Gobindgarh, Punjabto study the nitrogen management in late sown wheat varieties through leaf color chart (*Triticum aestivum*L.). The experiment was laid out in randomized complete block design (RCBD) with three replications. The treatments comprised of two varieties viz; PBW-343, PBW-

550 and four nitrogen levels viz; 100 kg N ha⁻¹,125 kg N ha⁻¹, 150 kg N ha⁻¹ and LCC. The Plant population was not influenced by varieties and nitrogen levels and leaf color chart. The variety PBW-343 recorded significantly higher plant height (92.1 cm) over the PBW-550 (87.4 cm). The grain yield was recorded significantly higher in variety PBW 550 (34.3 q ha⁻¹) over PBW 343 (31.7 q ha⁻¹). Straw yield and harvest index also followed the same trend in varieties.

The application of 125 kg N ha⁻¹ produced taller plants (85.5 cm) over 100 kg N ha⁻¹ (78.3 cm) but was at par with LCC (82.60 cm) and 150 kg N ha⁻¹ (72.6 cm). The variety PBW 550 was influenced significantly in all the yield attributes over PBW 343. The application of 125 kg N ha⁻¹ was significantly higher yield attributes over the 100 kg N ha⁻¹ but was at par with LCC. The grain yield was recorded significantly higher in PBW 550 (34.3 q ha⁻¹) over PBW 343 (31.7 q

ha⁻¹). Straw yield and harvest index also followed the same trend in varieties. The application of 125 kg N ha⁻¹ (35.5 q ha⁻¹) recorded significantly higher grain yield over 100 kg N ha⁻¹ (30.5 q ha⁻¹) and but was at par with 150 kg N ha⁻¹ (36.2 q ha⁻¹)LCC (34.8 q ha⁻¹). The Straw yield and harvest index also followed the same trend. The interaction effect between varieties and nitrogen levels was found to be non-significant in all the parameters.

Key words: Wheat Varieties, Nitrogen levels and LCC.

Abstract- PSRM-4/NCAPSR/118

RICE IMPROVEMENT PROGRAMME BY USING COMBINED APPROACH OF ANTHER CULTURE AND INDUCED MUTATIONS

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In the rice improvement programme the development of doubled haploid (DH) via anther culture reported better features for permeant fixation of induced mutation. The anther culture based DH development is a key factor to achieve homozygosity with the greatest fidelity upon induced mutation. The combination of mutation induction and anther culture were used to produce rice mutant DH's with resistance to blast disease. The commercial variety of rice i.e. IBD-1 (susceptible to blast disease) were irradiated with gamma rays and further mutant DH populations were selected as resistant to blast disease along with best agronomic traits. White calli from anther culture of IBD-1 were used for 15GY and 25GY mutagenic treatment and the experiment was performed along with control (without mutagenic treatment). It was found that the regeneration frequencyof calli in all caseswas found to be higher in control than in mutated calli and increasing level of radiation doses

decreased the regeneration capacity. Similarly, the highest percentage of haploid plants produced viable seeds upon colchicine treatment was obtained in the control, followed the 15GY and 25GY mutagenic treatment.After successful development of mutant DH through anther culture derived callus mutagenesis of IBD-1 variety, the seven DH lines developed from IBD-1 (15GY and 25GY) mutagenic treatmentalong with control (without treatment)had mutagenic blast disease resistance with best phenotypic performance without negotiating yield and grain quality. The application of radiation-induced mutagenesis with in-vitro culture has proved effective in the induction of genetic variation, selection and multiplication of mutant DH lines. The above investigation reported the high efficiency of doubled haploid production through anther culture and their applications in combination with mutation techniques for rice improvement.

Keywords: Rice, Doubled haploid, Gamma rays, Blast.

Abstract-PSRM-4/NCAPSR/119

AN EFFICIENT MICROPROPAGATION PROTOCOL FOR LARGESCALE PRODUCTION OF BAMBOO (BAMBUSA TULDA)

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The most recommended species of bambooin Maharashtra region is Bambusa tulda, which is a versatile, non-wood and perennialforest treewith highly important to overcome environmental changes coming in future. The bamboo also has commercial and marketable features that improve the socio-economic condition of farmers. The true-to-type, disease free and largescale production of bamboo can be possible through the *in-vitro*micropropagationtechnique. During present investigation, the nodal explants were used to develop an efficient protocol for micropropagation of *Bambusa tulda*. In the present investigation the combination of Tween 20, ethanol, Hgcl2, Bavistin and PPM was

proved as best to control the contamination in efficient manner. The initiation of shoots from the nodal segmentswas performed in half MS medium fortified with BAP and PPM. The combination of lower kinetin to higher BAPwas efficiently multiply the shoots. For development of roots from shoots, the hormone NAA alone was found sufficient. The hardening under greenhouse was performed for the healthy, disease-free and true-to-type development. Further the assessment of genetic uniformity was achieved viaapplication of DNA marker analysis for commercial production and sale of bamboo plantlets.

Keywords: Bambusa tulda, micropropagation, PCR, DNA marker

Abstract- PSRM-4/NCAPSR/120

HYGIENE PRACTICES FOR POST-HARVEST DISEASE CONTROL AND PREVENTION IN HORTICULTURAL CROPS

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Maintenance of hygiene at all stages during production and postharvest handling is critical in minimising sources of inoculum for postharvest diseases. To most effectively reduce inoculum, a good knowledge of the life cycle of the pathogen is essential. Sources of inoculum for postharvest diseases depend largely on the pathogen and when infection occurs. In the case of postharvest diseases which arise from preharvest infections, practices which make the crop environment less favourable to pathogens will help reduce the amount of infection which

occurs during the growing season. For example, in tree crops, pruning and skirting can increase ventilation within the tree canopy, making conditions less favourable for fungi and bacteria. Removal of dead branches and leaves entangled in the tree canopy is also an important way to minimise inoculum build-up. In many diseases, overhead irrigation can encourage pathogen spread and infection, trickle or micro-sprinkler irrigation systems may be more appropriate. As many pathogens are soil-borne, minimising contact of leaves and fruit with the soil is

desirable. Inoculum for infections occurring after harvest commonly originates from the packing shed and storage environments. Water used for washing or cooling produce can become contaminated with pathogen propagules if not changed on a regular basis and if a disinfectant such as chlorine is not incorporated. Water temperature can also be an important factor in the transfer of inoculum in some situations. For example, tomatoes harvested during hot weather may have a higher temperature than the water used to wash them. In this scenario, inoculum present in the washing water can be

taken in by the fruit tissue, causing higher levels of diseases such as bacterial soft rot. o Reject produce which has not been discarded from the packing shed or storage environment provides an ideal substrate for postharvest pathogens. Packing and grading equipment, particularly brushes and rollers, which is not cleaned and disinfected on a regular basis can also be a major source of inoculum. Containers used for storing and transporting fruit can harbour pathogen propagules, particularly if recycled a number of times without proper cleaning.

Abstract- PSRM-4/NCAPSR/121

AGRICULTURE AND FARMER SUICIDE Gejum Kena

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India is an agrarian country with around 60-70% of its people depending directly or indirectly upon agriculture for their livelihood and agriculture accounts for 16% of India's total GDP. But farmers suicide in India is worrying. Approximately 300,000 farmers have died by suicide since 1955 and over 537 have died in protest recently during the Indian farmer protests regarding 2020 Farm Bill. Maharashtra is the worst affected state. 35 years ago on 19'th March 1986 the first mass suicide by a farmer family was recorded in Yavatmal district, Maharashtra. The family committed suicide by consuming pesticide. There are several reasons why farmers commit suicide in our country. All these reasons come together to make this worrying issue prevalent. Natural calamities like droughts and floods are a major reason. Similarly, capitalization and privatization, high

debt burdens, government policies, mental health, the surge in input costs are among the other reasons. Some relief package and debt waiver schemes were announced by the government for the farmers. 2006 Relief Package, Agricultural debt waiver and debt relief scheme 2008, 2013 diversify income sources package, the package was aimed to diversify income sources of farmers. The government must take measures to tackle this issue at the earliest. Policies of integrated pest management to prevent damage, irrigation facilities for the crops must be enhanced, introduction of genuine crop insurance policies that covers the loss of these farmers so they don't go into debt. Moreover, the government must also ensure they learn new skills which will help them get some additional income into the family.

Abstract- PSRM-4/NCAPSR/122

NEW APPROACHES FOR ALMONDS (*PRUNUS AMYGDALUS*. BATSCH) PRODUCTION IN MEDITERRANEAN CLIMATES

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The Almond (Prunus dulcis, syn. Prunus amygdalus Batsch. Amygdalus communis L.,

Amygdalus dulcis Mill.) is a species of Prunus belonging to the subfamily Prunoideae of the

family Rosaceae. The plant is classified with the peach in the subgenus Amygdalus within Prunus, distinguished from the other subgenera by the corrugated seed shell. It is native to

southwest Asia, from northwestern Saudi Arabia, north through western Jordan, Israel, Lebanon, western Syria, to southern Turkey. Domesticated almonds appear in the Early Bronze Age (3000–2000 BC) of the Near East. A well-known archaeological example of almond is the fruits found in Tutankhamen's tomb in Egypt (c. 1325 BC), probably imported from the Levant. Almond is called Lawz in Arabic, and Baadaam in Persian, Urdu and Hind

Keywords: Almonds, cultivation, Variety, Irrigation, Drip systems, Processing

Abstract- PSRM-4/NCAPSR/123

NEW TRENDS FOR APRICOT (PRUNUS ARMENIACA L.) PRODUCTION IN MID HILLS TO HIGH HILLS HAVING VARIABLE CLIMATIC CONDITION

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Apricot (Prunus sp.) is an important fruit crop worldwide. Despite recent advances in apricot research, much is still to be done to improve its productivity and environmental adaptability. The availability of wild apricot germplasms with economically interesting traitsis a strong incentive to increase research panels toward improving its economic, environmental and nutritional characteristics. New technologies and genomic studies have generated a large amount of raw data that the mining and exploitation can help decryptthe biology of apricot and enhance its agronomic values. Here, we outline recent findings in relation to apricot production, pomological and nutraceutical properties. In particular, we retrace its origin from central Asia and the path it took to attain Europe and other production areas around the Mediterranean basin while locating it in the rosaceae family and referring to its genetic diversities and new attempts of classification. The production, nutritional, and nutraceutical importance of apricot are recapped in an easy readable and comparable way. We also highlight and discuss the effects of late frost damages on apricot production over different growth stages, from swollen buds to green fruits formation. Issues related to the length of production season and biotic and abiotic environmental challenges are also discussed with future perspective on how to lengthen the production season without compromising the fruit quality and productivity.

Key Words: Apricot kernel oil, plum pox virus, prunus armeniaca, spring frost, stone fruit.

Abstract- PSRM-4/NCAPSR/124

PRODUCTION TECHNOLOGY OF PEACH (*PRUNUS PERSICA L.*) AND NECTARINES [*PRUNUS PERSICA* (L.) BATSCH, VAR. NECTARINA]

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The cultivated/domesticated peach (*Prunus persica* var. *persica*; Rosaceae, subgenus *Amygdalus*; synonym: *Amygdalus persica*) originated in China, but its wild ancestor, as well

as where, when, and under what circumstances the peach was domesticated, is poorly known. Five populations of archaeological peach stones recovered from Zhejiang Province, China, document peach use and evolution beginning ca. 8000 BP. The majority of the archaeological sites from which the earliest peach stones have been recovered are from the Yangzi River valley, indicating that this is where early selection for favorable peach varieties likely took place. Furthermore, peach stone morphology through time is consistent with the hypothesis that an unknown wild *P. persica* was the ancestor of the cultivated peach. Production technology of peach, plum and apricot in India is elaborated in detail in relation to introduction, origin and distribution of crop, importance and uses, morphological features of tress, other related species involved, climate and soil requirement,

varieties, propagation and raising of rootstocks, planting and planting densities, cropping systems, manure and fertilisers application, cultural practices, weed management, orchard floor management, after care training and pruning, pollination and pollinizers, flowering and crop regulation, use of growth regulators, fruiting in the crop, fruit thinning and drop, maturity harvesting, post-harvest and management, handling and storage, insects, pests and diseases, special production problems like low productivity, unfruitfulness and selfincompatibility, premature leaf fall, replant problem, alternate bearing and remedies and physiological disorders of the crop.

Key Words: Peach, Plum, Apricot, production technology, India

Abstract- PSRM-4/NCAPSR/125

GROWTH AND YIELD OF WHEAT (Triticum aestivum L.) AFFECTED BY THE LEVELS OF IRRIGATION AND NITROGEN.

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Wheat (*Triticum aestivum* L.), the third most important crop, is widely grown across the world to provide sufficient quantities of food. Since crop water requirement is usually much greater than precipitation in most of the wheat growing areas in India so wheat production relies heavily on irrigation. However, the farmers normally use unreasonable levels of irrigation and N fertilizer supplementation in an attempt to increase yields. This not only reduced water and fertilizer use efficiency, but also increased the risk of resource wasting. Thus, more effective water and N fertilizer management strategies are urgently required. Numerous studies have been conducted formerly to optimize the irrigation and N fertilization. However, there still remaining unknown of the underlying

mechanism on coordinating use of water and nitrogen. Water productivity, an indicator of water use efficiency, is primarily used to evaluate if a particular practice can improve grain yield with less water. Nitrogen use efficiency is an important indicator for assessing N productivity which consisting of N uptake efficiency and utilization efficiency Therefore, optimizing N uptake and utilization of a crop is important to achieve the higher N productivity. It has been found that irrigation and N fertilization are two vital factors influencing N uptake and utilization. Irrigation often increases N utilization through the improvement of N translocation, distribution and accumulation. However, N fertilization increases N uptake but reduces N utilization.

BIOREMEDIATION AND PHYTOREMEDIATION OF WASTE WATER AND ITS UTILIZATION IN HYDROPONICS SYSTEM FOR CROPS PRODUCTION

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Water quality and quantity is an important factor was of optimum crop cultivation. Deteriorating water quality and its limited availability is imposing a challenge for sustainable agriculture all over the world. Water recycling and reuse of water is needed for efficient utilization of resource for futuristic crop production. Most of the water available for irrigation is already polluted which when directly apply to the soil can further effect the soil adversely. The scarcity and pollution of freshwater are extremely crucial issues today. In this scenario use of wastewater can be a futuristic approach but there could be a possibility of soil contamination by the use of polluted water or wastewater for agriculture without remediation which could further deteriorate ecological balance and adversely

affect soil health. Bioremediation technology integrated with hydroponic system of cultivation is a possibility for a futuristic crop cultivation. Through this system there could be intensive utilization of natural resources along with restoring ecological sustainability. Utilization of phytoremediation seems to be a less disruptive, economical and environmentally sound clean-up technology. Choice of appropriate plant is the most significant feature in phytoremediation. Aquatic plants perform very vibrant roles in the remediation of heavy metals from the polluted site with equal ease to other hyper accumulator plants. Application of aquatic plants both in bioaccumulation (with living plant biomass) and bio-sorption (with dead plant biomass) can be done successfully for the eradication of heavy metals

Abstract- PSRM-4/NCAPSR/127

IMPACT OF BALANCED FERTILIZATION

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Fertilizers are the backbone of Agriculture. Imbalance application of fertilizers results in poor crop yield & also causes deficiency of macro and micro nutrients in the soil. It also affects physical condition of the soil. In many parts of the country, application of N alone depletes phosphorus from the soil and due to imbalance use of fertilizers neither profit nor yield condition occurs. A balanced fertilization refers to the application of plant nutrients in time amount and optimum proportion. Application of fertilizers in right quantity, in right time, with right method results in increasing

crop production. It also increases soil health while imbalanced fertilization causes soil mining. The main objective of balanced fertilization is to supply each and every nutrient at different growth and developmental stages of crop to avoid under and over supply of nutrients. The nutrient demand of grain crops is 4:2:1, for legumes it is 0:1:1 or 1:2:1 or 1:2:3. For root crops the nutrient demand proportion is 2:1:2 and for other crops it is 2:1:1. Applied research has shown the benefits of the major nutrients, and their requirements for maximum economic crop production; it also has identified new

production constraints, such as micronutrients, for a range of crops, as the yield possibilities are raised by irrigation, improved varieties, and better management. The fact that crops need variable amounts of nutrients and that no one

essential nutrient can substitute for another, in addition to the economic and environmental implications of excessive nutrient use, raises the issue of "balanced fertilization".

Keywords: Balanced fertilization, macro micro nutrients, soil mining.

Abstract- PSRM-4/NCAPSR/128

A CASE STUDY OF HWC IN DEHRADUN UTTARAKHAND Nidhi Rawat and Tufaid Ashraf Wani

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Human wildlife conflict is a critical issue in agriculture and management areas. Worldwide HWC problem is increasing and is becoming more threat to both human and wild animals. The conflict is more to people living nearby protected areas and whose livelihood depends on forest and agriculture. Humans are exploiting resources and wild animals are protecting their territories this leads to the generation of human wildlife conflicts. In modern times human wildlife conflict is a critical and much debated term as it

has become a major threat to both the survival of wildlife and human population in different regions of the world. This study tries to evaluate the HWC and its consequences on the basis of villager's perception. In addition, threat ranking is given for various key threats in the area observed during survey. Most of the respondent considered HWC as a serious menace for agriculture. Decision makers required data information to frame sustainable policies and plans to reduce HWC.

Abstract- PSRM-4/NCAPSR/129

ORGANIC FARMING IN UTTARAKHAND: A VISION TOWARDS SUSTAINABLE DEVELOPMENT AND HEALTHY PLANET

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The most important factors that have gained attention among consumers about any food item is its quality and safety. Due to increased application of chemical fertilizer, hormone treatments and pesticides during production by the farmers, impose serious health problems and with residual effect. Therefore people are moving toward the search of organic foods because they are chemical free, safe and have high nutritional value without any residual effect. Moreover they are produced by using low input resources and does not involve the use of chemical fertilizer, pesticides, genetically modified organism, thereby minimizing harmful effects on environment.

Organic farming also help in achieving goal of sustainable development and also improves the livelihood status of people of rural areas in Uttarakhand. It will help in developing the rural economy by increasing the production of organic traditional food crops with high nutritional content. Uttarakhand present huge potentiality and good indigenous traditional skills for growth of organic farming. Presently it achieved rapid growth in organic agriculture, Therefore, organic farming has a great potential in achieving good heath of state and leading to development of nation through sustainable development

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IDENTIFICATION OF CORE GENE SET AND PHYLOGENETIC ANALYSIS OF MYCOBACTERIUM TUBERCULOSIS.

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Mycobacterium Tuberculosis is causative agent of Tuberculosis disease, which is major global public health issue. Mycobacterium *tuberculosis* species seven major descents shows different characteristics in terms of evolutionary status, drug resistance, transability, vaccine interaction, variation in virulence and pathogenicity also show by subdescents.A phylogenetic tree is an estimate of the relationships among taxa and their hypothetical ancestors. The most basic assumption of phylogenetic analysis is that all the sequences on a tree are homologous that are descended from a common ancestor. The development of molecular biological tools has led to profound modifications in the classification and methods of identification of the bacteria. Today, most phylogenetic trees are built from molecular data either DNA or protein sequences. Different phylogenies for the genes have been developed using sequence analysis of the 16s rRNA gene. Most mycobacterial identification tools are currently available such as the ribosomal differentiation of medical microorganism database or microseq kit.

Keywords: Comparative genomics, Phylogenetic tree, Tuberculosis

Abstract- PSRM-4/NCAPSR/131

COMPARISON OF THREE GENOMIC DNA EXTRACTION METHODS TO OBTAIN HIGH QUALITY DNA FROM FISH FIN TISSUES.

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Deoxyribonucleic acid (DNA) the complex macromolecule that contains all the necessary information required to maintain and build the organism. Sometimes DNA is used to study population genetic structure in fishes. The extraction of high yield good quality DNA is a prerequisite for most of the genetic analysis of any individual species. In the present study fish samples were collected from two tributary of Ganga River near Garhwal Himalayas. Total 10 fin samples were collected from 10 fishes (Schizothorax richardsonii) five each from two locations. High quality sheared free DNA was isolated from the fin tissues. The High quality of DNA is achieved with isolation of high

molecular weight fragment and absorbance ratio A260/280 between 1.8 and 2.0. We compared and statistically evaluated the effectiveness of three DNA extraction procedures for the fin and tissue sample of cold water fish. Different physical disruption methods were used for cell The effects of different chemical lysis. extractants (sodium dodecyl sulfate [SDS], chloroform, Urea and phenol were used for comparison purpose. The isolated DNA is aliquot and stored in -20° C. The stability of the extracted DNA will be analysed on 3 months and months period using agarose electrophoresis.

Keywords: DNA, Genetic analysis, SDS, Schizothorax Richardsonii and Electrophoresis.

ANTIOXIDANT ACTIVITY OF CAULIFLOWER STEM Indra¹ Rautela and Pallavi Upadhyay²

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Antioxidants are capable of delaying or preventing rancidity of food due to oxidation and therefore lengthen the shell life of the product. They are very important in food industry because they allow food to conserve their nutritional properties and their quality levels. This promotes the use of chemically synthesized antioxidants that can be major cause of peptic ulcer and in extreme cases can lead to cancer. Therefore, it is need of hour to use biologically synthesized antioxidants to reduce the ill-effects. In this context, the current investigation aimed to evaluate the antioxidant activity of kitchen waste . There are many organic compounds present in the peels, seeds, flesh, juice, stem as well as roots of food waste. One such enzyme is peroxidase which is a great antioxidant used in many industries. This enzyme was extracted from cauliflower stem. The stems were finely chopped and a thick slurry was made which was homogenized by 0.1M phosphate buffer in the ratio 1:2 respectively. The solution was centrifuged and supernatant was stored. Then, hartree-lowry assay was used to determine the protein concentration in a solution. The protein concentration was maximum between 200nm-280nm which shows positive result fir the assay. After the protein presence was confirmed, it was ready to be purified using ammonium sulfate precipitation which is most common method for protein purification. The maximum protein concentration observed was at 50% concentration i.e., when 50% of crude extract and 50% ammonium sulfate salt suspension was prepared. This suspension was then dialyzed against 0.1M phosphate buffer to extract the enzyme in a pure form, the dialyzed extract was then filtered bv column chromatography method to use the final enzyme as a food preservative. This purified peroxidase was then mixed with cellulose and starch for the production of bioplastic for the packaging of Thus, this food products. biologically synthesized antioxidant from food waste was reused in other food products, as functional ingredients able to confer some characteristic quality criteria and at the same time to exert human health benefits due to their antioxidant properties.

Keywords: peroxidase, antioxidant, cauliflower crude extract and protein purification

Abstract- PSRM-4/NCAPSR/133

ETHNOMEDICINAL REPORTS FROM \it{BHUTIA} TRIBAL COMMUNITY OF UTTARKASHI DISTRICT, UTTARAKHAND, INDIA

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The major objectives of the present study was to identify medicinal plant species used for the management of healthcare problems prevalent among the *Bhutia* tribal community of Uttarkashi district, Uttarakhand, India. Data about medicinal uses of plants were collected by

questionnaire, personal interview and group discussion with pre-identified members of Bhutia tribal community residing at Uttarkashi district. The present study includes a total of 171 ethnomedicinal records for 70 plant species from Uttarakhand. *Bhutia* tribe used these

species in the treatment of 104 different health problems. Use Value (UV), Fidelity level (FL), Relative Frequency of Citation (RFC) and Factor of Informants Consensus (Fic) were used for identification of the popularity level, efficiency medicinal importance of the plants among the community. In the study area, the interviewed person consensus about usages of medicinal plants ranges from 0.4 to 0.76 with an average

value of 0.7. Only 8.6% of the ethnomedicines are from cultivation and rest 91.4 % from wild resources. During the study, it was found that twenty of the popular medicinal plants used by *Bhutia* tribe, are not scientifically evaluated so far for their claimed ethnomedicinal uses. These species may be used in phyto-chemical and pharmacological investigations in future.

Keywords: Ethnomedicine, Traditional Knowledge, Uttarkashi, Bhutia tribe, Uttarakhand, India, Use Value, Fidility Level, Relative Frequency Citation.

Abstract- PSRM-4/NCAPSR/134

MICROBIAL DIVERSITY ASSOCIATED WITH RHIZOSPHERE OF ZINGIBER CHRYSANTHUM: A MEDICINALLY IMPORTANT RHIZOMATOUS PLANT SPECIES Abhishek Gupta¹, Vipin Parkash², Akshita Gaur², Ranjana Kaundaf², Supriti Pauf²

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Zingiber chrysanthum plant commonly known as Golden Flowered Ginger belongs to family Zingiberaceae. It is a perennial herb found widely distributed along the tropical and subtropical Tarai areas of the Kumaun and Garhwal regions of Uttarakhand, India. The plant was evaluated for microbial diversity (fungal, root bacterial. fungal endophytes, endomycorrhizal diversity and root colonization) of rhizospheric zone. Isolation of bacteria and fungi was carried out through serial dilution method. Isolation of endophytes was done through the modified prescribed standard protocol whereas Arbuscular Mycorrhizal (AM) spores were isolated by wet sieving and decanting method. Arbuscular Mycorrhizal root colonization was studied by rapid clearing and staining method. It was observed that fungal as species such Aspergillus niger and Arthrobotrys were present sp.

rhizospheric region. Among the bacterial diversity only 2 different species of Bacillus and 2 different Coccus species were isolated. Endomycorrhizal spores of Acaulospora sp., Acaulospora foveata, Acaulospora laevis, Acaulospora denticulata, Glomus sp., Glomus macrocarpum and Scutellospora sp. were present in the rhizospheric soil samples of the plant. The roots were detected for extreme AM fungal colonization. Two fungal endophytic species viz. Fusarium chlamydosporium and Trichoderma cremeum were isolated from the rhizomatous roots of the plant. The study indicates that the target plant species is heavily dependent on endomycorrhizal fungi and other microbes and the microbial interaction can be attributed to the presence of alkaloids present in the bulbs of the plant species as per the literature review and therefore, this aspect requires studies and should be explored further.

Keywords: Arbuscular Mycorrhizal Fungi, Bacterial diversity, Endomycorrhizal fungi, Endophytes.

A REVIEW ON ORGANIC FARMING: FUTURE PROSPECTS

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Organic farming is a production management system that uses on-farm agronomic, biological, and mechanical methods such as crop rotations, crop residues, animal manures, off-farm organic waste, mineral grade rock additives, and biological systems of nutrient mobilisation and plant protection, among others, to promote and enhance biodiversity, biological cycles, and agro-ecosystem health. Organic farming is a crop and livestock production system that entails much more than avoiding the use of pesticides, fertilisers, GMOs, antibiotics, and growth hormones. Planting crops in organic farming does not necessitate the use of expensive fertilisers, pesticides, or HYV seeds. As a result, there is no additional cost. A farmer can earn a good return on investment by using cheaper and local inputs. Organic products are in high demand in India and around the world, generating additional revenue through export. Organic items are more nutritious, flavorful, and

beneficial for your health than chemical and fertiliser-based products. Organic farming does not use pesticides or fertilisers, thus it is safe for the environment. The absence of proper infrastructure and marketing of organic products is a major challenge in organic farming. When compared to chemical products, the items obtained by organic farming cost less in the early years. As a result, farmers are having difficulty accommodating large-scale production. Chemical items have fewer faults and a longer shelf life than organic products. In organic farming, off-season crops are limited and have fewer possibilities. Organic farming is a holistic approach aimed at increasing the productivity and fitness of agro-ecosystem groups such as soil organisms, plants, livestock, and people. The primary purpose of organic farming is to create businesses that are both sustainable and environmentally friendly.

Abstract- PSRM-4/NCAPSR/136

RESPONSE OF WHEAT (*Triticum Aestivum* L.) VARIETIES TO NITROGEN LEVELS UNDER LATE SOWN CONDITIONS

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The field experiment was carried out at Agricultural Research Farm of School of Agriculture Sciences and Technology, RIMT University, Mandi Gobindgarh (Punjab) during the rabi season of 2019-2020 to study the response of wheat (Triticum aestivum L.) varieties to Nitrogen levels. The treatments consist of two varieties viz. PBW 550 and PBW 725 with four nitrogen levels viz. 0, 75, 100, 125 kg N ha⁻¹. The experiment was laid out in randomized complete block design (RCBD) with three replications. The variety PBW 550 recorded significantly higher grain yield of late

sown wheat over variety PBW 725. Growth characters, yield attributes and grain yield were significantly increased with the application of 125 kg N ha⁻¹. Nitrogen levels significantly influenced growth character, yield attributes and grain yield. Similarly, the highest grain yield was observed with 125 kg N ha-1 which was significantly higher than control and rest of the N levels. The magnitude of increase was 28%, 16% and 5.9% over 0, 75, 100, 125 kg N ha⁻¹ respectively. The interaction between Varieties and Nitrogen levels was non-significant in all growth parameters, yield attributes and yield.

ORGANIC FARMING: A WAY TOWARDS HEALTHY NATION Nongthombam Indraban Singh

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Food quality and safety are two critical elements that have attracted widespread attention. Growing environmental awareness and a number of food risks (such as dioxins, bovine spongiform encephalopathy, and bacterial contamination) have eroded public confidence in food quality in recent decades. Organic farming as a growing method has grown in popularity in recent years (Dangour et al., 2010). For both customers and farmers, organically farmed food has become one of the finest options. Organically farmed foods are an important aspect of living a green lifestyle. But, first and foremost, what does organic farming imply? Organic farming and food processing processes are diverse, necessitating the creation of a socially, environmentally, and economically sustainable food production system. The essential four principles of health, ecology, fairness, and care have been proposed by the

International Federation of Organic Agriculture Movements (IFOAM) (Figure 1). The main principles and practices of organic food production are to inspire and enhance biological cycles in the farming system, to maintain and improve deep-rooted soil fertility, to reduce all types of pollution, to avoid the use of pesticides and synthetic fertilizers, to preserve genetic diversity in food, to consider the vast socioecological impact of food production, and to produce high-quality food in sufficient quantities (IFOAM,1998). Organic farming produces food that is more nutritious and safe. Organic food is becoming increasingly popular as consumers seek for meals that are perceived to be healthier and safer. As a result, organic food may ensure food safety from farm to fork. Organic farming more environmentally friendly conventional farming.

Abstract- PSRM-4/NCAPSR/138

FEEDING THE FUTURE: SUSTAINABLE AGRICULTURE

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The purpose of sustainable agriculture is to meet society's current food and textile demands without compromising future generations' ability to meet their own. There is a need to boost the productivity of resource-efficient farming so that it can adapt to climate change and prevent its worst effects. Equality and sustainable access to natural resources, as well as effective management of them, are critical. Smallholder farmers, particularly women, are anticipated to be the key agents of change, hence the focus is on them. Promoting sustainable agriculture research that has to be scaled up, as well as agriculture. sustainable campaigning for Investment in sustainable agriculture, both

public and private, must be maximised. The need to maintain agricultural land and enhance food production has become crucial since the world's population has surpassed 6.7 billion people and is expanding at a rate of over 6 million people each month. The primary principle underpinning the concept sustainability is to meet current needs without compromising future generations' ability to meet their own. The farming system is unsustainable if natural resources such as soil, fertilisers, and water are depleted faster than they are supplied. Maintaining a high level of biodiversity, particularly in the soil and surrounding ecosystem, is also necessary for sustainability. Biodiversity loss, dryland salinity, acid soils, and pests and weeds are all major hazards to sustainable agriculture. Farmers, scientists, and agricultural authorities are collaborating to develop solutions. Sustainable agriculture is a straightforward notion that encompasses a

tangle of scientific and economic concerns. Information technology advancements will be critical in handling the complexity. We must address both environmental consequences and land productivity in order to achieve sustainable agriculture.

Abstract- PSRM-4/NCAPSR/139

GMO GENETICALLY MODIFIED ORGANISM. *Kritika Adhikary*

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GMOs are plants or crops who has two or more desired traits combined together to form improved variety of crop. Almost everything we eat today are genetically modified. More than 10% of the world's croplands are planted with GM crops. The aim is to introduce a new trait to the plant which does not occur naturally in the species like resistance to certain pests, diseases, environmental conditions, herbicides etc. GM proponents says the technology leads to better crop yield and may solve food shortages and reduce pests. Opponents says GM is a threat to the environment and humans. So where does the truth lies? Academic research suggests GM crops are generally safe for humans and the environment. GMOs helps us preserve the land while doing more with fewer resources (e.g., drought tolerant and fertilizer use efficiency products), it helps us to reduce the cost of food. Grow more food safely and sustainably, i.e. GMOs have been proven safe and over the last 20 years, GMOs have allowed farmers to increase crop yield by 22% and reduced the overall environmental impact of pesticides by 8.4%. Increased nutritional benefits are there, Scientists are still working on GMO crops to help address nutrition deficiency and food security issues around the world. In India, the GEAC(Genetic Engineering Appraisal Committee

) is the main body for the commercial release of GM crops. In 2002, the GEAC allowed the commercial release of Bt cotton. GM cotton has been modified with insecticidal gen, which research shows makes it more resistant to pests. The modified cotton also requires less insecticidal use. According to few researchers there few issues surrounding GMO like safety, ethics of farmers, effectiveness, health effects, issues with banning GM crops , illegal cultivation. GM mustard ad approved by GEAC in2016 for field trails, but SC (Supreme court) stayed the order. There are as many as 20 GM crops already undergoing trails at various stages . In my opinion any technology which are newly introduced obviously will have some pros and some cons, but the anti-GM crops lobby says it should be totally banned, It is wrong . What should be done is proper study and research to ensure that technology doesn't harm human and environment health. It should be introduced until and unless we have proper regulatory mechanisms and proper monitoring system. Government should boost research and improve the system. Any new technology adopted in the farming sector should be in interest of the farmers without affecting the rights of consumer.

ORGANIC FARMING: KEY TO SUSTAINABILITY AND CIMATE CHANGE Udita Sarkar

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The term "organic" refers to "living," "earthfriendly," or "of plant or animal origin." Organic farming (OF) is a unique production management system aimed at cultivating the land and raising crops in such a way as to keep the soil alive and in good health by using organic wastes (crop, animal, farm, and aquatic wastes) and other biological materials, as well as beneficial microbes (biofertilizers), to release nutrients to crops for increased sustainable production in an environmentally friendly, pollution-free environment. In India, OF has a long history. Since the Vedic period, organic manure has been manufactured and applied to cultivation. To decrease land degradation and input misuse, the primary requirement is to promote a healthy soil-plant-environment system. As indicated by decreased crop and factor yield, environmental degradation, and increased chemical pollution, the present agricultural system is becoming unsustainable.

Product quality was overlooked since the primary goal was to expand production. As a result, biological diversity has been lost, soil productivity has decreased, water resources have been misused and polluted, climate change has happened, and environmental issues have risen to the top of the global agenda. Constraints such as "inadequate availability of inputs such as vermicompost, biofertilizers, and organic manures," "lack of skill about improved composting methods," "lack of awareness about the concentration, time, and local market for organic produce," and "poor access to guidelines, certification, and input costs and method of biofertilizer application" were felt strongly by both organic and conventional farmers. Government and non-government agencies must work together to encourage farmers to use OF as a solution to climate change, health, and sustainability issues.

Abstract- PSRM-4/NCAPSR/141

INTEGRATED PEST MANAGEMENT-A TOOL FOR SUSTAINABLE AGRICULTURE Rakshita Sharma

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Insect pests are the most major biotic elements restricting our country's food supply. They cause significant yield losses either directly or indirectly by transmitting illnesses. Even though chemical pesticides are successful at controlling pest damage, their widespread usage produces a slew of environmental issues, including pesticide poisoning, insecticide resistance, insect pest resurgence, non-target organism effects, and pesticide residue. Recent improvements in

IPM appear to be an alternate technique leading to the tagline "Low External Input Sustainable Agriculture," with a focus on understanding insect virulence through biology, favourable environment, susceptible hosts, natural enemies, and time of occurrence, among other things. As a result, IPM-based approaches were proven to be a sustainable, economically viable, environmentally safe, and effective alternative to pesticides for pest management in crops.

ABSTRACT- PSRM-4/NCAPSR/142

EFFECT OF DIFFERENT DOSES OF NITROGEN IN THE GROWTH AND YIELD OF WHEAT (*Triticum Aestivum* L.)

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The present investigation entitled "Effect of different doses of nitrogen in the growth and vield of wheat (Triticum aestivum L.)". under normal practice and system of wheat intensification was carried out at the Agricultural Research Farm of Alpine Group of Institutions, Nanda ki Chawki, Premnagar, Dehradun, Uttarakhand. The experiment was laid out in split plot design keeping 8 NPK levels i.e. Control plot, (25%N+ RDF P;K), (50% N+ RDF P;K), (75%N+ RDF P;K), (RDF N;P;K), (125%N + RDF P;K), (150%N + RDF P;K), (175%N + RDF P;K) and system of sowing utilized is (20 cm Row to Row), and replicated thrice. A uniform dose of urea, single super phosphate and muriate of potash were used as source of nitrogen, phosphorus and potassium, respectively. One third of nitrogen and full dose of phosphorus and potassium were applied at the time of sowing as per treatment. The remaining two third quantity of nitrogen was top dressed after first and second irrigation in two split doses i.e., one third and one third, respectively. Observations regarding effect of different NPK levels, system of sowing on growth parameters plant height are recorded at 30, 60 and 90 DAS and at harvest. Yield and yield attributing traits, viz., effective tillers m-2,

spike length, grains per spike and 1000-grain weight were recorded at maturity. The application of NPK levels recorded significant variation on growth parameters during the experimentation. The growth parameters of wheat viz., plant height and shoot dry weight m ² at (at 30 DAS) produced by 125%N + RDF P;K proved significant superiority over Control plot, (25%N+ RDF P;K), (50% N+ RDF P;K), (75%N+ RDF P;K), (RDF N;P;K), (150%N + RDF P;K), (175%N + RDF P;K) at all dates of observation. Application of 125%N + RDF P;K significantly produced the maximum value of the yield attributing characters like number of effective tillers, spike length, grains per spike and 1000-grain weight. Similarly, 125%N + RDF P;K significantly increased grain yield (55.700 Q ha⁻¹) and straw yield (60.500 Q ha⁻¹) as compared to (25%N+ RDF P;K), (50% N+ RDF P;K), (75%N+ RDF P;K), (RDF N;P;K), (150%N + RDF P;K), (175%N + RDF P;K). The harvest index was also produced significantly higher under the application of 125%N + RDF P;K as compared to Control plot, (25%N+ RDF P;K), (50% N+ RDF P;K), (75%N+ RDF P;K), (RDF N;P;K), (150%N + RDF P;K), (175%N + RDF P;K).

Abstract- PSRM-4/NCAPSR/143

EFFECT OF MICRONUTRIENTS AND THEIR COMBINATIONS ON GROWTH, YIELD AND QUALITY PARAMETERS OF PALAK (*BETA VULGARIS* L.) VAR. *BENGALENSIS* CV. ALL GREEN *Deepali*

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Palak is scientifically known as *Beta vulgaris* var. bengalensis belong to the family

Chenopodiaceae has a chromosome number 2n=2x=18, It is also known as Indian spinach in

English and Palak in Hindi. In India, palak is the most common leafy vegetable and most probably native of Indo-Chinese region. It was known in China as early as 647 A.D. (Nath, 1976). The experiment was carried out with major objectives i.e., to find out the effect of CaCl2, ZnSO4 and MnSO4 on growth, yield and quality characters of Palak, to find out the effect of their combination on growth, yield and quality characters of Palak and to find out the best treatment on growth, yield and quality characters of Palak. The experiment was laid out in a randomized block design with three replications having 19 treatments. The analysis of variance for 15 characters, the mean sum of square due to treatments revealed that significant differences were found at a 5% level for almost all the character studied viz. height of plant after 40 and 80 DAS (cm), number of leaves per plant after 40 and 80 DAS, leaf length (cm), leaf width (cm), leaf area (cm3), root length (cm), fresh weight of whole plant(g), fresh weight of leaf (g), fresh weight of root (g), dry weight of leaf (g), dry weight of root (g), yield per plot (kg), vitamin C (mg/100g),

chlorophyll content (SPAD) and TSS (oBrix). The quality analysis was carried out by the procedure given by Ranganna (2015). The results of the analysis of variance revealed that the mean sum of square due to treatment was significant at 5% level for most the traits except the dry weight of leaf(g), dry weight of root (g), Vitamin C and TSS which was found nonthe significant. The result of present investigation showed that the resulted treatment T5 (ZnSO4 @ 10 ppm) height of plant at 40 and 80 DAS (23.57cm and 39.66cm), the number of leaves at 80 DAS (34.25), leaf length (18.26cm), leaf area (92.19cm2), fresh weight of leaf (5.45g) and root (2.17g) and yield per plot (1383g). Treatment T8 (MnSO4 @ 10ppm) root length (15.69cm) and chlorophyll (38.91 SPAD value). Treatment T9 (MnSO4 @ 100ppm) leaf width (3.92cm).treatment T15 (CaCl2 + MnSO4 @ 100ppm) number of leaves at 40 DAS (19.33). Treatment T11 (CaCl2 + MnSO4 @ 1ppm) the fresh weight of the whole plant (74.00g) could be used to enhance the production of palak.

Abstract- PSRM-4/NCAPSR/144

EFFECT OF INTEGRATED NUTRIENT MANAGEMENT ON GROWTH, YIELD AND QUALITY OF WHEAT (Triticum Aestivum L.)

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field experiment was conducted at Experimental Farm of Agronomy, Alpine Institute of Management and Technology, Nanda Ki Chowki, Premnagar, Dehradun (UK) during rabi 2018-19 on sandy clay loam soil. The experiment was laid out in randomized block design with three replications comprising integrated nutrient management treatments viz. control, 50% RDF (60-30-30 kg N-P-K ha-1), 75% RDF (90-45-45 kg N-P-K ha-1), 100% RDF (120-60-60 kg N-P-K ha-1), 50% RDF + FYM 3 t ha-1, 75% RDF + FYM 3 t ha-1, 100% RDF + FYM 3 t ha-1, 50% RDF + FYM 2 t ha-1 + VC 1 t ha-1, 75% RDF + FYM 2 t ha-1 + VC 1 t ha-1 and 100% RDF + FYM 2 t ha-1 + VC 1 t ha-1. Results indicated that application of 100% RDF + FYM 2 t ha-1 + VC 1 t ha-1 significantly increase the plant height, number of tillers, dry matter production, number of effective tillers, spike length, number of spikelets spike-1, grain yield, straw yield, biological yield and quality parameters protein content, N, P & K content as well as uptake and also gross returns. While maximum net returns and B: C ratio was observed with application of 75% RDF + FYM 2 t ha-1 + VC 1 t ha-1.

AN OVERVIEW OF DMH-11: INDIA'S FIRST EDIBLE GM CROP AyushiSrivastava*, Jaya Rathore and YuvrajYadav

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DMH -11, i.e., Dhara Mustard Hybrid-11 is the transgenic mustard developed by a team of scientists lead by Dr. Deepak Pental at Centre for GeneticManipulation of Crop Plants at Delhi University under aGovernment sponsored project. It is a genetically modified variety of Herbicide Tolerant (HT) mustard. It was created by using "barnase/barstar"system comprising of genes from a soil bacterium that makes the mustard self-pollinating plant. DMH -11 contains three genes viz. Bar gene, Barnase, and Barstarsourced from Bacillus amyloliquefaciens. The bar gene had made the plant resistant to herbicide named 'Basta'. Genetic Engineeringtechnology hasutilized genetic diversity available in B. junceato produce a hybrid that shows heterosis for yield. The hybrid breeding system developed in *B. juncea*(Indian mustard) consists of a barnasegene containing line that confers male sterility (MS) and a barstargene containing the line that restorer juncea fertility (RF). Brassica beina apredominantly self-pollinating crop, pollination control system is required to prevent self-pollination. Initially, the parental

comprised of RLM198 for barnasegene and Varuna for the *barstar*gene. Later, barnaseelite event (bn 3.6) was transferred to Varuna genotype of B. junceaby backcrossing the *barstar*gene construct (modbs2.99) was used to transfer the barstar gene to EH -2 (European gene pool lines) via backcrossing. This combination of male sterile (barnase) and restorer (barstar) lines in B.junceahas been used to develop hybrid DMH-11. The edible plant parts of Indian mustard are mainly seeds and leaves. Quantitative enzyme linked immune-sorbent assay (ELISA) was performed to detect presence and level of expression of the three proteins (barnase, barstar, bar) in GE events where the results scientifically proved that proteins/genes present in GE mustard are not present in leaves and seeds. The seeds of DMH- 11 (used for oil extraction and meal) contain only traces of the Bar protein whereas no detectable levels of either barstaror barnase protein. It only contains fat, so there are no threats to human and animals due to the absence of protein inmustard hybrid DMH-11.

Keywords: mustard, hybrid, herbicide tolerant, genetic engineering, backcrossing.

Abstract- PSRM-4/NCAPSR/146

TREE BIOMASS AND CARBON ESTIMATION IN AGRISILVICULTURE SYSTEM ALONG DIFFEERENT ALTITUDE IN THE HILLS OF UTTARAKHAND HIMALAYAN REGION Harish Arya

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Study on Biomass and Carbon estimation in Agri silviculture systems along different altitude in the hills of two districts i.e, Tehri Garhwal & Uttarkashi, in Uttarakhand. The study was carried out in varying altitudinal ranges of 1000 to 1500m(Lower elevation), 1500 to 2000m

(Middle elevation) and 2000 to 2500m (Higher elevation) msl covering northern and southern aspects including 12 working sites with six in each district. The major agroforestry systems(AF) recorded in the area was agrisilviculture (AS), agri-silvi-horticulture (ASH) and

agri-horticulture (AH). However, the AS system was studied in detailed for change in elevation and aspects and their effect on land-use, tree-crop combinations, vegetation and standing biomass and carbon storage in agroforestry trees. The standing volume, biomass and carbon were estimated for Agrisilviculture system. The standing volume of trees under Agrisilviculture systemin Tehri district ranged from 38.82 to 63.78 m³ /ha and in Uttarkashi

34.04 to 64.75 m³ /ha while the standing biomass of trees ranged from 46.81 to 73.71 Mg/ha in Tehri and 46.32 to 79.23 Mg/ha in Uttarkashi. The standing carbon of trees in Tehri district ranged from 24.14 to 38.76 Mg/ha while in Uttarkashi from 23.66 to 41.12 Mg/ha in AS system. The higher amount of biomass was estimated in lower elevation (1000-1500m) compared to middle (1500-2000) and higher elevation (2000-2500m).

Keywords: Mean sea level(msl), Biomass, Agrisilviculture system(AS), Elevation, Agroforestry(AF)

Abstract- PSRM-4/NCAPSR/147

STATUS OF PLANT TISSUE CULTURE IN PIGEONPEA (*CAJANUS CAJAN* (L.) *MILLSP*): A REVIEW *Jaya Rathore**¹, *Yuvraj Yadav*¹ and *Ayushi Srivastava*¹

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Pigeon pea [Cajanus cajan (L.) Millsp.] (Family: Fabaceae) is an important legume crop cultivated across 50 countries in Asia, Africa, and the Americas; and ranks fifth in area among pulses after soybean, common bean, peanut, and chickpea. It is consumed as a major source of protein (21%) to the human population in many developing countries. In India, it is the second important food legume contributing to 80% of the global production. Several biotic and abiotic stresses are posing a big threat to its production and productivity. Attempts address these problems through conventional breeding methods have met with partial success. This paper reviews the chronological progress made in tissue culture through organogenesis and somatic embryogenesis, including the influence of factors such as genotypes, explant sources, and culture media including the supplementation of plant growth Comprehensive regulators. lists morphogenetic pathways involved in in vitro regeneration through organogenesis somatic embryogenesis using different explant tissues of diverse pigeon pea genotypes are presented. Similarly, the estab-lishment of protocols for the production of transgenics via particle bombardment and Agrobacteriummediated trans- formation using different explant tissues, Agrobacterium Pigeon pea [Cajanus cajan (L.) Millsp.] (Family: Fabaceae) is an important legume crop cultivated across 50

countries in Asia, Africa, and the Americas; and ranks fifth in area among pulses after soybean, common bean, peanut, and chickpea. It is consumed as a major source of protein (21%) to the human population in many developing countries. In India, it is the second important food legume contributing to 80% of the global production. Several biotic and abiotic stresses are posing a big threat to its production and **Attempts** address productivity. to these problems through conventional breeding methods have met with partial success. This paper reviews the chronological progress made in tissue culture through organogenesis and somatic embryogenesis, including the influence of factors such as genotypes, explant sources, culture media includina and supplementation of plant growth regulators. Comprehensive lists of morphogenetic pathways involved in in vitro regeneration through organogenesis and somatic embryogenesis using different explant tissues of diverse pigeon pea genotypes are presented. Similarly, the estab- lishment of protocols for the production of transgenics via particle bombardment and Agrobacterium-mediated trans- formation using different explant tissues, Agrobacterium Pigeon pea [Cajanus cajan (L.) Millsp.] (Family: Fabaceae) is an important legume crop cultivated across 50 countries in Asia, Africa, and the Americas; and ranks fifth in area among pulses after soybean, common bean, peanut,

and chickpea. It is consumed as a major source of protein (21%) to the human population in many developing countries. In India, it is the second important food legume contributing to 80% of the global production. Several biotic and abiotic stresses are posing a big threat to its production and productivity. Attempts to address these problems through conventional breeding methods have met with partial success. This paper reviews the chronological progress made in tissue culture through organogenesis and somatic embryogenesis, including the influence of factors such as genotypes, explant sources, and culture media including the supplementation of plant growth regulators. Comprehensive lists morphogenetic pathways involved in in vitro regeneration through organogenesis somatic embryogenesis using different explant tissues of diverse pigeon pea genotypes are presented. Similarly, the estab- lishment of protocols for the production of transgenics via particle bombardment and Agrobacteriummediated trans- formation using different explant tissues, Agrobacterium Pigeon pea [Cajanus cajan (L.) Millsp.] (Family: Fabaceae) is an important pulse crop which is cultivated with the cereal grains such as maize, millet and sorghum etc. In many developing countries pigeon pea is taken as a major source of protein

(21%) to the human population. In India, it is the IInd most important food legume crop which contributes about 80% of the global production. Due to global warming, production and productivity of pigeon pea are suffering by several biotic and abiotic stresses. There is a need to increase productivity per unit area and enhance the nutritional value of these pulse crops. To overcome this problem conventional breeding methods is not enough for fully In the technology of genetic success. transformation plant tissue culture is used for the regeneration plant material. Tissue culture can be applied for preservation of vegetative tissues when the targets for conservation are clones instead of seeds. Plant regeneration via callus formation has been developed in pigeon pea using two varieties as BDN-2 and GT-101. Techniques to develop drought resistance varieties through embryo culture and anther culture in past research of plant tissue culture have done in more crops e.g. datura, crucifers, linseed, tomato, tobacco, dahlias, but till now except pigeon pea research of plant tissue culture have not done in pulses. There is need to widen the genetic base and to incorporate desirable characters into pulses. So, plant tissue culture techniques could be beneficial.

Key words: Tissue Culture, Drought resistance, Genetic transformation

Abstract- PSRM-4/NCAPSR/148

RECENT TRENDS IN SEED INVIGORATION TECHNIQUES

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Quality seed plays a crucial role for good seed production and sustainable food security. Seed invigoration constitute physical, physiological and biological treatments of seed to overcome the problems related to germination by uniform plant stands, early emergence of seeds and better yields. Enhanced germination rates and high seedling vigour are possible due to reduction of emergence time by early start of

biochemical activities of hydrolytic enzymes and mobilization of resources. There are several mechanisms which play vital role in the tolerance of biotic and abiotic stresses like activation of antioxidants, reduced lipid peroxidation, etc. However, the knowledge on such mechanisms and other biological agents for seed treatments and availability of market for high quality seeds are some hurdles for seed

analysts and scientists. In this context, there is a need to reduce the factors which are associated with less vigour during seed production, enhance the seed longevity and handling and physiological, molecular seed research for delivery of quality seed delivery

over next generations. The idea of writing this review is to focus on the problems related to seed germination, seedling vigour and explore the recent advances in seed invigoration related to different seeds.

Keywords: seed, invigoration, longevity, vigour, physiology

Abstract- PSRM-4/NCAPSR/149

FERTIGATIONAL ASSESSMENT OF AGRO-INDUSTRIAL WASTEWATER AND CHEMICAL FERTILIZER ON SPINACH (SPINACEA OLERACEA LINN).

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A study was conducted for fertigational assessment of different rates of DWW and CF @ 200 Kg/ha along with equal quantity of FYM and control (BWW) separately for the cultivation of Spinacea oleracea. The results revealed that 10%DWW+FYM, 25%DWW+FYM, 50%DWW+FYM, 75%DWW+FYM 100%DWW+FYM had significant (P<0.01/0.1) effect on EC, pH, OC, Cl⁻, Na⁺, K⁺, TKN, P Ca²⁺, Mg^{2+} and SO_4^{2-}/MC , while insignificant (P>0.05) effect on BD and WHC. 100%DWW+FYM, decreased WHC (14.48%), MC (3.10%), BD (6.45%) and pH (9.33%) and increased EC (42.46%), Cl⁻ (88.84%), Mg²⁺ (1209.77%), OC (1807.76%), exchangeable Na⁺ (60.47%), available K⁺ (37.57%), Ca²⁺ (708.39%), TKN (798.28%), PO₄³⁻ (118.86%) and SO42-(39.15%), Zn (158.87%), Cu (215.16%), Fe (94.57%), Cd (125.00%), Ni (3840.00%) and Cr

(650.00%) in effluent irrigated soil. The better performance of the S. oleracea was increased from control to 25%DWW+FYM and decreased from 50%DWW+FYM to 100%DWW+FYM in comparison to control and CF+FYM. Appliance significantly (P<0.05) 25%DWW+FYM increased plant height, leaf width and leaf length. Root length, Chlorophyll content and crop yield was recorded to be significantly (P<0.001), while No. of leaves, F.wt. and D.wt. were recorded to be significantly (P<0.05) / (P<0.01) different with 25%DWW+FYM in comparison to other treatments. Hence 25%DWW+FYM acted as best fertigational assessment in the form of plant nutrients which provided fertility potential in the form of liquid dilutions fertilizer after appropriate enhancing the *S. oleracea* productivity.

Keywords: Distillery Waste Water, FYM, Fertigational Assessment, Chlorophyll Content

Abstract- PSRM-4/NCAPSR/150

ANTIMICROBIAL PRODUCING ACTINOMYCETES: A REVIEW *Priyanka Yadav*

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Actinomycetes are thread like fragments gram positive bacteria found in the soil. According to previous findings, there are about 85 isolates were collected from different part of Madhya

Pradesh, basically from Chambal Territory. The characterization and screening was done by scanning electron microscopy (SEM) and pigment diffusion ability of streptomycetes. Well

agar diffusion method and agar method applied to confirm the antimicrobial activity against various pathogens. 85 isolates showed diffusion ability and pigment producing ability in media and linear chain structure was confirmed by gram staining and SEM in actinomycetes. There are some previous researches showed that

actinomycetes showing antimicrobial activity and also useful in the chemical industry in the production of secondary metabolites. The idea of writing this review is to collect all the information regarding antimicrobial producing actinomycetes and will be helpful for microbiologist, pathologist, etc.

Keywords: Actinomycetes, Antimicrobial Activity, Streptomycetes, SEM, Characterization

Abstract- PSRM-4/NCAPSR/151

INFLUENCE OF MICRONUTRIENTS AND ORGANIC FERTILIZERS ON CAPSICUM Aashiq Hussain Bhat and Sachin Kishor

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Sweet pepper (Capsicum annum L.) is a member of family Solanaceae and genus capsicum. Tropical South America, especially Brazil is thought to be the original home of pepper. It is now widely cultivated in Central and South America, Peru, Bolivia, Costa Rica, Mexico, in almost all the European countries, Hong Kong and India. In India it is cultivated commercially in Tamil Nadu, Karnataka and Himachal Pradesh and in some parts of Uttar Pradesh. Now a day's production of capsicum decreases sharply due to due excessive use of chemical fertilizers and some climatic fertilizers. The excessive use of chemical fertilizers has hazardous effect on environment, soil health and human population. So, organic fertilizer is the key to improve the sustainability of agricultural farming system and soil productivity. Use of organic manures to meet the nutrient requirements of crop would be an inevitable practice in the years to come for sustainable agriculture since organic manures not only improve the soil physical, chemical and biological properties but also improve the moisture holding capacity of soil, thus resulting in enhanced crop productivity along with better quality of crop produce. Micronutrients play vital roles in the growth and development of plants, due to their

stimulatory and catalytic effects on metabolic processes and ultimately on flower yield and quality. Application of micronutrients viz., zinc, boron, magnesium and organics viz., vermicompost and FYM bring profound changes in various metabolic processes within the plant system thereby influence the yield considerably. In recent years, the roles of these micronutrients are gaining more importance particularly in capsicum to boost not only the productivity but also to improve the quality. Besides. vermicompost also contains significant quantities of nutrients, a large amount of beneficial microbial populations and biologically active metabolites particularly gibberellins, cytokinins, auxins and vitamins all of which have a beneficial effect on photosynthesis and translocation. In some studies, the organic manures increases the availability of nutrients, especially protein synthesis further it was suggested significantly increase in number of fruits and fresh, dry weight of fruit weight might have accelerated the mobility of photosynthetic from source to the sink which was influenced by the growth hormones which released from Vermicompost, the organic sources.

Key words: Capsicum, Micronutrients, Organic Fertilizers, Vermicompost, Zinc

PREPARATION OF NATURAL ORGANIC HERBICIDE/WEEDICIDE USING BLACK WHEAT HYDROLYSATE (GLUCOSE) AS THE SUBSTRATE

Anusha Manikonda^{1,2}*, KVSS Sairam², Abhishek Mathur²

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The different ranges of chemical herbicides across the globe are in use and have been utilized in modern agricultural methods in order to eliminate the target herbs and weeds. However, these herbicides may leave toxic residues in the soil and on the crop thus affecting the crop's health and destroy our natural ecosystem as well as the biome. Thus, there is a need to explore and identify natural agents which can be produced via natural fermentation process which can be utilized effective herbicide/weedicide. fermentation derivatives viz. organic acids produced by utilizing black wheat glucose as the carbon source with other nutrients and nitrogen sources can be utilized as the effective herbicides/weedicides. These organic acids will agricultural expenses cost to simultaneously will leave no toxic residues in the environment and on the crop system. Far from other available artificial herbicides, organic acids

biodegrade into more simpler forms and then to carbon dioxide and water; thus, it does not pose any threat to the environment. The studies are focused on the preparation of Propionic acids specifically from total organic acids content produced via fermentation. It is less caustic and corrosive than formic acid, another common herbicide. If proper formulation and respiratory protection are used, propionic acid (PA) does not cause any health hazards during application. Propionic acid can control both monocotyledonous and dicotyledonous plants and it is an effective pre-emergent and post-emergent herbicide. Utilizing black wheat may also results in generation of some effective compounds as well besides production of total organic acid content which may results in preparation of novel formulation that can be utilized as an effective herbicide/weedicide.

Keywords: Black wheat glucose/hydrolysate, fermentation, organic acids, propionic acid, herbicide, weedicide.

Abstarct- PSRM-4/NCAPSR/153

STUDY OF GROWTH PROMOTION AND PESTICIDAL ACTIVITIES OF CURCUMIN BASED SILICA NANOPARTICLES AGAINST COMMON PESTS INVADING COTTON CROP Akshma Koul*1,2, Abhishek Mathur², KVSS Sairam², Anusha Manikonda²

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Silica is a dominant and abundant natural molecule found in earth crust. It is also available as phytoliths in the plants/crops. It is a super growth supplement for the crops maintaining the internal strength and rigidity in the crops. Silica creates strong cell wall which leads to stronger and bigger branches and stem responsible for uptake and absorption of more water, nutrients and plant secretions throughout the plant body,

facilitating faster growth rate and stronger plant. Silica enables the proper development of over all growth of crops and maintaining the fruits health and rigidity within it. Silica enables enhanced metabolic function, showing higher concentration of chlorophyll in leafy tissues. It also enables better use of CO2 and higher rate of photosynthesis. Silica accelerates synthesis of protein and starch, increasing brix level in plants.

Silica activates at least 60 different enzymes involved in plant growth. In the present investigation, silica solubilizing bacteria (SSB) were utilized in suitable media formulation using Silica as one of the major compositions. SSB degrades the silica in the media composition releasing the blend of silica nanocomposites, some growth factors, proteins and plant responsible for enhancing hormones sustainable agriculture and productivity. Curcumin is a bright yellow chemical produced by plants of the Curcuma longa species. It is the principal curcuminoid of turmeric (Curcuma longa), a member of the ginger family, Zingiberaceae. It is sold as an herbal supplement, cosmetics

ingredient, food flavoring, and food coloring. It is a strong antimicrobial, antioxidant and anti-inflammatory agent. The significance of this molecule was utilized to develop antimicrobial agents against phyto-pathogens. The study utilizes the preparation of blended composite of Silica and Curcumin to develop unique formulation which was tested on cotton crop in assessing growth promotion activities and pesticidal activities on cotton crop. The results were found to be effective and significant as there were promising growth promotion activities on cotton crop and reduction in percent population of boll worm.

Keywords: Silica, Biogenic silica, silica nano-composites, silica solubilizing bacteria, Curcumin, Silica-curcumin nanocomposite, growth promotion activities, pesticidal activities, cotton crop.

Abstract- PSRM-4/NCAPSR/154

PHYTOCHEMICAL ANALYSIS, ANTIBACTERIAL AND ANTIBIOFILM EFFICACY OF *TINOSPORA CORDIFOLIA* EXTRACTS

Akshat Srivastava, Minakshi Rajput

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Infections related to hairs and scalp are one of the major current concerns as they are the main reason of hair damage and loss. In this behalf, many antimicrobial drugs available in market suffer from the resistance of pathogenic strains. Antimicrobial resistance stems from a number of factors, including inappropriate and excessive use of antimicrobial drugs. Therefore, the need for new antimicrobials have been dramatically increasing and medicinal plants are considered as one of the most promising sources for the discovery of new antimicrobial compounds. In this context the present study aimed to evaluate the phytochemical analysis, antimicrobial antibiofilm potential of *Tinospora cordifolia* (Giloy) extracts. Aerial parts of T. cordifolia were used for the extraction in three different solvents namely petroleum benzene, ethyl acetate, and distilled

water by Soxhlet apparatus. All the extracts were analysed for the presence of several phytochemicals such as alkaloids, phenolics, flavonoids, carbohydrates, terpenoids, amino saponins, and tannins etc. antimicrobial activity of the extracts was carried out by agar well diffusion method and minimum inhibitory concentration (MIC) were determined by and broth dilution method. Ring test assay and microtiter plate method was applied to determine the antibiofilm potential or to evaluate biofilm inhibitory concentration (BIC) of the extracts. The present investigationopens a new avenue for its phytoconstituents of T. cordifoliaextract as antimicrobial and antibiofilm agent and it can further be applied in pharmaceutical compositions or precursors for the synthesis of new antibiotics.

IMPORTANCE OF GEOGRAPHICAL INDICATIONS Ayush Kumar

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Geographical indications (GI) are a sort of intellectual property (IP) protection that links items to a specific location. The GI tagging is applied in such a way that the commodity's quality, reputation, and other distinguishing characteristics are linked to its origin. A product's GI tag can only be utilized by legitimate users and residents of the country of origin. Agricultural products, handicrafts, textiles, manufactured goods, foodstuffs, and other items can all be given GI tags. A geographical name, a figurative depiction, or a combination of the two may be used as the supplied GI tag. The geographical origin of a product should be conveyed via the tag it is given. GI has a critical role in supporting biodiversity protection among rural populations. In 1999, India established the Geographical

Indications (GI) of Commodities (Regulation and Protection) Act, which made it easier to register and defend intellectual property in the context of goods. "Geographical Indication in relation to goods, means an indication that identifies such goods as agricultural goods, natural goods, or manufactured goods as originating manufactured in the territory of a country, or a region or locality in that territory, where a given quality reputation or other characteristic of such good is essentially attributed to its geographical origin, and in case such goods are manufactured goods, means an indication that identifies such goods as agricultural goods, natural goods, or manufactured originating aoods as manufactured in the territory.

Abstract- PSRM-4/NCAPSR/156

RESPONSE OF INTEGRATED NUTRIENT MANAGEMENT ON GROWTH AND YIELD OF WHEAT (Triticum aestivum L.)

Anne Leij and Harendra Singh

Hemvati Nandan Bahuguna Garhwal University Srinagar, Garhwal

A field experiment entitled "Response of Integrated Nutrient Management on growth and yield of wheat (*Triticumaestivum L.*)" was conducted during Rabi season of 2018-19 at Agriculture Research Farm of Department of Agronomy, School of Agricultural Sciences, BFIT Group of Institutions, Suddhowala, Dehradun (Uttarakhand) with the objectives To study the effect of integrated nutrient management on growth parameters of wheat and to study the effect of integrated nutrient management on yield and yield attributes of wheat. The treatment was laid out in Randomized Block Design (RBD) with 9 treatments. The treatment were: T₁Control (No treatment),T2:50% RDF NPK,T3:50% RDF + FYM @5.5 t/ ha + PSB @ 10g/kg of seed + Azotobacter @ 10g/kg of seed, T₄:75% RDF + FYM @5.5 t/ ha + Azotobacter @ 10g/kg of seed + PSB @ 10g/kg of seed,T5:100% RDF + FYM @5.5 t/ ha + PSB @ 10g/kg of seed + Azotobacter @ 10g/kg of

seed.T₆:50% RDF+ **PSB** 10a/ka PSB @ seed,T₇:75% RDF + 10g/kg seed,T₈:50% RDF + Azotobacter @ 10g/kg of seed + PSB @ 10g/kg of seed, T₉:75% RDF +Azotobacter seed treatment + PSB @ 10g/kg of seed + 2% urea spraying replicated thrice having gross and net plot size 5.4 m x 3.6 m and 3.6 m x 2.7 m, respectively. Variety Pioneer 3242 of wheat was sown on 9th November, 2018 from the result it can be concluded the growth factors viz. Plant height (cm), number of tillers per m row length, Dry matter accumulation (g). Seed yield parameters viz. Spike length (cm), number of grains/spike etc. was recorded in highest in treatments T_5 -100% RDF + FYM @5.5 t/ ha + PSB @ 10g/kg of seed + Azotobacter @ 10g/kg of seed showed significantly highest grain yield and biological yield. Whereas the lowest grain, straw and biological yield recorded in treatment T7-75% RDF + PSB seed treatment.

IMPACT OF SHIFTING CULTIVATION ON SOIL CHARACTERISTICS AT CHHINGCHHIP VILLAGE, MIZORAM R. lalnungrenga¹, Girish Chandra², M. Sankar³

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Shifting cultivation is a practice which consists of cyclic nature, under which selection of fields usually on hills slopes is done and clearing the land by cutting down the jungle (December-January), drying and burning the dry debris (March-April) on which seeds of different crops are sown by dibbing or broadcasting before the onset of rain is carried out. Shifting cultivation causes deforestation, loss of soil nutrients. The clearing of forest areas at regular and frequent intervals for shifting cultivation results in the loss of primary forests and formation of secondary forests and then to degraded wastelands. Mizoram is one of the states in North East India which is rich in biodiversity and also is composed of steep slopes and hilly terrain and receives a high amount of rainfall every year. The majority of the population depends on shifting cultivation for their livelihood generations. The length of fallow period has been significantly reduced to 7 years which lead to decline in soil fertility and huge loss of nutrients that erodes every year.

Here the area is divided into 4 treatments based on years such as T1- 0-2 years, T2 - 2-4 years, T3 – 4-6 years, T4 – Normal Forest (Control), T1 is the area where Shifting cultivation is being carried on, T2&T3 are fallow lands. In each treatment there are 4 depth increments such as Depth 1 which is 0-10cm, Depth 2 - 10-20cm, Depth 3 - 20-30cm and Depth 4 - 30-50cm. On the basis of soil analysis recorded that the pH value (5.43) is highest in T2 of Depth 2, the Electrical Conductivity (0.08 dS/m) is highest in T2 of Depth 1, the Soil Organic Carbon (2.67%) and Soil Organic Matter (4.61%) is highest in T4 of Depth 1, the Nitrogen (378.98 kg/ha) and Phosphorus (28.8 kg/ha) is highest in T4 of Depth 1 and the Potassium (391.17 kg/ha) is highest in T2 of Depth 1. On the basis of the findings it is concluded that the organic carbon and organic matter are the higher in normal forest (Control) with nitrogen and phosphorus hence that gives the best soil. So, results indicated that need to stop the shifting cultivation to prevent soil fertility

Abstract- PSRM-4/NCAPSR/158

PERSPECTIVE OF MAIZE INTERCROPPING WITH MANGO AND TEAK Sameer Mohapatro¹, Sandeep Rout² and Pragnya Pramita Mishra³

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The importance of agroforestry models in agricultural sector has been more because it promotes and increases the land utilization ratio in farmers' field. The time period before the approach of intercropping of commercial crop with Agroforestry, intensively focused on monoculture system. Mango forms a potential component in many Agroforestry systems. Mangoes are planted at wider spacing for higher fruit yields and provide ample scope for intercropping. Mango based agri-horticultural

systems have improved land use systems both economically and ecologically. Yields of maize under established teak when the spacing between trees exceeded 8 m. Increased initial stocking rates for teak could increase the growth rates of teak, improving individual tree volumes and potentially reducing time to commercial harvest. Keywords: Agroforestry, Mango, Teak, System.

PSRM-4/NCAPSR/159

GENETIC DIVERSITY ANALYSIS OF COMMON BEAN (*PHASEOLUSVULGARIS* L.) COLLECTED FROM NORTH WEST HIMALAYAFOR AGRO-MORPHOLOGICAL TRAITS

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Understanding of genetic diversity among the genotypes is the mainstay of plant breeding. The present study was carried out to determine genetic divergence among 59 common beans genotypes collected from North West Himalaya for nine agro-morphological traits. The analysis of variance depicted significant variability among genotypes for all the traits under study indicating wide range of variability present in bean genotypes. The phenotypic coefficient of variation (PCV) and genotypic coefficient of variation (GCV) was high for seed yield per plant followed by days

to bud initiation. High heritability was also observed for all traits except pod length. Cluster analysis grouped bean genotypes into five distinct clusters. The genotypes under group II, III, V have more number of pods per plant, seeds per pod and single plant yield which can be utilized as potential donors for enhancing the yield of other genotypes in breeding programmes. Hence, the selection based on these yield contributing traits may helpful in future crop improvement programmes.

Key words: genetic diversity analysis, morphological attributes, common bean, Phaseolus vulgaris L.

Abstract- PSRM-4/NCAPSR/160

CHARACTERIZATION OF NODULAR *RHIZOBIUM* STRAINS COLONIZED WITH LEGUMINOUS FOREST PLANT SPECIES OF HIMALAYAN REGION

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A studywas conducted to isolate and characterize the Rhizobacteria from root nodules of leguminous plant species from different sites of Uttarakhand (Dehradun, Shri-nagar, Uttarkashi, Rudraprayag, Almora, Nanital and Udhamsingh Nagar). A total of 10 bacterial isolates were isolated from root nodules of leguminous plant species on YEMA (Yeast Extract Manitol Agar) medium after 48 hours, the colonies of the bacteria were observed. Isolated strains of Rhizobacteria were identified on the basis of authentication tests like Congo red test, Bromothymol blue test, starch digestive test, Ammonium production test, MR-VP test and motility test etc.. On the basis of morphological properties, all the isolates were found to be round, creamishand white in colourwith raised elevation and smooth surface and highly mucous producingRhizobia. Gram's reaction revealed that they were pink in colour, rod-shaped and cocci in shape, indicating that these were Gram negative bacteria in nature. Acacia catechu nodule was

dark brown in colour and circular in shape, while Erythrinavariegata and Erythrinablackei nodules are white in colour and semi-globular in shape. The Cyanmethemoglobinmethod was used to test Leg-haemoglobin in all root nodules. Leghaemoglobin was found in all nitrogen-fixing nodules. As a consequence, the colourof nodules due to the presence of Leg-haemoglobin can be used to determine its nitrogen fixation activity. Leg-haemoglobin content was high in the root nodules of FRI/ASR/AC-1 and FRI/RAI/AC-4, with absorbance values of $2.68(\mu g/mg)$ and 2.45(µg/mg), respectively. As a result of this study, it will provide basis for further research on the phylogenetic analysis of Rhizobium strains that nodulate leguminous forest plant species as well as their inoculants application as a potential biofertilizer to improve growth and nitrogen fixation ability of leguminousforestplant species in nursery. The work on this aspect is under progress in the laboratory.

Key words: Cyanmethemoglobin, Leg-haemoglobin, Nodules, Rhizobacteria.

EFFECTOF VERMIWASH ON AGRICULTURAL CROP PRODUCTION Pardeep Singh¹ and Adit Singla² RIMT University, Mandi Gobindgarh Punjab pardeepbhaika.111@gmail.com

Now days due to indiscriminate use of chemicals fertilizers as well as pesticides, modern agriculture is totally affected, due to increasing demand of food there is no doubt it will be increased as per time. Soil, water, and inputs they are basics necessities for the successful crop production, by the introduction of green revolution production of food grains is easily achieved but not healthy food, farmers basically focusing on maximum output rather than quality, as I have studied many research work on different crops which shows organic manures can also increase the yield of various crops, actually not focusing on crop yield behind this it also ameliorate the soil properties along with quality of produce.I know there are various organic manures are available but I want to talk about the Vermiwash, which is basically ignored. There are several organic fertilizers in the form of Vermicompost and Farm yard manure that have been applied producing

phenomenal increase in yield and quality. Recently the use of Liquid fertilizers given in the form of foliar sprays has gained tremendous importance. The advantages of using the liquid fertilizer, has increased the need for the production of several such materials & to be used as foliar sprays. Vermiwash in a liquid fertilizer used in organic agriculture both as replacement and supplement for solids and for their unique capacity to provide effective and quick nutrients Vermiwash generally used as a foliar spray, is a liquid biofertilizer collected by the passage of water through a column of worm activation. In recent years many studies have reported that Vermiwash as foliar spray which was effective for growth. There are reports by Lalitha et.al. (2000), Zambare et al. (2007), Ansari and Ismail (2001) and Shiva Subramanian and Ganeshwar (2004) for the effectiveness of Vermiwash as a biofertilizer helpina in organic farming.

1st Plant Science Researchers Meet - 2018 28th January, 2018

Venue: Town Hall Auditorium, Dehradun, Uttarakhand, India



2nd Plant Science Researchers Meet - 2019 16 & 17 February, 2019

Venue: Uttarakhand Technical University (UTU), Sudhowala, Dehradun, Uttarakhand, India



3rd Plant Science Researchers Meet – 2020 26 & 27 September, 2020

Venue: Plantica Foundation, Dehradun, Uttarakhand, India



4th Plant Science Researchers Meet - 2021 20 & 21 November, 2021

Venue: Uttaranchal University, Premnagar, Dehradun, Uttarakhand, India

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