Association of Plant Science Researchers – (APSR)

Abstract and Souvenir

2nd Plant Science Researchers Meet (PSRM) - 2019

National Conference
On Climate Change: Plants People and Planet

16th & 17th February, 2019

PPP
Plants People Planet

Organized by

PLANTICA

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And

Shivalik College of Engineering
Dehradun, Uttarakhand

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श्री देव सुमन उत्तराखण्ड विश्वविद्यालय

बादशाहीथौल, टिहरी गढ़वाल, उत्तराखण्ड–249 199

Sri Dev Suman Uttarakhand Vishwavidhyalaya

Badshahithaul, Tehri Garhwal - 249 199

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Dated : 30 / 01 / 2019

Message

It is matter of immense pleasure that PLANTICA – Journal of Plant Science published by Association of Plant Science Researchers, Dehradun and Shivalik College of Engineering, Dehradun jointly organizing two days National Conference on "Climate Change: Plants People and Planet" on February, 16th and 17th 2019 under 2nd Plant Science Researchers Meet (PSRM) – 2019.

It is very inspiring and at the same time heartening to see the tremendous response received by the conference from the research community. This conference would offer a broad platform for researchers and students of the nation. Being one of the descriptive, predictive and observative fields in nature the context of Plant Science can be well implicated by experimentation, further augmenting the continuum of research and achievements with scientific learning and practices. The organizers have chosen a very interesting topic for deliberation as research and development in plant sciences are important means in day to day life for humans, animals as well as environment. It is supported by a large technically sound and talented pool and with tremendous opportunities of growth in Agriculture, Environment and public sector. It has an amazing potential in a developing economy.

Organizing an event does not come without an effort. It requires vision, mission and hard work of various minds. I extend my heartfelt regards to the Organizing Committee and students for their concerted and enthusiastic contribution towards the success of this prestigious event: 2nd Plant Science Researchers Meet – 2019.

Congratulation and Best Wishes

(Dr. U. S. Rawat)
Vice Chancellor

Dr. R. K. Arora
M.Sc., Ph.D., ARS
Ex- Principal Scientist
CPRI – Indian Council of Agricultural Research

Message

It is pleasure to know that PLANTICA – Journal of Plant Science published by Association of Plant Science Researchers, Dehradun and Shivalik College of Engineering, Dehradun jointly organizing two days National Conference on "Climate Change: Plants People and Planet" on February, 16th and 17th 2019 under 2nd Plant Science Researchers Meet (PSRM) – 2019.

This is 2nd PSRM and the theme of 2nd PSRM – 2019 is Climate Change: Plants, People and Planet. Climate change is one of the major global challenges of the 21st Century, and key priority of United Nation's Framework Convention on Climate Change (UNFCCC). Human impact on climate system is more explicit. Scientists, researchers and academicians have fully realized that the present pace of rising global temperature is a serious matter of concern and needs to be mitigated to save the living planet. It has many reasons to be concerned about the climate change. Indian agriculture being a gamble of monsoon is very sensitive and vulnerable to climate change and variability. It faces the dual challenge of teeming more than a billion people in changing climate and economic scenario. The major manifestations are realized in the form of crop failure, low yields and adversely affected lives and livelihood of people.

The proposed theme addressing one of the burning issue of the globe, which is a centre of debate and discussions among the climatologists, earth scientists, geographers, geo-spatial researchers, social scientists, academicians, planners and administrators to find out plausible measures to mitigate and adapt in accordance with climate change and to orient the resilient path of development.

I wish that research scholars, faculty members and industry experts will have an interactive and learning experience as part of this conference. I congratulate organizing team for their initiative and efforts.

(R. K. Arora)

Ajay Kumar

Vice Chairman
Shivalik College of Engineering
Dehradun, Uttarakhand, India

Message

It is matter of immense pleasure for me that PLANTICA – Journal of Plant Science published by Association of Plant Science Researchers, Dehradun and Shivalik College of Engineering, Dehradun jointly organizing two days National Conference on "Climate Change: Plants People and Planet" on February, 16th and 17th 2019 under 2nd Plant Science Researchers Meet (PSRM) – 2019.

It is my great pleasure to welcome all the participants in the 2nd PSRM- 2019 at UTU Campus, Dehradun, India. The conference offers a broad platform for the students, academicians and researchers to share their thoughts, knowledge, ideas and experience in the diverse fields of Plant Science. It is venture of joining hands towards the recent discoveries in the field of climate change and plant science.

I feel great to receive the participation of the distinguished speakers, professors, researchers who will be delivering keynote speech and invited talks. I also wish to extend my sincere appreciation to the faculty members of Department of Agriculture, Shivalik College, Dehradun for putting in their unfeigned efforts in organizing this conference.

I firmly believe that the deliberation and interaction during conference will be beneficial, stimulating, productive and encouraging to the researchers and participants. I would like to wish for a very successful conference, which hopefully besides the hard work will be a fiesta of science, celebration of knowledge and a cheerful forum of wisdom.

Ajay Kumar)

(Ajay Kumar)

Prof. (Dr.) D. P. Gupta

Director
Shivalik College of Engineering
Dehradun, Uttarakhand, India

Message

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I am extremely delighted to invite all the eminent speakers, invitees, delegates and dear students on the 2nd Plant Science Researchers Meet – 2019. This conference is exceptional in all respects because it is an effort to bring together the leading scientists and scholars in scientific disciplines to discuss the climate change and plants science from the perspective of 21st century.

I am happy to receive the participation of the distinguished speakers, professors, researchers who will be delivering keynote speech and invited talks. I also wish to extend my sincere appreciation to the faculty members of Department of Agriculture, Shivalik College, Dehradun for putting in their unfeigned efforts in organizing this conference.

Once again I welcome you all on a very cordial note to this National Conference on Climate Change.

(Dr. D. P. Gupta)

Pankaj Chaudhary

Joint Director and Dean (Academics)
Shivalik Group of Institutions,
Dehradun, Uttarakhand, India

Message

It is matter of great pleasure that PLANTICA – Journal of Plant Science published by Association of Plant Science Researchers, Dehradun and Shivalik College of Engineering, Dehradun jointly organizing two days National Conference on "Climate Change: Plants People and Planet" on February, 16th and 17th 2019 under 2nd Plant Science Researchers Meet (PSRM) – 2019.

I am sure that interaction of expert speakers of renowned counterparts will go a long way in knowledge sharing to help students and researchers to grow and to compete globally. This event will provide a common platform for the plant science researchers of all the specialties to share information, explore collaboration and to identify future needs of our country in different aspects of climate change and plant science.

Such kinds of platforms are specifically designed to provide an innovative platform to researchers and scientists. The members of the organizing committee need special mention for their untiring efforts in this event. I extend my greetings and good wishes for the success of this conference.

(Pankaj Chaudhary)

Dr. Anoop Badoni
(M. Sc.-Ag, Ph.D., FAPSR, FMSTC, MSFSN)

Dean – Agriculture – Shivalik College
Founder President – APSR
Editor – In – Chief: PLANTICA
Convener: 2nd PSRM – 2019

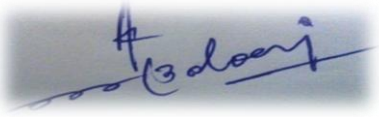
Message

It is an immense pleasure to us to organize two days National Conference on "Climate Change: Plants People and Planet" on February, 16th and 17th 2019 under 2nd Plant Science Researchers Meet (PSRM) – 2019 in association with Shivalik College of Engineering, Dehradun and International Journal of Pharmaceutical Sciences and Research published by Society of Pharmaceutical Science and Research.

Almost all our gains in the field of science and technology, industries, agriculture and means of transportation and communication had so far been realized at the cost of our health and environment. Climate change is one of the complex problems facing mankind today which is attributed to the burning of fossil fuels, deforestation and agri-business activities emitting Green House Gases in to the atmosphere and threatening to the ecological balance. If we fail to maintain the ecological balance at the moment, it would be too late tomorrow. Keeping this point in mind we have choose the topic Climate Change and feel great that we have received more than 200 papers from all over India.

On behalf of Organizing Committee of 2nd PSRM -209 and on my personal behalf I would like to welcome all distinguished scientists, researchers and students and thank them for participation in the conference. With this I would like to express my special thanks to Mr. Ajay Kumar Ji, Vice Chairman, Shivalik College for encouragement and provide support to conduct this conference.

Thanks to all members of APSR, Editorial and Advisory Board of PLANTICA, Faculty Members of Department of Agriculture, Shivalik College, Students and all participants to support us by your valuable suggestions, research and time.



(Dr. Anoop Badoni)

National Conference
On
Climate Change: Plants People and Planet

Abstract and Souvenir

2nd Plant Science Researchers Meet (PSRM) – 2019
National Conference on Climate Change: Plants, People and Planet
16th & 17th February, 2019

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Content:

Key Note Address – 1

EFFECT OF CLIMATE CHANGE IN POTATO CROP

Dr. R.K. Arora
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Climate change is likely to have a significant effect on potato growth, seed multiplication and processing sectors affecting its production and thereby profitability of the farmers**.** According to a simulation study all India estimates of production showed a decline in production by 3.16 and 13.72 % in the year 2020 and 2050, respectively though some states in northern India will show an increase in yield. Climate change is likely to bring an increase in ambient temperature which can influence behaviour, distribution, development, survival and reproduction of pests and diseases. The rate of multiplication of most of the potato viruses is expected to rise with the increase in temperatures. In sub-tropical plains, the major seed producing areas, the increase in temperature will allow early appearance of the aphids as well increase in their population. This could reduce the favourable period required for seed production. Number of insecticide sprays for keeping the vector population in check could also increase reducing profitability besides causing environmental pollution. In order to meet the challenges posed by the climate change, there is an imminent need to develop multipronged strategies which may include development of early bulking, heat tolerant and virus resistant varieties. Regular monitoring of population of potato pests, changes in their population, pest forecasting, rescheduling of sprays based on distribution of new pathogen population and following IPM measures strategies to cope with the effects of climate change.

Key Note Address – 2

THE AFFECTS OF CLIMATOLOGICALLY HAZARDS ON CROPS, GROUND WATER, FOREST ECOSYSTEM AND FLORA & FAUNA OF UTTARAKHAND HIMALAYAS

Dr. J.S. Chauhan
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This articles present an over view of climate change impacts on crops, pollinators, ground water, and forest ecosystems in Uttarakhand Himalayan Mountains based on literature review. The rising global temperatures have altered plant phenology such as flowering, germination and senescence. Increased temperatures can have a variety of effects on the physiology of flowering plants that are likely to influence plant interactions with pollinating insects. Pollinators, too, are susceptible to many changes as a direct result of climate change which could also affect the life span of pollinating insects. Elevated temperatures have been found to have varying effects on flower production. The production of floral scent, nectar, and pollen can also be affected by temperature. Many insect taxa obtain nectar from flowers to fuel their flight and metabolic activity; many insects also rely on floral resources, especially pollen. Climate change not only has an effect on crop species; it also affects weeds, insect pests, and crop diseases. Weeds already cause about 34% of crop losses with insects causing 18% and disease 16%. Other large-scale environmental changes, such as nitrogen deposition and altered precipitation regimes, have also been linked to changes in plant phenology. Declining diversity contribute to rising global temperatures. Changing climate can interfere with healthy soil life processes and diminish the ecosystem services provided by the soil, such as the water holding capacity, soil carbon, and nutrients. Future generations face an environmental "time bomb" as the world's groundwater systems take decades to respond to the present day impact of climate change because ground water is the largest source of freshwater on the planet and more than two billion people rely on it to drink or irrigate crops. It is slowly replenished through rainfall—a process known as recharge—and discharges into lakes, rivers or oceans to maintain an overall balance between water in and water out. It is predicted that by 2050 about 64% of the developing world and 86% of the developed world will be urbanized. Apart from this weather and climate are the most important factors influencing fire activity and these factors are changing due to human-caused climate change.

It seems that human interference in natural buildup has a remarkable influence over climate of the region. The population shift fast from rural to urban residency along hill regions have potentially contributed to temperature increase, and intensifying infrastructure development activities have disturbed the climatic balance of the Uttarakhand state which is quite visible in form of more frequent climatological hazards hitting the state day by day. There is a compelling requirement to adopt eco-friendly development schemes for this climate sensitive region and to monitor and synchronize the urbanization and settlement growth along fragile areas.

Key Note Address – 3

APICULTURE: AN EFFECTIVE TOOL IN PRODUCTIVITY ENHANCEMENT OF CROSS POLLINATED CROPS

Dr. A. K. Karnatak
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Apiculture is concerned with the practical management of social species of honeybees. Honeybees are the prominent pollinators of agricultural and horticultural crops. They contribute to more than 80% of all the pollination of cultivated crops. About 15% of the principle crops are pollinated by domestic bees and 80% by the wild bees. Pollination is important for the reproduction of the plants to produce seeds. Unlike the self - pollinated crops most of the cross pollinated crops utilize live agents (mostly honeybees) to aid this transfer of pollens. Pollination of crops by honeybees not only results in higher crop yield but it also gives a better quality of produce. Besides, it also increases the oil content in oil seed crops. Honeybee belongs to genus *Apis* and family Apidae. Honeybees mainly *Apis cerana* (European honeybee) and *Apis mellifera* (Indian honeybee) which are practically managed in hives play a major role in increasing crop productivity. The honeybees are the most adapted creatures for pollination purpose. Their body size and proboscis length suits them to forage. They have evolved numerous adaptations which makes them the most efficient pollinators. Basi tarsus and tibia of foreleg are modified into antenna cleaning structures. Tibia of middle leg bears a short spur or wax pick used in removing wax plates and scrapping pollen basket of hind leg. The third pair of leg of honey bee has pollen basket or corbicula and is therefore modified for pollen collection. Among the three castes of honeybee (Queen, Workers and Drones) workers are the main foraging bees making about 19,000 trips per day for pollen and nectar collection. The bee is capable of carrying pollen loads of 26-35 % of its body weight. Moreover, the communication system of honeybees is highly advanced enabling them to communicate among themselves in the form of dances (round dance and wagtail dance) about the source of pollen and nectar, its distance and direction from the hive. The domesticated species of honeybees are maintained, fed and transported by beekeepers. Besides honeybee various other bees such as *Trigona iridipennis* (stingless bees) in India are also domesticated and used for pollination. The colonies of honeybees can be moved to crops needing pollination. For pollination of crops, Italian bee is used @ 3 colonies/ ha and Indian bee @ 5 colonies/ ha although it differs from crop to crop. The quality pollination by honeybees can be achieved by four ways such as by placing strong bee colonies, having large amount of unsealed brood in the colonies kept for pollination and finally the colonies must be pests and disease free. Stress should be given on keeping the colonies in the vicinity of the crops at the time of 5-10% flowering in crops to bring about effective pollination.

In addition to pollination services, honeybees are the best source of income generation to the farmers by providing the produce like honey, bee wax, propolis, bee venom and royal jelly. Bees can pollinate flowers of various plants such as mustard, rapeseed, okra, onion etc. However, they restrict themselves to a single source of pollen or nectar until it is exhausted called royal fidelity. The period when a good number of plants have nectar is called a honey flow period while when there is no honey flow it is known as dearth period. If nectar secreting plants are available in large numbers with short or no dearth period in a locality, then beekeeping can be successful in such a place. In recent years, there has been a decline in the honeybee population due to pests, diseases, indiscriminate use of pesticides leading to colony collapse disorder etc. This reduced bees population has lead to reduced pollination followed by decline in crop productivity. Thus, it is important to conserve the honeybee population. This can be further achieved by habitat conservation, using safer pesticides; promoting organic farming will also help in conserving pollinators. Selection of a flower variety that provides blooms continuously throughout the growing season will ensure the regular return of pollinators. Spraying the crops with certain pollinator attracting pheromones can also be exploited for this purpose. Moreover, promotion of integrated pest management will also have positive effects. Formulation of policies to include pollination as an input in agriculture is a must to maximize productivity in cross pollinated crops.

Key Note Address – 4

PLANT BIODIVERSITY WITH ETHNO-MEDICINAL VALUES IN PALAMU DIVISION OF JHARKHAND

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India has a vast biodiversity of 45000 plant species and 7500 medicinal plant species growing in 16 agro climatic zones under 63.7 million hectares of forest cover.Indian (Indigenous) system of Medicine is based on use of traditional medicinal knowledge of plant biodiversity. About 65 per cent of world population has access to traditional system of medicine with local medicinal plants whereas 70 per cent of rural population is struggling to access and afford modern allopathic medicines. Jharkhand state is the hot spot of biodiversity in eastern India having 29.2 per cent area under forest. The Garhwa district of Jharkhand is primarily rural and most of the population resides in villages. Tribal population of the district still leaves in the forest areas.Out of 13 lakhs of total population of the district, 19.9 per cent is tribal population.A huge biodiversity provides multidirectional service to backward peasantry of the district. It proves to be a precious gift of god for People as they seek food, fodder, fuel and pharmaceutical aids from this biodiversity in forest. The healing power of traditional herbal medicines has been realized since antiquities. About 34 per cent of all pharmaceutical preparations come from higher plants and it goes to 60 per cent when bacteria and fungi are taken in to account. In Jharkhand, collection and documentation of traditional knowledge of medicinal use of plant species is utmost important in view of establishing relation between Indigenous System of Medicine (Ayurveda, Homeopathy) and tribals'/ traditional knowledge (Horopathy, Mundari system). The study was done for developing inventory of Indigenous Technological Knowledge (ITKs) on plant biodiversity during 2008-2010. Some live samples and photographs were also collected as per the identification made by the respondents. Complete documentation of 67 plant species belonging to 37 familieswas done. Regarding habit and habitat of the plant biodiversity, most of the plants of medicinal use are trees and shrubs occurring in forests or villages. Annual herbs of medicinal importance mostly occur in cultivated or fallow lands where as climbers, perennial grasses and parasitic epiphytes occur in forests. In this investigation, traditional knowledge on medicinal value of 31 tree species, 9 shrubs, 20 herbs, 4 climbers, 2 perennial grasses and one parasitic epiphyte have been studied. The available biodiversity was found to be frequently used in ailment of gynecological and physiological problems like gonorrhea, leucorrhoea, vomiting, diarrhea, dysentery, bone fracture, strengthening of gums, diabetes, abdominal complaints, malarial and typhoid fevers, cough and cold, snake and scorpion bite, rheumatism etc. in human and in cure of different infectious diseases and wounds of animals. The mode of administration varied from decoction, extract, infusion, powder, paste and poultice to combination with other plants. Many plants were administered locally and others orally. As far as plant parts in use are concerned, roots, bark, leaves, and fruits are taken for external as well internal use for ailment. Many species which were sometimes abundant in the forests and even in waste landsof Garhwa are facing danger of extinctiontoday. For example, *Asparagus racemosus* (Satawar), *Tinosporacordifolia* (Giloe), *Withaniasomnifera* (Aswagandha), *ucunaprurita* syn. *M. pruriens* (Kawanch), *Curcuma amada* (Amahaldi), *Curcumaangustifolia* (Tikhur) and *Hemidiscusindicus* (Anantmool, chhotidudhi). Some plant species occur gregariously growing viz., *Butea monosperma* (Palas), *Acacia catechu* (Khair) encroaching the cultivated lands.

Key Note Address – 5

THE CHALLENGES IN DOUBLING FARMERS INCOME IN UTTARAKHAND

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Uttarakhand is a largely rainfed hilly state where irrigation facilities are minimal, land holdings are small and fragmented, with a predominance of wastelands and forests. Crop yields are low and there is a lack of effective marketing infrastructure and pricing. In addition, there is a lack of availability and accessibility to agricultural inputs and the knowledge/information about suitable and remunerative crops and scientific management practices is scanty. Uttarakhand has just 14% of the total land under cultivation and more than 70% of population depends on agriculture for their livelihood. The average size of holding in the state is around 0.98 hectare. The contribution of agriculture to the state's domestic product is about 22.4 per cent. Despite the small holdings most of the farmers who have access to the market and have adequate irrigation facility have opted for a shift in production from low value food-grains to high value commercial crops particularly vegetables and pulses. Productivity across the same crops differs greatly between the hills and plains. There is a huge divide in the productivity of hill and plain areas of the state and the productivity of wheat in the Uttarakhand hills is approx. 13.47 quintals/hectare, while in the plains it is about 37.94 quintals/hectare. For rice the figures stand at approx. 14.15 quintals/hectare in the hills and 31.56 quintals/hectare in the plains. Fingar millet is one of the major crop of Uttarakhand and productivity of finger millet is 1402 Kg/ha but for Tamil Nadu its 3013 Kg/ha followed by Karnataka 1685Kg/ha and Indian average productivity is 1601 Kg/ha. the productivity of Barnyard millet is also below the South Indian states. Agricultural incomes need to be doubled, but can it be done for a sector whose growth has always been below the government projected targets. Many experts have doubted the claims of doubling the farmers income by 2022-23. This is primarily because agricultural growth in the post-reform period, barring a few exceptional years, has been stagnant and has historically failed to meet the target set by the government. Farmers have regularly raised many points and these points seek and need attention of the political class, bureaucracy and the scientific community. These are raising productivity, reforming land policies and solving the remunerative price mess. The measures proposed are in the right direction if the farmers' incomes have to be doubled. The five point action plan includes the following measures: 1) Remunerative prices for farmers by reforming the existing marketing structure; 2) Raising productivity; 3) Reforming agriculture land policy; and 4) Relief measures ; 5) use of natural resources of the state (forestry etc). Since agriculture is dominated by marginal farmers in Uttarakhand who have small holdings, raising productivity is likely the single most important factor if incomes of this group are to be doubled. But here also there are many challenges. First of all, on the one side resources like water and land are limited and on the other hand land holding is getting fragmented. The problem is further compounded by rising input costs.

Doubling agricultural income by 2022 is a mammoth task. It is also one that is the need of the hour. With majority of the country's population dependant on agricultural activities, no true development can be said to be meaningful unless it incorporates the needs of this sector. We now need to ensure that the implementation by all stakeholders is uniform, effective and done whole heartedly.

Key Note Address – 6

PLANT GROWTH PROMOTING BACTERIA: EFFECTIVE TOOLS FOR NUTRIENT MANAGEMENT AND CROP PRODUCTION UNDER ORGANIC FARMING

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Agriculture has been and will be the backbone of Indian economy. Continuous efforts are therefore being made to increase the agriculture production and farmer's income as well. Though, application of inorganic fertilizers and chemicals enhances crop production but it is simultaneously posing harmful effects such as reduced soil fertility and contamination of surface and groundwater. Such harmful effects are eventually resulting in deteriorating the health of agro-ecosystem. Traces of such chemicals have also been reported to be deposited in agricultural produce that may cause serious health problems in human beings. Considering such facts, organic farming is being promoted worldwide to strengthen agro-ecosystem, soil health, biodiversity, and biological activities in soil. Plant growth promoting bacteria (PGPB) possess different traits to enhance nutrient availability, plant growth and suppress plant diseases. Considering there diverse actions, PGPBs have become an important component of organic agriculture.

Use of PGPBs can increase the nutrient availability to the host plant and thereby enhances the plant growth, plant health and crop yield. Bioformulations of PGPBs are cost-effective, eco-friendly and easy to apply and can play a vital role in uplifting the economy and livelihood of resource poor small and marginal farmers. PGPBs can be used alone, in the form of microbial consortium and along with organic manures. Ours studies suggest that PGPBs can enhance the nutrient use efficiency of the host plant that further contributes to increase the crop yield. In addition, the significant residual amounts of nutrients remain available in soil even after harvesting the crop. These residual amounts of nutrients remain available to the next crop and thus can reduce the cost of cultivation. Therefore the use of PGPBs can help in releasing the nutrients sustainably and can contribute towards achieving the goal of sustainable agriculture production and soil health.

Key Note Address – 7

PLANT GROWTH PROMOTING RHIZOBACTERIA (PGPR): THE PROMISING CANDIDATES FOR AGRICULTURE AND SUSTAINABLE DEVELOPMENT

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The microbes residing in the soil are beneficial for the growth of crops in terms of vegetative and reproductive growth are known as plant growth promoting microbes (PGPMs). These PGPMs may be agriculturally promising bacterial and fungal strains which resides in the rhizosphere region of crops. Today these PGPMs are of area of interest for research and commercialization. These PGPMs are now broadly categorized as Plant Growth Promoting Rhizobacteria (PGPR). These PGPRs play a vital role in maintaining soil fertility and plant health. They can act as biofertilizers and provides immunity to the crops against invasion of pathogens and resist against different biotic and abiotic stress conditions. PGPRs are effective growth modulators for the crop as they secrete novel metabolites and growth molecules that enable the crop to sustain in adverse and stress conditions. Several substances produced by antagonistic rhizobacteria have been related to pathogen control and indirect promotion of growth in many plants, such as siderophores and antibiotics besides growth harmones secreted by them as Indole acetic acid (IAA), Auxins and Cytokinin. The present research is about the isolation and screening of different isolates from the rhizosphere region of different soil samples from the soil samples of semi-arid and sandy soil prevalent local gardens and fields of Nagpur, Maharashtra region and The dominant isolates were found to be in the form of *Bacillus subtilis* (PGPR-NCS-145/18), *Bacillus mycoides* (PGPR-NCS-146/18) and *Pseudomonas fluorescens* (PGPR-NCS-147/18) The isolates were screened for plant growth promotion, fungicidal and pesticidal properties. The results were found to be very significant as the results were found to be very promising.

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Abstract – 001

OCEAN ACIDIFICATION AND CLIMATE CHANGE

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Ocean acidification is the ongoing decrease in the pH when carbon dioxide (CO_2) is absorbed by seawater, reducing carbonate ion concentration, and saturation states of biologically important calcium carbonate minerals. These chemical reactions are termed ocean acidification. Sea water is slightly basic and ocean acidification involves a shift towards pH neutral conditions rather than a transition to acidic condition. Continued ocean acidification is causing many parts of the ocean to become under saturated with minerals like Calcium carbonate, which is likely to affect the ability of some organisms to produce and maintain their shells. CO_2, once in the ocean transforms into carbonic acid. In small amounts, the acid is not particularly harmful, however, in large doses; carbonic acid is unnatural and poisonous. The result of this acidification has equaled a nearly 30% decrease in the ocean's pH levels over the last few centuries. Ocean acidification is expected to impact ocean species to varying degrees. Photosynthetic algae and sea grasses may benefit from higher CO_2 conditions in the ocean, as they require CO_2. Studies have shown that lower environmental calcium carbonate saturation states can have a dramatic effect on some calcifying species, including oysters, clams, sea urchins, shallow water corals, deep sea corals, and calcareous plankton. The rate of ocean acidification has been increasing with increasing industrialization and other inventions that run on fossil fuels, and it is likely that the effects will only worsen with time. Today, more than a billion people worldwide rely on food from the ocean as their primary source of protein. The mitigating steps include awareness of energy use and waste disposal, regulation on factories, reduction of carbon footprint and geo-engineering activities. Thus, both jobs and food security around the world depending on the fish and shellfish in our oceans may be at stake if the scenario is not taken care of.

Keywords: Ocean acidification, CO_2, Calcium carbonate, pH, Energy

Abstract – 002

PATH FROM C_3 TO C_4 PHOTOSYNTHESIS: ENHANCING YIELD AND ADAPTIBILITY IN CHANGING CLIMATIC SENARIO

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The rapidly growing global population demands boosting of crop yields significantly. One of the avenues being recently explored is the improvement of photosynthetic capacity by installing the C_4 photosynthetic pathway into C_3 crops like rice to drastically increase their yield. Unlike C_3 pathway of photosynthesis that compromises efficiencies in CO_2 fixation, some plants use a super-charged photosynthetic mechanism called C4 photosynthesis. The C_4 pathway is used by the most productive vegetation and crops on Earth. In addition to faster photosynthesis, C_4 plants demand less water and less nitrogen. The aim is to suggest introduction of the characteristics of C_4 into C_3 crops. If current C_3 crops could be converted to use C_4 photosynthesis, large economic and environmental benefits would ensue from both their increased productivity and the reduced inputs associated with the C_4 pathway. Efficient C_4 photosynthesis would be achieved by alterations to leaf development, cell biology and biochemistry. Noble genes from crops like maize (*pepc* gene, *ppdk* gene, *nadp-me* gene, *rbcS* gene), Echinochloa (*ppdk* gene), Sorghum (*nadp-mdh* gene) have been employed to induce C4 activity in *indica* rice, through methods like electroporation, particle gun method etc. or through plasmids (pBI221). Although over expression of C_4 gene in rice showed diverse effect it is still far from the purpose of increasing yield greatly. C_4 rice research is very expensive and laborious owing to huge distance of anatomy and genetics between C_3 and C_4 rice. The commercialization of transgenic rice is still difficult in the present era. The huge advances in agricultural production associated with the Green Revolution were not associated with increases in photosynthesis, and so its manipulation remains an unexplored target for crop improvement both for food and biomass. Even partial long-term success would have significant economic and environmental benefits.

Key words: C_3 plants, C_4 plants, Maize, Sorghum, *indica* rice, transgenic

Abstract – 003

PADDY CULTIVATION AND ITS ADVERSITY IN CLIMATE CHANGE

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India is one of the world's largest producers of rice, accounting for 20% of world's rice production. It demands temperature of around 25°C and above and rainfall of more than 100 cm. India's rice production reached to a record high of 108.86 million tonnes in the year 2016-17. It is predominantly a *kharif* crop in India but in the recent times with assured irrigation it is grown throughout the year. Rice paddy fields are a rich source of the GHGs carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). These three gases extensively contribute 33% to the global greenhouse gases. The extent of GHG emission depends on how the land is used, organism living in soil, soil chemical and physical properties. With the increase in carbon dioxide in the atmosphere and rising temperatures have caused rice cultivation to release more of the potent greenhouse gas methane (CH_4) for each kilogram of rice it produces. N_2O is produced by soil microbes in both anaerobic and aerobic condition and emissions are largely dependent on nitrogenous fertilizer. It is a powerful GHG which is about 300 times more effective at trapping heat than CO_2. N_2O emission from agricultural soil occurs through the nitrification and denitrification of nitrogen in soil in both aerobic and anaerobic condition through microbial processes. However, possible mitigation methods are being adopted to reduce the GSC emission which includes altering water management with mid-season aeration, improving organic matter management e.g. composting and promoting aerobic decomposition of crop residues, improving N fertilizer application to match with crop demand, appropriate management of animal wastes, reducing the amount of rice straw incorporating into rice soil, proper drainage during the crop cycle and use of selected rice varieties.

Keywords: Rice, Green House Gases (GHGs), carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), emission, mitigation.

Abstract – 004

RESURRECTION PLANTS: A SOLUTION TO CLIMATE CHANGE

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With an increase in the intensity and frequency in climate-related shocks, farming communities are needed to be contending with drought and occasional floods as a new reality. Resurrection plants, which are known for their ability to survive extreme dehydration, even over months or years, could be an excellent solution to the problems that are faced by the farming communities in the context of present day scenario due to climate change leading to frequent droughts. During a drought, a resurrection plant behaves like a seed, drying up and appearing to be dead, but then bursts back to life when rain falls. The incorporation of this promising survival skill of these plants into various economically important crops in making them resistant to ravages of weather and could make them a better choice to feed the world's ever increasing population. Attempts were made: BhbZIP60 from Resurrection Plant *Boea hygrometrica* Is an mRNA Splicing-Activated Endoplasmic Reticulum Stress Regulator Involved in Drought Tolerance, Isolation of a Drought-Induced bZIP Transcription Factor from *B. hygrometrica*: In previous microarray analysis of the plant *B. hygrometrica* under dehydration stress, was noticed that a putative bZIP transcription factor encoding a homologous protein of AtbZIP60 was strongly induced by dehydration. To better characterize, the full-length cDNA was cloned and designated as BhbZIP60. The full-length BhbZIP60 protein contains a typical bZIP domain and a TMD, which are conserved in AtbZIP60 in *Arabidopsis*, OsbZIP50 in rice, and ZmbZIP60 in maize, which are representatives of those well-studied bZIP proteins from different species . Further Exploration of the genes responsible for desiccation tolerance, existing gene composition *LEA* 4 group genes from the resurrection plant *Boea hygrometrica* confer dehydration tolerance in transgenic tobacco. Mechanisms to figure out how these genes are turned on in roots and leaves and flipped in vegetative tissues of resurrection plants in response to water loss are Dehydration, Activation of "desiccation-related" genes, Alterations in metabolism and Production of "protective" proteins.

Key words: Climate change, drought, desiccation, dehydration, resurrection plants.

Abstract – 005

EXPLOITATION OF SMALL HEAT SHOCK PROTEINS IN THE DEVELOPMENT OF TOLERANT CROP VARIETIES

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Dysfunctioning of proteins usually accompany abiotic stress. Therefore maintaining proteins in their functional conformations and preventing aggregation of their non-native proteins are particularly important for cell survival under stress. Among many stress responsive protiens small Heat shock Proteins (sHSPs) are found to be preodominantly involved in plants, are stress induced molecular chaperons that act as holdages towards polypeptides that have lost their foldings in stress conditions. SHSps confer thermotolorence to cellular structures and proteins in cellular extracts during prolonged incubations at elevated temperature. Some are induced due to multiple stressful events to protect the cell while others are expressed in addition to their intercellular properties also during extracellular damage. This demonstrates the ability of SHps to protect cellular proteins and to maintain cellular viability under intensive stress such as heat shock or chemical resistance to different types of injuries or pathological conditions. Recent studies indicate that sHSPs have important biological function in thermostability, disaggregation and proteolysis inhibition. These functions can be harnessed for various applications, including nano-biotechnology proteomics, bioproduction and bioseparation which basically focus on identification and transfer of desirable gene to less tolerant crop species. For instance, carrot transgenic cells and regenerated plants which constitutively expressed the carrot Hsp17.7 gene, has shown more thermotolerance as compared to the controls. DnaK1, a member of Hsp70 from the halotolerant *Cyanobacterium aphanothece,* was overexpressed in transgenic tobacco plants improving their salt tolerance. The discovery and use of new stress tolerant genes as well as heterologous genes to confer plant stress tolerance has been an ongoing effort since decades. But the complex traits of abiotic stress phenomena in plants treatments. Through specific ad-reversible modifications in their phospho-oligomeric organizations, small HSps can chaperone appropriate client proteins in order to provide cells with make genetic modification for efficient stress tolerance difficult to achieve.

Keywords: abiotic stress, sHSP, carrot, *Cyanobacterium aphanothece,* tobacco.

Abstract – 006

ROLE OF ADAPTIVE PHENOTYPIC PLASTICITY OF PLANT AS A RESPONSE TO CLIMATE CHANGE

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Natural environments inevitably vary, both spatially and temporally. According to the classic neo-Darwinian model, organisms accommodate that variation by means of natural selection, which through evolutionary time matches specific genotypes and environments. By assuming a simple Mendelian relationship of genotype to phenotype, this powerful model provides a genetic mechanism for adaptive phenotypic changes in populations. The second major mode of adaptation, one which is becoming particularly well understood in plants: the capacity of a single genotype to produce different, functionally appropriate phenotypes in different environments, or adaptive phenotypic plasticity. This property of short-term individual response offers an 'alternative picture' of the way that organisms adapt to their environments. By virtue of phenotypic plasticity, adaptation occurs through individual development and physiology as well as through change in population gene frequencies. Thus, a single genotype may be able to maintain function and hence reproductive fitness under a variety of environmental conditions The plasticity as a major mode of adaptation in plants to sustain present climate. Plasticity studies depend critically upon the genotypic sample, the choice of environmental factors and factor states, and the definition of phenotypic traits**.** Most traits encountered in plant breeding are quantitatively inherited, whether controlled by few or many genes is influenced significantly by environmental variability and plant height, where phenotypic traits respond differently to a given change in environmental conditions. Organisms can also respond to climate change through phenotypic plasticity-the ability of a given genotype to

modify its phenotype in response to environmental variation. If a plastic genotype has higher fitness across variable environments than a non-plastic one, then plasticity is adaptive. Adaptive plasticity can itself be the subject of selection and differ between populations.

Keywords: phenotypic plasticity, environmental, genotype and climate change.

Abstract – 007

EFFECT OF CLIMATE CHANGE ON HONEY BEES AS POLLINATORS

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The rapidly increasing human population and increasing demand for food-producing areas has degraded environment amid uncertainties resulting from climate change. This puts pressure on the ecosystem service and increases the demand for natural pollination by pollinators in agricultural system. The area covered by pollinator-dependent crops has increased by more than 300 percent during the past 50 years. Pollinators are also affected by the climate change. Bees are the most important pollinators worldwide and are ectothermic, requiring elevated body temperatures for flying. The less surface-to-volume ratio of small bees leads to rapid absorption of heat at high temperatures and rapid cooling at low temperatures. Bees are also crucial in maintaining biodiversity by pollinating numerous plant species whose fertilization requires an obligatory pollinator. Many bees are also able to control the temperatures in their flight muscles before, during and after flight by physiological and behavioral means. With potential effects of global warming, pollinators' behavioral responses to avoid extreme temperatures can to significantly reduce pollination services. Additionally, clearing of forests eliminates the natural habitat of the bees to survive. Studies have shown a reduction in number of fruits per plant, number of seeds per fruit and seed yield drastically in crops like rapeseed. In the context of climate change, the variability of the honey bees' life-history traits in regard to temperature and the environment shows that the species possesses such plasticity and genetic variability that this could give rise to the selection of development cycles suited to new environmental conditions. Thus in particular environment where honey bee population is declining, protection of pollinating bee population is a necessity not only for the maintenance of plant and animal bio-diversity but also for preserving the economic activities related to agriculture and bee keeping.

Keywords: Pollinator, honey bee, *Apis mellifera*, climate change, rapeseed, ectotthermic.

Abstract – 008

REDUCING THE INCREASED ATMOSPHERIC CO_2 THROUGH BIOSEQUESTRATION

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The disastrous increase in the amount of CO_2 has created an overabundance of greenhouse gases that traps additional heat, which causes alteration in the circulation of atmospheric and oceanic currents, increased melting of snow and ice, abnormal sequestration of CO_2 by plants, amount and types of clouds formed and alters atmospheric water vapour. The processes involving CO_2 capture and storage (CCS) are gaining attention as an alternative for reducing CO_2 concentration in the ambient air. This scenario can be mitigated by the capture and storage of atmospheric greenhouse gas carbon dioxide by various biological processes i.e., biosequestration. One of the ways is by improving photosynthetic activities by modifying RUBISCO genes in plants to increase its catalytic activity of that enzyme, promoting C_4 photosynthetic pathway. The bioenergy plantations are ideal agroforestry sources of carbon sequestration such as bamboo, one of the highest terrestrial carbon sequestration plant with a potential of 392T CO_2 over 7 years of biomass accumulation period. Biochar, an organic charcoal material, is the final product of pyrolysis. The limitation of oxygen in the system prevents the complete burning, instead producing the charcoal that captures much more of the natural carbon from the biomaterial. Such a form of carbon will not only be able to capture additional carbon, but also store carbon dioxide in sinks and out of the atmosphere for thousands of years. Another technology could be the biological capture of CO_2 using microalgae due to its unmatched advantages over higher plants and ocean fertilization. Specific pathways include

autotrophic production via both open pond or closed photobioreactor (PBR) systems. Photosynthetic efficiency of microalgae ranges from 10–20 % in comparison with 1–2 % of most terrestrial plants. Each of these approaches has a potential, but there are several technical, fiscal challenges as well as well as economic issues posing a setback to the idea. If these huddles are cleared off, then effect of global warming can be reduced significantly.

Keywords: Bioseqquestration, C_4, Bamboo, Biochar, microalga, Photo bioreactor.

Abstract – 009

EFFECT OF CLIMATE CHANGE ON BROWN PLANT HOPPERS (BPH)

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Outbreaks of brown planthoppers have been reported as being induced by insecticide while other factors such as global warming that could be potential drivers have been neglected. This abstract draws the idea that global warming may increase outbreak risk of brown planthoppers (*Nilaparvata lugens*). It is predicted that the current atmospheric CO_2 concentration will be doubled and global mean temperature will increase by 1.5–6°C by the end of this century. In rice, interactive effect of elevated CO_2 and temperature led to an increase in the number of tillers and canopy circumference but resulted in a decrease of reproductive tillers, seed panicle and 1000 seed weight there by reducing grain yield. Moreover, positive effect of increased CO_2 concentration and temperature on BPH population exacerbates the damage which in turn coupled with plant traits to hamper the production. The effects of the weather variables on BPH abundance when analysed statistical model showed that the expected effect of increasing temperatures is ambiguous and interacts with the amount of rainfall. The analysis indicates that global warming may have contributed to the recent outbreaks of BPH in some rice growing areas of Asia, and that the severity of such outbreaks is likely to increase if climate change exaggerates. Studies in the Free Air Carbon Enrichment (FACE) facility during rainy season showed that significantly higher canopy circumference under elevated condition provided better environmental condition for the BPH multiplication. Efficient introgression of resistance genes into elite rice cultivars by marker assisted selection together with strategic deployment of these genes can be an important approach to develop stable resistance to BPH and sustain rice production in the tropical and temperate rice growing regions.

Keywords: Brown plant hoppers, CO_2, climate change, gene introgression.

Abstract – 010

ASSOCIATION ANALYSIS BETWEEN AGRONOMIC TRAITS AND KNOWN BPH RESISTANCE MARKERS IN GERMPLASM OF RICE (*Oryza sativa* L.)

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Rice (*Oryza sativa* L.), the world's most important cereal crop, is the primary source of food and calories for about half of the human population. Finding association between molecular markers and agronomic traits provide an excellent tool for indirect selection of a trait of interest in the population. A total of 10 SSR markers were used for this study which are reported linked markers to nine BPH resistance genes viz., *Bph2, Bph3, Bph6, Bph9, Bph10, Bph15, Bph18, Bph21 and Bph26* of which 5 primers were polymorphic. The association between trait and markers were calculated using single marker analysis (SMA) in Microsoft Excel program. The significant marker trait associations were indicated by a P-value (<0.05). We detected a total of 16 significant marker-trait association (P<0.05). All of the significant SSR loci were identified for the agronomic traits. The P-value ranges from 0.003 to 0.049.

Keywords: Rice, BPH resistance gene, agronomic traits.

Abstract – 011

POTENTIAL EFFECT OF CLIMATE CHANGE ON BEE POPULATION

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Bees are considered as effective ecosystem service provider and integral part of terrestrial ecosystem. There are almost 17,000 bee species which had been recognized. Bee populations had rapidly been declined all over the world due to variety of factors which includes bee diseases and pests, pesticides, genetically modified organisms, electromagnetic radiation etc. This phenomenon is known as Colony Collapse Disorder (CCD). Studies had brought out evidence to support the theory of CCD possibly as a result of erratic weather patterns brought on by a changing climate. Climate change affects pollination by disrupting the synchronized timing of flower blooming and the timing at which bees pollinate. Thus, when bees begin pollination there is limited nectar available as flowers tends to bloom earlier in growing season due to rise in temperature. It had been reported that lower temperatures were associated with lower prevalence of parasites which indicated that higher temperatures as a result of climatic change could result in more bees infected with *Nosema cerana.* Studies had shown that elevated quantities of CO_2 caused the protein found in pollen to become diluted and unhealthy for the bees. In addition, climate change allowed invasive species to take over bee hives, spoil stored food and disrupt other processes within the hives, causing further decline in bee populations. Moreover, climate change could cause habitat loss as bees fail to migrate to cooler areas and establish new colonies. The decline of bee population had been seen as a grave risk to the delicate equilibrium of the ecosystem. There is an urgent need to understand the immediate and direct impact of climate change on bees and to work out strategies with minimal environmental implication.

Keywords: Bee, climate change, colony collapse disorder.

Abstract –012

EFFECT OF CLIMATE CHANGE SOIL MICROBES ON SOIL HEALTH

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SOIL, "Soul of Infinite Life", provides habitat to many microorganisms. Soil has a biodiversity which includes numerous biota such as fungi, nematodes, bacteria etc. It takes millions of years for formation of one inch of soil through the process of weathering. So, it should be favourable for cultivation having good structure, texture, moisture holding capacity, etc. To achieve these properties and for proper weathering soil fauna plays a crucial role. They are the precursor for biological activity within soil which vital to acquire cultivable soil and are sensitive to temperature and moisture. The activity of micro organisms is more in top soil. Presence of organic matter favours the better living of soil fauna. But these are the two factors which are most effected due to global climatic change. Variation in these factors necessary for proper growth and reproduction of soil biota has led to reduction in their population in soil, disturbance in their metabolic activity, alteration in their biological activity on soil during weathering etc. The soil fauna plays an important role in nutrient cycles they facilitate the process, now the cycles are getting distorted due to the low population and lower activity of microorganisms in soil. It is seen that due to the changes in environment strongly influenced the physiology of earthworms like they lose their weight, increase burrowing activity and enter into diapause state in dry soil. The main contribution of the soil biota in the environment is decomposition of matter. It is also hampered due to change in soil temperature, moisture, nutrients etc. Some of the measures to keep the habitat of soil microorganisms undisturbed are mulching which conserves the moisture and heat within the field, application of organic residues which is the basis for their growth and development and through crop and landscape management.

Keywords: soil, microbes, fauna, organic, climate

Abstract – 013

EFFECT OF INCREASED CO2 AND TEMPERATURE ON *SPODOPTERA LITURA*

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The common cutworm*, Spodoptera litura Fabricius,* is an economically important pest in India and is considered one of the major threats to present-day intensive agriculture and changing cropping patterns worldwide. This pest occurs in India, Pakistan, Bangladesh, Sri Lanka, South East Asia, China, Korea, Japan, Philippines, Australia, Pacific Islands, Hawaii and Fiji. With the changing climate, there is a potential for this pest to become a severe pest in certain regions of India due to increased habitat suitability. Significant effect of temperature has been recorded on the biological parameters of *S. litura* and reveals that development duration of life stages and the total life span of insects decreases with increase in temperature from 18±1to 33±1^{0}C.Total development time is found to be inversely related to temperature and has decreased significantly from 64.19 to 27.18 days with temperature from 18±1 to 33±1^{0}C.Hence, it can be observed that the pest can sustain under above constant temperature range, but the favorable temperature is only between 24 to 27^{0}c for the development and survival of the insect. From experiment, it has been recorded that the overall survival of S. litura is 74.81, 80.52, 85.84, 88.67, 76.40 and 70.04 at 18±1, 21±1, 24±1, 27±1, 30±1 and 33±1^{0}c respectively. Thus temperature influences greatly on survival irrespective of stage of the pest. Also it has been observed that elevated CO_2 as compared to ambient CO_2 significantly prolongs the duration of larva and pupa, adult longevity decreasing the pupation rate, pupal weight, relative growth rate (RGR), efficiency of conversion of ingested food and digested food and increasing the relative consumption rate and approximate digestibility. Future climate change of temperature and elevated CO_2 concentration would likely affect the growth and food utilization of *S. litura* resulting in no significant reduction in insect-induced yield loss in crop plants.

Keywords: *Spodoptera litura*, CO2, habitat, RGR, yield loss.

Abstract – 014

GENETIC DIVERSITY AND STABILITY ANALYSIS FOR HEAT TOLERANCE UNDER DIFFERENT SOWING CONDITIONS IN BREAD WHEAT (*Triticum aestivum* L. em. Thell)

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The present investigation was carried out with 32 diverse genotypes of bread wheat in completely randomized block design with three replications at NEBCRC, GBPUAT Pantnagar for the screening of wheat genotypes for heat tolerance under three environments viz. timely sown (stress free), late sown (stress) & very late sown (stress) conditions. Analysis of variance indicated the significant variation among the treatments for different characters in all the sowings. Among the morphological characters, plot yield exhibited highest range of variation while among physiological traits, relative water content exhibited the highest range of variation. On the basis of heat susceptibility index under late sown condition, the nineteen genotypes were found heat tolerant & rest genotypes were found moderately heat tolerant. Under very late sown condition, the five genotypes were found heat tolerant while rest genotypes were found to be moderately heat tolerant & moderately heat susceptible. The five genotypes HD-2967, IC-118737, CHIRYA-3, CUS/79/PRULLA & BWL-0814 were found tolerant to heat stress under both stress conditions. These five genotypes performed very well in all the three sowing conditions. On the basis of stability analysis, different genotypes were found stable for different characters. These findings may be helpful in exploiting these heat stress tolerant genotypes in the future breeding programme for developing the stable genotypes for heat tolerance as donor parents.

Keywords: Bread wheat, genotype and morphological.

Abstract – 015

ENVIRONMENTAL RESEARCH IN ANTARCTICA

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Environmental monitoring and impact assessment studies are very important to evaluate the negative impact of anthropogenic activities on various environmental components. Human interference and settlements is the emerging issue in various part of south pole including east Antarctica. Many environmental studies were carried out and a few are in the progress in Vestfold Hills, Larsemann Hills and Schirmacher Oasis in East Antarctica. Long term environmental studies were carried out in east Antarctica during the austral summer seasons of various Indian Scientific Expeditions to Antarctica (26th ISEA to 30th ISEA) by SIIR during Year 2006 to 2011) at Larsemann Hills and Schirmacher Oasis for Ambient Air Quality, Freshwater Quality, Marine Water Quality, Soil & Sediment Quality, Noise level Monitoring, Solid waste generation, Biodiversity assessment, etc. A comprehensive work was carried out before and during the construction of Bharti Station, hence the detailed study after commissioning of Bharti Station is equally important and must be carried out to evaluate the impacts on various environmental components.

Key words: Antarctic Environment, environmental monitoring, Impact assessment, environmental components, Larsemann Hills.

Abstract – 016

CONSERVATION OF INSECT POLLINATORS: AN ECO-FRIENDLY APPROACH FOR INCREASING THE YIELD OF POLLINATOR DEPENDENT CROPS

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Pollinators play an important role in sexual reproduction of flowering crops they carry pollen grains from one flower to another flower which facilitate development of more number of seeds and fruits. There are many crops which require a carrier of pollen grain for sexual reproduction *viz.* Mustard seed crop, Cotton, Radish, Cauliflower seed crop, Broccoli seed crop, Turnip seed crop, Onion seed crop, Brinjal, Okra, Pomegranate, Apple, Guava, Papaya, Cashew, Strawberry, Kiwifruit etc. In these crops maximum contribution is of insect pollinators. The major insect pollinators are honeybees which play a crucial role in pollination. Other than honeybees, bumble bees syrphid flies, solitary bees etc. also introduced as known pollinators. Environmental pollution, global warming, urbanization, deforestation, intensification of agriculture and uncontrolled use of pesticides are the major causal of decline of population and efficiency of insect pollinators. Taking into consideration to these factors and importance of insect pollinators, conservational practices are very essential. Insect pollinators have three basic habitat needs: Constant supply of food (Nectar), Nesting site and protection from pesticides. The major strategies for conservation of pollinators are including, planting divers flowering plants, providing undisturbed grassy areas around fields for providing suitable nesting sites, keeping holes drilled wooden blocks or bundles of cut plant stems around the field on trees or on other safe sites as artificial nesting site, using less toxic formulations of pesticides, avoiding spraying of pesticides when activity of pollinators at peak in the field. So these eco-friendly approaches are good for insect pollinators health, environment and also helpful for increasing yield of pollinator dependent crop plants.

Keywords: Insect pollinator, eco-friendly, conservation, honeybees.

Abstract – 017

EFFECT OF CLIMATE CHANGE AND UNDER RAIN FED CONDITION MORPHOLOGICAL VARIABILITY AND DIVERSITY IN FOXTAIL MILLET (*SETARIA ITALICA* L. BEAUV)

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Millets are group of small grained cereal food crops which are highly nutritious and are grown in marginal or low fertile soils requiring, low inputs of fertilizers and pesticides. Most millet crops are native of India and are popularly known as cereals they provide most of the nutrients required for normal functioning of human body. The millets contain 7-12% protein, 2-5% fat, 65- 75% carbohydrates and 15-20% dietary fiber Starch is the major component of foxtail millet grain. Foxtail millet is a promising source of micronutrients and protein compared to other cereals. Foxtail millet grain is (per 100g) rich in protein (12.3 %), iron (2.8 mg), calcium (31 mg) as compared to rice (7.9 % protein and 1.8 mg iron) according to millet network of India (MINI). It also contains high quantity of beta carotene. They release sugars very slowly and thus have a low glycemic index (GI) and hence can be used in therapeutic diet but its potential role as low GI food has remained unrealized and unexploited. The low GI diet has been shown to reduce blood glucose levels. They have a higher proportion of non starchy polysaccharides and dietary fiber. Apart from starch, protein and lipids are also present in substantial amounts. A small amount of free sugar and non-starchy polysaccharides are also present . Starch is extensively used as a raw material in various industries like textile, food, pharmaceutical and paper industries. Native starch has very limited use in industries. Modified starches with specific properties can be produced by physical, chemical or enzymatic methods to suit various applications**.** As starch is the major component of foxtail millet grain, it can be extracted and its potential for industrial use can be exploited. Native and modified starches from millets have been mostly used in non-food industries and their reported food applications are much scarce **.** During 21 century at the time of industrialization the period of 60 and 70s several public polishes have been introduced and followed to make life easy fast. After these rules has been taken in to account everyone has shifted to words consumption of Wheat and Rice. Leaving behind millets consumption and there importance in our diet. Just because of this there cultivation has been reduced to a very critical extent, resulting in extinction of several sepses of millets and putting millets in endanger condition. To get the essential nutrients vitamin etc human have shifted to words consumption of pills ,vit. Tablets and capsules, calcium capsules, Iron, Zinc, Injections etc but millets contain several impotent's nutrients for healthy and better life. Introduction of these millets into our diet can help radius consumption of several synthetic tablets and chemically synthesized tablets, protein powders etc. The present study were conducted to examine the genetic diversity existing among 50 genotypes of foxtail millet, during kharif-2017 under RBD(Randomized Block Design) replicated thrise. The data were recorded for to obtain estimates of variability, heritability, genetic advance and genetic divergence. Significant differences were observed among the genotypes for all the character studied. High estimates of GCV were observed for grain yield followed by panicle length and biological yield. High estimates of PCV were observed for leaf length followed by plant height and leaf width. High heritability was recorded for leaf length followed by pedicle length. High genetic advance was recorded for plant height followed by leaf length. The characters such as Leaf length, Days to 50% flowering, Days to 75% maturity showed high heritability coupled with moderate genetic advance, which indicates that there is more chance of inheritance from progeny to their offspring, therefore these characters should be given top priority for effective selection.

Keywords: Foxtail millet *(setaria italica* L. beauv), genetic diversity, Stability.

Abstract – 018

ESTABLISHMENT OF *IN VITRO* AND *IN VIVO* GROWN EXPLANTS OF *WITHANIA SOMNIFERA* AND DETERMINATION OF ANTIOXIDANT POTENTIAL

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Antioxidant potential of *Withania somnifera* due to the presence of secondary metabolites, it possesses considerable importance in various pharmacological activities. In addition, these metabolites are often associated with defense against pathogen, response against stresses. To enhance or to control the metabolism of these secondary metabolites, transcription factors (TF) came into play a very important role. In the present study different plants of *Withania* (R1, R2, R3 and R4) were successfully propagated and grown in *in vitro* and *in vivo condition* and their comparative propagation rates were measured. On the basis of results it can be concluded that experiments aimed to obtain 100% germination frequency with minimum chances of infection in *Withania somnifera*. Hence it can be suggested that *Withania somnifera* is successfully regenerated from shoots nodes and buds of the plants by using MS media. Plant antioxidants give rise to the formation of a vast array of chemically complex compounds, many of which are commercially important. Difference of Antioxidants activity in *In vitro* and *In vivo* condition is totally varies. There antioxidant activity was also measured by spectroscopic method. Reaction was carried out in 4 replicates in *in vitro* and *in vivo* condition. The propagation was observed after 14 days in R1 showed 92.1%, R2 showed 90 %, R3 showed 96.8% R4 showed 66.6% propagation rate of explants. The antioxidant activity of propagated *Withania Somnifera* were sample R3 (93.42%) followed by, R2 (89.12%), R1 (80.95%) and R4 (61.34%). In *In vitro* condition found to have more ascorbic acid activity and total phenolic activity as comparison to *In vivo* condition of Withania *somnifera.* So, it may become critical to develop an alternative source of important therapeutic natural products since plant cell culture provides an environment friendly renewable alternative for antioxidant supply due to high medicinal value of *Withania somnifera.*

Key Words: - *Withania somnifera, In vitro and In vivo,* TAA, Ascorbic acid, Chlorophyll content, phenolic content**.**

Abstract – 019

IMPORTANCE OF FORESTS IN CLIMATE CHANGE

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Forests not only playing a critical role to slow down or to stop the climate change it also decreasing the current as well as future effects on people. For example, forest goods and agriculture acting more climatic resilient whenever disaster occurs or occurrence of crop failure happens forests play a role like a safety nets to protect the communities from losing all food resources and income also. Forests also help in regulation of water ways to protect soil, cool cities and entire regions and more. The global warming mitigation requires the renewable biomass which is having the tremendous potential to do it. Renewable biomass plays a multiple role in which an energy source and fodder, grasses, food production, biodiversity conservation, yield and other services for the society and the mitigation of the impact of climate change both. There are different strategies for the mitigation of global warming in agriculture, agroforestry, forestry and grassland.

Key words- Climate change, Forest goods, Agriculture, Disaster, Forests.

Abstract – 020

STUDY THE EFFECT OF DIFFERENT ORGANIC MANURE FOR GROWTH AND YIELD OF RICE USING SYSTEM OF RICE INTENSIFICATION (SRI) METHOD UNDER CITRUS BASED AGROFORESTRY SYSTEM

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To study the effect of different organic manure for using of System of Rice Intensification (SRI) method is an important tool to obtain high growth and yield of riceunder Citrus based agroforestry system in Kharif season. Planting in college of Forestry SHUATS Allahabad UP India, an experiment was carried out in *kharif* seasons of 2017 in RBD design with three replications nine treatments. The results revealed that SRI recorded significantly higher values for all growth parameters, plant height at 30DAT 22.86 cm and 120 DAT119.53cm, No of tillers at 60DAT 10.33hill^{-1}and 120 DAT 25.00hill^{-1},flag leaf length at 30DAT 23.86 cm and 120 DAT 72.73cm, and Dry weight 30DAT 7.20and 120 DAT 137.60 gm/hill^{-1},leaf area index 30DAT 7.20 and 120 DAT 14.20 was significantly. Length of panicle (cm), Number of panicle per hill-1and Test weight, was significantly. After harvesting time The result recorded the higher Grain yield (3.71 t/ha^{-1}), Straw yield (4.40t/ha^{-1}) and Benefit cost ratio (B.C. ratio). 1:5.4 was in the treatment T_5 (75% RDN through FYM+ 25% RDN through PM), significantly. Rice under Citrus based agroforestry system, respectively.

Keywords: Rice, Organic manure SRI Method, citrus.

Abstract – 021

STUDY THE EFFECT OF ORGANIC MANURE ON GROWTH AND YIELD OF *CAPSICUM ANNUUM* UNDER POPLAR BASED AGROFORESTRY SYSTEM

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A field study was conducted at the research area of a Department of Agroforestry, Sam Higginbottom University of Agricultural, Technology and Sciences, Allahabad (UP) during the period January, 2018 to May, 2018. In their treatments such as T_1, T_2, T_3 T_4, T_5, T_6, T_7,T_8 T_9, T_{10}, T_{11} and T_{12} there were used three type of organic compost such as farm yard manure Vermicompost and poultry manure respectively with *Capsicum annum*. The different pre- harvest observation of growth parameters such as Plant height, Number of branches and Number of flowers per plant, Number of leaves were recorded for each treatment and for each replication at an interval of 30, 60, 90 and 120 days. The different post-harvest observation such as, the Number of fruit per plant and yield of fruit were taken after final harvesting i.e. at 120days. The growth performance such as plant height, number of branches and other growth parameters are maximum observed better with FYM (T_8) followed with poultry manure. The maximum yield was also observed better in FYM (T_8). The maximum profit in terms of benefit: cost ratio was obtained with treatment T_8 (1: 2.23) and T_{11} (1:2.21).

Key words: Organic compost, FYM, Plant height, Yield, Poultry Manure.

Abstract – 022

LINK EXPLORATION BETWEEN YIELD AND AGRONOMIC TRAITS IN NATIVE RICE (*ORYZA SATIVA* L.) OF BASTAR FOR PATERNAL LINE ASSORTMENT.

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The investigation was carried out at Research farm, S.G. College of Agriculture and Research Station, Kumhrawand, Jagdalpur, Bastar, Chhattisgarh, India. Molecular studies were performed at Plant Molecular Biology laboratory, S.G. College of Agriculture and Research Station, Kumhrawand, Jagdalpur. In studycarried out 94 rice accessions, along with 3 checks, on the basis of 16 qualitative and 20 quantitative characters. Analysis of variance for quantitative characters showed differences for different characters. From the result of major rice insect's incidence, it was concluded that out of 97 genotypes tested against different insect-pests, 55, 69 and 3 genotypes were categorized at most promising entries against gall midge, stem borer and leaf folder. In major rice disease incidence, out of 97 genotypes tested against leaf blast and brown spot disease, 7 and 15 genotypes are most promising entries against leaf blast and brown spot disease. High coefficient of variation in the entire genotypes was observed for grain yield per plant (27.4 %), number of effective tillers per plant (22.37 %), test weight (21.14 %) and kernel length breadth ratio (20.59 %). Correlation analysis revealed positive and highly significant correlation of total number of filled grains per panicle, total\ number of grains per panicle, plant height and number of effective tiller per plant; harvest index, test weight, flag leaf length and days to maturity had positive highly significant correlation with grain yield per plant. Principal Component Analysis revealed, out of 20, only 7 principal components (PCs) exhibited more than 1.00 eigen value, and showed about 77.42 % variability among the traits studied. So, these 7 PCs were given due importance for further explanation. Component matrix revealed that the PC1 was mostly related to quality characters while PC2, PC3, PC4, PC5, PC6 and PC7 mostly associated with yield related traits. Cluster analysis performed by UPGMA method using Euclidean distance as dissimilarity measure divided the 97 genotypes of rice into ten clusters. The cluster III constituted of 48 genotypes, forming the largest cluster followed by cluster VI (22 genotypes), cluster V (10 genotypes), cluster II (5 genotypes) and cluster VIII (4 genotypes), cluster I, IV and VII (two genotypes each), cluster IX and X had (only one genotypes each). Quality analysis performed for 97 rice genotypes revealed wide range of genetic variability for most of the quality traits. Total of 12 SSR markers (primers) were used for molecular characterization and discrimination of 28 genotypes of rice. After analyzing the data generated from 12 microsatellite markers (SSR), a total of 22 alleles were detected in 28 rice genotypes. The number of alleles per locus generated by each marker ranged from 1 to 3 alleles with an average of 1.8 alleles per locus. Out of 12 SSR markers, 6 markers showed polymorphic reaction with polymorphism information content (PIC) values of 0.53 in RM125, 0.6 in RM161 and 0.75 in RM152, 0.84 in OCR13, 0.88 in RM413 and 0.89 in RM408. Genetic similarity of genotypes of rice under study the genetic similarity coefficient (Jaccard coefficient) ranged from 0.51-1.00 as revealed by UPGMA cluster analysis using the 12 SSR markers. A total of five distinct groups resulted at a cut-off similarity coefficient of 0.683 among the 28 rice genotypes.

Key words: Bastar Rice Research, PC Analysis, SSR Marker, Correlation Analysis. Leaf Blast & Brown Spot, Gall Midge, Stem Borer & Leaf Folder.

Abstract – 023

IDENTIFICATION OF BLB RESISTANT DOUBLE HAPLOID RICE *(ORYZA SATIVA)* LINES

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In rice production the major constraints for low productivity of rice is biotic and abiotic stresses which adversely affect seed yield in upland rice. Some biotic stress like infection of bacterial leaf blight (BLB) occurs in early stage (plant withers and dries up), in later stage blightining starts from the tip of the leaves to the base, straw turned yellow, and partially filled grains resulting yield loss is the major problems to overcome. For that the generation of doubled haploids through anther culture aims to accelerate the acquisition of pure lines within a short span of time. Selection of the desired traits such as BLB resistance, number of panicles/plant, number of tillers/plant, plant height, grain length, grain breadth, aroma, seed weight/plant and 50 % flowering time can be done directly from anther culture resulted progeny at early generations. So, the production of doubled haploids through anther culture *in vitro* is a rapid approach to homozygosity that shortens the time required for development of new rice cultivars through conventional methods, which require at least 6 - 7 generations. Haploids are also valuable to detect and fix desirable recessive traits introduced through mutation or hybridisation.Simultaneously, DNA based markers will also use to conform the stability of selected DH lines showing homozygosity in all individual DH populations. Therefore, the selected DH lines will be efficiently used as successful products in future. Therefore the DH lines developed through anther culture is essential to allow a biotechnologist to select cultivars of plants which are more adaptable to environmental changes, efficient in utilizing nutrients**,** tolerant to diseases and pests and improved in yield and quality.There is a continuous change with time, in natural and man-made environments and human population needs. Therefore, our continuous efforts should be directed towards tailoring the new cultivars, that are capable of withstanding continuous changes and fulfilling human food demand.

Key words: Rice, bacterial leaf blight and DH lines

Abstract – 024

***crtRB1*-3′ TE GENE LOCI TARGETED FOR PROVITAMIN A BIOFORTIFICATION IN TROPICAL MAIZE INBRED LINES**

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Maize (*Zea mays* L.) is the essential staple cereal crop targeted for provitamin A biofortification since it's kernel accumulates carotenoids like α-carotene, β-carotene and β-cryptoxanthin. Among the different carotenoids β-carotene has the highest provitamin A activity, but is present in lower concentration. Favourable allele of the gene crtRB1 encoding *β-carotene hydroxylase 1* is rare in frequency and is unique to temperate germplasm. One of the polymorphism of crtRB1 *i.e* 3′ TE (Transposable Element) responsible for variation in carotenoid levels in maize endosperm. Present study was undertaken to find out the allelic difference for *crtRB1*-3′ TE gene loci. Totally 228 tropical maize inbred lines were screened for the favourable allele of *crtRB1* gene using *crtRB1*-3′ TE gene specific markers. Out of which 226 inbreds showed the presence of unfavourable allele and two inbreds (VL1016247 and VL1016213) possessed both favourable and unfavourable alleles which found to be heterozygous for the allele. The study indicated the possibility of developing maize hybrids with enhanced provitamin A levels from low provitamin A level inbreds using marker assisted backcross breeding.

Key words: Maize, gene loci, biofortification and inbred lines.

Abstract – 025

PHYTODIVERSITY AND STAND STRUCTURE IN A TROPICAL FOREST OF RAJAJI TIGER RESERVE, INDIA

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The population structure of tree species has been explored in order to elucidate regeneration potential of the subalpine forests of Indian western Himalaya. The structure, function and the ecosystem services of tropical forests are highly depends on its species diversity, richness, dominance and variation in the assemblages of the tree species population over time. Phytodiversity, species composition and regeneration pattern of the tree species may be changed by adaptive evolution and by migration to the favourable climatic region. The long-term data from permanent vegetation plots generally have yielded a wealth of data on the species diversity as well as the dynamics of tree populations but these types of studies only rarely been undertaken in the tropical landscape which favour large human population. Thus the drivers of anthropogenic pressures and their effects on community composition and species diversity are not well known. Here we present data on tree species composition, diversity and stand structures in a forest community under the tropical forest of Rajaji tiger reserve, Northern India. The enumeration of 12 plots by Nested quadrats method results a total of 3825 individuals, 14 species, 14 genera, 12 families in study area. The forest community also has showed variation in herbs and shrubs composition. The species which shows higher importance value index (IVI) in the study area shows higher dominancy in a commmunity. The study area is dominated and co dominated with *Shorea robusta Listea chinensis, Mallotus philippensis*, *Ehretia laevis, Aegle marmelos, Cassia fistula* etc. The community with highest value of Shannon index revels the highest diversity of that community among all the studied habitats whereas the highest value of Simpson index revels the least diversity of that community. The Shannon diversity index was 1.35 and the Simpson index was 0.446 in study area whereas the Margalef index was 2.58 and the Evenness index was 0.55 in the study area.

Key words: Phytodiversity, tropical forest and rajaji tiger reserve.

Abstract – 026

FIELD SCREENING OF SUGARCANE CLONES AGAINST RED ROT FOR IDENTIFICATION OF RESISTANT LINES

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Sugarcane is an important agro industrial crop cultivated in tropical and sub- tropical parts of the world. It is valuable because it store high concentrations of sucrose in its stem and also for ethanol production. Among various diseases of sugarcane in the Indian subcontinent, red rot is the most common and caused by the fungus *Colletotrichum falcatum* Went. It is the main causes of severe yield and quality losses of canes and can reduce up to 29% cane weight and 31% loss in sugar recovery**.** To develop resistant cultivars, screening and identification of genotypes with resistance is a vital requirement. These screening techniques are based on inoculation of the stalks and scoring of disease severity based on the four main symptoms of the disease which are condition of tops (leaves), progress of the red rot lesion along the length of the cane, width of the lesion and the amount of white spots present**.** The present investigation was conducted with 167 C_2 clones of sugarcane selected from progenies of purposely made crosses involving red rot resistant and susceptible parents. The screening for red rot was conducted under field condition against two virulent pathotypes of red rot pathogen, i.e. Cf 08 and Cf 09 using plug method of inoculation. A bore hole was punched in the middle of the 3rd inter-node from the bottom and a small quantity of the spore suspension was injected into the bore hole and bore hole was sealed with Parafilm**.** After 60 days, the inoculated canes were split open longitudinally and the severity of red rot symptoms expressed was scored on a 0 – 9 scale as suggested by **Srinivasan and Bhat (1961).** Based on this screening 54 progeny clones out of 167 were found resistant/moderately resistant against both the races, while 34 progeny

clones were showed resistance/moderate resistance against race 08 but found susceptible against race 09. On the other hand 8 progeny clones were found to be resistant/moderately resistant against race 09 while susceptible to race 08.

Key words: Sugarcane, *Colletotrichum falcatum*, and progeny clones.

Abstract – 027

IN-VITRO EVALUATION OF MYCOTOXICITY OF COMMERCIAL FUNGICIDES AND BOTANICALS AGAINST _COLLETOTRICHUM CAPSICI_ F. SP. _CYAMOPSICOLA_ CAUSING ANTHRACNOSE DISEASE OF CLUSTER BEAN

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Clustebean [*Cyamopsis tetragonoloba* (L.) Taub.] commonly known as 'Guar' is an important *kharif* arid legume crop of India in recent years. Anthracnose caused by *Colletotrichum capsici* f. sp. *cyamopsicola* is one of the major disease of clusterbean and is prevalent in almost all the clusterbean growing locations of country. The present study was carried out to test the efficacy of fungicides and botanicals which inhibiting the *C. capsici*, under *in vitro* condition. It was revealed from the evaluation that among seven fungicides tested Carbendazim (97.33%) was found highly effective over other treatments followed by Propiconazole (94.33%) and Tebuconazole (92.77%). Whereas resulted from the evaluation of botanicals, maximum inhibition was found in *Azadirhachta indica* (82.22%) followed by *Calotropis procera* (80%) and *Allium cepa* (79.50%) .

Keywords: *In-vitro,* commercial fungicides, botanicals and anthracnose

Abstract – 028

METROGLYPH ANALYSIS IN SEWAN GRASS (_LASIURUS SINDICUS_ HENR.) ACCESSIONS

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The present investigation was carried out to estimate morphological variation for green fodder yield and related traits in sewan grass (Lasiurus sindicus Henr.) for 273 accessions. The observations were recorded for eleven characters during kharif-2017 at Agricultural Research Station, Bikaner. Out of 273 accessions, metroglyph analysis study was done for 30 best accessions based on green fodder yield per plant. Among all the characters, two characters viz., number of tillers per plant and dry matter yield per plant showed high phenotypic coefficient of variation, respectively. These two characters were represented as glyph for metroglyph analysis; other nine characters were represented as rays on glyph at various lengths at different positions on the basis of their means criteria. On this basis, the 30 accessions were classified into seven clusters which had low-yielding, medium-yielding and high-yielding groups. The accessions from the low and high groups, respectively, generally possessed low and high values for each of the characteristics. The accessions from the medium-yielding group were intermediate for most of the characters. It can be also inferred that the scoring procedure would be utilized in the preliminary screening of a large number of genotypes for selection of accessions with desirable combination of various characters influencing the number of tillers per plant with dry matter yield per plant in sewan grass. Highly diverse accessions, on the basis of their total index score; (RLSB 1-41, RLSB 10-1, RLSB 4-41, RLSB 4-37 and RLSB 10-17) were identified.

Key words: Sewan grass, variability, metroglyph analysis, accessions

Abstract – 029

JEEVAMRUT: LIQUID MANURE FOR VEGETATIVE GROWTH IN APPLE NURSERY PLANTS

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Apple is the major fruit crop of temperate region of India. Due to its high demand among farmers, healthy nurseries are needed to be established. Since excessive use of inorganic fertilzers have degraded the nutrient content in the soil so there is urgent need to switch to organic nursery production of apple.Jeevamrut is organic liquid manure made from five products namely cow dung, cow urine,gram flour, jaggeryand soil under the Banyan tree/ Peepal tree which has miraculous effects on plants vegetative growth when properly mixed.Jeevamrut is prepared by adding 10 kg cow dung, 10 lts. of cow urine, 1 kg jaggery, 1kg gram flour and handful of soil in 200 lts. of water.For apple nursery, 1litre is dissolved in 10 litres of water with irrigation in beds at fortnight interval. Jeevamrut makes congenial environment for soil microorganisms and increases the fertility status of the soil.

Keywords: Apple nursery, Jeevamrut, Liquid manures, soil fertility

Abstract – 030

RESPONSE OF DIFFERENT CULTURE MEDIUM ON *IN VITRO* PLANT REGENERATION THROUGH DIFFERENT EXPANTS IN ISHWARMUL (*Aristolochia indica* Linn)

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Ishwarmul is known by different vernacular names viz., Ishwar balli (Kannada), Indian Birthwort (English), Ishwarmul (Hindi) and Ishwari (Sanskrit). In India this plant found in Kerala. It is grown in India especially in tropical and sub tropical region. Ishwarmul is in-vitro propagation can be used as an effective alternative for conservation and multiplication of this plant. Poor seed viability and germination restricts the use of seeds in multiplication segment. The active constituent "Aristolic acid" is potent drug used in Ayurvedic, Sidda and Homeopathy systems of medicines. Roots are widely used in joint pains and seeds in inflammation, biliousness, dry cough and dyspepsia. The using explants as stem segment, cotyledons, leaf. The explants were cultured on Murashige and Skoog's medium augmented with different concentration and combinations of plant growth regulators. The best callusing percentage (71.60%) from leaf base was found to be MS medium supplemented with BAP (1.6mg/l) and 2,4-D (5mg/l).Highest fresh callus weight (910.60) may be found in leaf base in this medium. Highest frequency of shoots produced through leaf base and cotyledons observed on Murashige and Skoog's medium supplemented with BAP (1.6mg/l) and 2,4-D (5mg/l).Maximum number of shoot lets regeneration (18-25) was found in this medium. The in vitro raised shootlets were sub-cultured on half strength Murashige and Skoog's medium supplemented with various concentrations of BAP and IBA for root formation. Highest percentage, maximum number of rootlets /shootlet were observed in half Murashige and Skoog's medium supplemented with 1.6mg/l BAP, 5mg/l 2,4-D and 1mg/l IBA. More than seventy five percentages of rooted plants survived in the soil.

Key words: *in vitro* plant, *Aristolochia indica* Linn and PGR.

Abstract – 031

EFFECT OF DIFFERENT SPACING ON HERBAGE YIELD AND OIL CONTENT OF *Occimum basilicum L.*

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The present investigation was conducted during Kharif season of 2018 at Medicinal Plants Research and Development Centre (MRDC) of Govind Ballabh Pant University of Agriculture and Technology, Pantnagar, District Udham Singh Nagar, India, to study the effect of spacing on growth and herbage yield of basilicum (var. CIM- Somya) and to optimize its spacing. The experiment was laid out in Split Plot Design (SPD) having three spacing and three replications. The experimental soil was sandy clay loam in texture, neutral in reaction, having pH 6.9, medium in organic carbon (0.68%), low in available nitrogen (180.78 kg ha^{-1}) and medium in both available phosphorus (20.14 kg ha^{-1}) and potassium (200.64 kg ha^{-1}). Treatments were T1: 30x40cm^2, T2: 40x40 cm^2 and T3:50x60 cm^2. It was found that T_2 treatment gave highest oil recovery and herbage yield as compared to other spacings.

Key words: Spacing, Basilicum, oil content, herbage yield.

Abstract – 032

PEAK VARIATION ON THE ANTIOXIDANT POTENTIAL OF MEDICINAL PLANT *Angelica glauca* OF HIMALAYAN REGION

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Seeds of choru (*Angelica glauca*) a medicinal plant used traditionally in early Indian household for medical purpose . It has a potent medicinal properties. Methanolic and Acetonic extracts were prepared from seeds of choru (*A. glauca*) for estimation of antioxidant activity. In this study the effect of variation of altitude on the total B-carotene and DPPH content of seeds of *Angelica glauca* along with associated antioxidant potential was investigated. It was observed that the extracting solvent significantly affected the total antioxidant potential of extracts with higher antioxidant capacity had higher B-carotene contents also. It could be convincingly seen that solvent and altitudinal variations have profound effects on the B-carotene and DPPH content, antioxidant activity of all the samples of *Angelica glauca*. However, All the measured parameters of samples from high altitudes were relatively higher than those collected from lower altitudes. The outcome of this study also suggested that environmental temperature plays a significant effect on all the measured parameters.

Key Words: *Angelica glauca,* antioxidant and medical purpose.

Abstract – 033

IMPORTANCE OF BIO-FERTILIZER IN CROP PRODUCTION AND IMPROVEMENT OF SOIL HEALTH

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Biofertilizers are known to play a number of vital roles in soil fertility, crop productivity and production in agriculture as they are eco friendly and cannot at any cost replace chemical fertilizers that are indispensable for getting maximum crop yields. They are cheaper, pollution free and renewable energy sources. Biofertilizers are very important in biogeochemical cycles and have been used for crop production. The beneficial influences of microorganisms on plant growth include nitrogen fixation, acquisition and uptake of major nutrients, promotion of shoot and root growth, disease control or suppression and improved soil structure. Some of the commonly

promoted and used beneficial microorganisms in agriculture worldwide include *Rhizobia*, Mycorrhizae, *Azospirillum*, *Bacillus*, *Pseudomonas*, *Trichoderma*, *Streptomyces* species and many more. Some Biofertilizers *(eg, Rhizobium BGA, Azotobacter* sp) stimulate production of growth promoting substance like vitamin-B complex, Indole acetic acid (IAA) and Gibberellic acids etc. Nitrogen fixation is one of the essential beneficial biological processes for the economic and environmental sustainability of agriculture worldwide. Symbiotic nitrogen-fixing bacteria include the cyanobacteria of the genera *Rhizobium*, *Bradyrhizobium*, *Azorhizobium*, *Allorhizobium*, *Sinorhizobium* and *Mesorhizobium*. Phosphate mobilizing or phosphorus solubilizing biofertilizers / microorganisms (bacteria, fungi, mycorrhiza etc.) converts insoluble soil phosphate into soluble forms by secreting several organic acids and under optimum conditions. They improve physical properties of soil, soil tilth and soil health in general.

Key words: Bio- fertilizer, soil health and yield.

Abstract – 034

CLIMATE CHANGE AND ITS IMPACT ON AGRICULTURE

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Agriculture plays a vital role in India's economy. Over 58 per cent of the rural households depend on agriculture as their principal means of livelihood. The share of primary sectors (including agriculture, livestock, forestry and fishery) is estimated to be 20.4 per cent of the Gross Value Added (GVA) during 2016-17 at current prices. India's GDP is expected to grow at 7.4 per cent in 2018-19. India's food grain production reached 275.68 million tones in 2016-17 and is targeted at 274.55 million tones in 2017-18 and It is expected to achieve the ambitious goal of doubling farm income by 2022 (*The Economic Survey 2016–17, APEDA).* Climate Change is increasingly one of the most serious national security threats which will have significant impacts on natural resources, ecosystem and biodiversity. Rising temperature affects flowering and leads to pests and disease buildup. Flood and excess rain over a short duration of time cause extensive damage to crops. Extreme weather events have caught attention of agrarian experts and scientists alike and they are now focusing on natural farming to arrest the impacts of climate change.

Key words: Economy, GDP and climate change.

Abstract – 035

EFFECT OF SORGHUM CULTIVARS AND NUTRIENT MANAGEMENT ON ECONOMICS OF SORGHUM

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A field experiment was conducted during 2016-2017 in *kharif* season at Agronomy Research Farm, ICAR-National Dairy Research Institute, Karnal to study the effect of sorghum cultivars and nutrient management on economics of sorghum. The experiment was laid out in split-plot design with eight varieties of forage sorghum *viz.*V_1 (MP Chari), V_2 (PC-615)-local check, V_3 (CSV 30F), V_4 (CSV20), V_5 (CSV 27), V_6 (CSV 21F), V_7 (UPMC 503), V_8 (CSV 15) in main plots and four Nutrient Management: Control, N:P:K (150:80:40), N:P:K (100:60:30), N:P:K (50:40:20) in sub plots with three replications in total 96 numbers of plots . The findings of the experiment revealed that among the different cultivars, the highest monetary returns (gross returns, net returns and B: C ratio) was realized by cultivar UMPC -503 followed by CSV 15. However the lower monetary returns were recorded in cultivar CSV 27. Among the different fertility levels, it has been observed that the highest monetary returns (gross returns, net returns and B: C ratio) was with the application of N-150, P-80, and K-60 kg ha^{-1} i.e. F_1 and lower returns were realized in control.

Key words: Sorghum, economic and nutrient management.

Abstract – 036

METROGLYPH ANALYSIS IN SEWAN GRASS (*Lasiurus sindicus* Henr.) ACCESSIONS

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The dominant perennial grass i.e. indigenous sewan grass is popularly known as the "king of desert grasses". Sewan grass (*Lasiurus sindicus* Henr.) belongs to family *Poaceae* is native to dry areas of North Africa, Sudanese and Sahelian regions, East Africa, and Asia. Sewan grass is a diploid species with somatic chromosome number (2n) 20. Sewan grass is a perennial grass that can live up to 20 years, propagation is done either by sowing or root slips and highly tolerant to drought. The present investigation was carried out to estimate morphological variation for green fodder yield and related traits in sewan grass (*Lasiurus sindicus* Henr.) during *kharif*-2017 at ARS, Bikaner. Among all the characters, two characters viz., number of tillers per plant and dry matter yield per plant showed high phenotypic coefficient of variation, respectively. These two characters were represented as glyph for metroglyph analysis; other nine characters were represented as rays on glyph at various lengths at different positions on the basis of their means criteria. On this basis, the 30 accessions were classified into seven clusters. It can be also inferred that the scoring procedure would be utilized in the preliminary screening of a large number of genotypes for selection of accessions with desirable combination of various characters influencing the number of tillers per plant with dry matter yield per plant in sewan grass. Highly diverse accessions, on the basis of their total index score; (RLSB 1-41, RLSB 10-1, RLSB 4-41, RLSB 4-37 and RLSB 10-17) were identified.

Key words : Sewan grass, variability, metroglyph analysis, accessions

Abstract – 037

YIELD AND ECONOMICS OF DIRECT SEEDED RICE *(Oryza sativa* L.*)* AS INFLUENCED BY MULCHING, NITROGEN LEVELS AND WEED MANAGEMENT PRACTICES IN EASTERN PART OF UTTAR PRADESH

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A field experiment was carried out in the year 2014 and 2015 at experimental field of Banaras Hindu University, Varanasi, Uttar Pradesh, to evaluate the influence of mulching, nitrogen levels and weed management practices on direct seeded rice. Twenty-four treatment combinations consisting of two mulching *viz*. no mulch and live mulching (brown manuring with *Sesbania*) and nitrogen levels (120 kg ha^{-1}, 150 kg ha^{-1} and 180 kg ha^{-1}) in main plot and four weed management practices *viz*. weedy check, two hand weeding at 20 and 40 DAS; azimsulfuron @ 30 g ha^{-1} + bispyribac-sodium @ 25 g ha^{-1} at 10-15 DAS; pendimethalin @ 1 kg ha^{-1} at 1-3 DAS *fb* bispyribac-sodium @ 25 g ha^{-1} 15-20 DAS were allocated to sub plots. It was observed that maximum grain yield was recorded under brown manuring with *Sesbania* for both the years. Among nitrogen levels, 150 kg N ha^{-1} and under weed management practices pendimethalin @ 1 kg ha^{-1}*fb* bispyribac- sodium @ 25 g ha^{-1} produced maximum grain yield, respectively, for both the years. Further, it was observed that although cost of cultivation of mulch treatment was more, yet it recorded maximum gross returns, net returns and B: C ratio during both the years. Also it was clearly revealed that maximum gross returns, net returns and B:C ratio was recorded with application of 150 kg N ha^{-1} under various nitrogen levels and with application of pendimethalin @ 1 kg ha^{-1}*fb*bispyribac- sodium @ 25 g ha^{-1} among weed management practices for both the years.

Key words: Rice, mulching and weed management.

Abstract – 038

EARLY GENERATION TESTING IN CAULIFLOWER (*Brassica oleracea*var. *botrytis* L.)

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Testing of S_2 or S_3 families is effective to select the segregantsat early generation in derivation of inbred lines in allogamous crops. Thirty eight test cross entries generated from the cross between nineteen cauliflowers lines at second selfing generation (S_2) with two testers in line x tester design were evaluated along with their parental linesin two dates of transplanting in 2016-17. Analysis of variance components revealed the predominance of non-additive gene action for all of the traits. Hzp 106, SA-1, Hzp 101, Sel 16; Sel 3, Hzp 108 and Hzp 110 were found to be good general combiners in the first experiment; while SA-1, Hzp 106, Sel 332, Hzp 111 and Hzp 101 were in second experimentfor net curd weight(g) per plant. BRMCF-125 and SA-1 were found to be good general combiners for maximum of eight traits both in the experiment. Inter simple sequence repeat (ISSR) markers were found to be effective than simple sequence repeat (SSR) in distinguishing the lines as revealed by highly polymorphic.Parental lines were grouped into four clusters with only single genotypes in cluster I and Cluster II each. Early testing and molecular markers were found effective to identify the cauliflower genotypes.

Key words: general combining ability, molecular markers, inbred, cauliflower.

Abstract – 039

EFFECT OF CLIMATE CHANGE ON AGRICULTURE

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Global climate change is a change in the long term weather patterns that characterize the regions of the world. The term 'weather' refers to the short term (daily) changes in temperature, winds, and/or precipitation of a region. In the long run, the climatic change could affect agriculture in several ways such as quantity and quality of crops in term of productivity, growth rates, photosynthesis and transpiration rates, moisture availability etc. Climate change is likely to direct impact food production across the globe. Increase in the mean seasonal temperature can reduce the duration of many crops and hence reduce the yield. In areas where temperatures are already close to the physiological maxima for crops, warming will impact yields more immediately. Drivers of climate change through alterations in atmospheric composition can influence food production directly by its impact on plant physiology. The consequences of agriculture's contribution to climate change and of climate change's negative impact on agricultures, are severe which is projected to have a great impact on food production and may threaten the food security and hence, require special agricultural measures to combat with.

Key words: Climate change and crops.

Abstract – 040

EFFECT OF CLIMATE CHANGE ON AGRICULTURE

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Agriculture and climate change are intensely intertwined. Climate change is any significant long-term change in the estimatedcontexts of average weather of region (or the whole Earth) concludedanimportant period of time. The climatic change could affect agriculture in several ways such as quantity and quality of crops in terms of productivity, growth rates, photosynthesis, transpiration rates and moisture availability etc. Agricultural

activities are affected by climate change affects due to their direct dependence on climatic factors. Climate change scenarios include higher temperatures, changes in precipitation, and higher atmospheric CO2 concentrations. Increase in the mean seasonal temperature can reduce the duration of many crops and hence reduce the yield. In high latitude areas with low temperature, increased temperature due to climate change could allow for longer growing season. Agriculture affects climate through emissions of greenhouse gases (GHGs) such as carbon dioxide, methane and nitrous oxide. These emissions come directly from use of fossil fuels, tillage practices, fertilized agricultural soils and livestock manure in large proportion. Climate change, the outcome of the "Global Warming" has now started showing its influences worldwide. Food production systems are extremely sensitive to climate changes like changes in temperature and precipitation, which may lead to outbreaks of pests and diseases thereby reducing harvest ultimately affecting the food security of the country. We need yields to grow to meet growing demand, but already climate change is slowing those yields. It is warning that the scientific community aware to people that decrease in crop yields is already taking place due to global warming. At the same time, agriculture – especially intensive agriculture, characterized by monocultures and aimed at feeding farm animals – is one of the sectors that generates the highest amount of emissions of CO2 (the main greenhouse gas). Conversely, agriculture could be a solution for climate change by the widespread adoption of mitigation and adaptation actions. This happens with the help of best management practices such as organic farming, agroforestry practice and manure management.

Key words: Agriculture, Climate, Change, global warming.

Abstract – 041

SUSTAINABLE AGRICULTURE IDEA FOR OUR UPCOMING FORMERS

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By the year 2050 the human population will be nearly 10 billion which means we'll need to have doubled the quantity of food we now harvest. This is an inspection of the agricultural improvements future down the channel that will help get us there.Two factors were most responsible for the surge in productivity: engines and the widespread availability of electricity. Today, the innovations on our immediate horizon include autonomous pickers UK researchers have already created one that gathers strawberries twice as fast as humans, the challenge will be creating robotic Pickers that can switch between all kinds of crops; robots or drones that can precisely remove weeds or shoot them with the targeted spritz of pesticide, using 90% less chemicals than the conventional blanket sprayer. For the organic farmer, they could zap the weeds with a laser instead. This could have a big impact; the UN estimates that each year, between 20 and 40 percent of global crop yields are destroyed by pests and disease. Tiny sensors and cameras will monitor crop growth and alert farmers on their smartphones if there's a problem, or when it's the best time to harvest; the bounty Rob can take a soil sample, liquidize it, then analyze its pH and phosphorous levels all in real time; as a proof of concept for all this autonomous farming technology, researchers at Harper Adams in the UK plan to grow and harvest an entire hectare of barley without humans ever entering the field. For now though, only expensive, leafy greens like lettuce-or herbs like basil-have proven profitable in the vertical system. and the jury is definitely still out on whether this is truly and environmentally friendly technique; one possible solution is to use blue and red light wavelengths to optimize photosynthesis and turbo-boost growth a technique tested by researchers at project growing researchers at project Growing Underground and experimental farm operating in Old World War two bomb shelters underneath London; another advancement in indoor farming is the Open Agriculture Initiative, which aims to create a "catalogue of climates" so temperature and humidity can be set to recreate the perfect conditions for growing crops that would normally come from all over the world, locally instead. This is an attempt to tackle the "food miles" issue. When produce is shipped around the world it creates unnecessary CO2 emissions.

Key words: Innovative technology, Future Agriculture, precision agriculture, Sustainable agriculture idea, IoT and AI in farming.

Abstract – 042

FINE MAPPING OF QTL FOR DAYS TO 50% FLOWERING UNDER DROUGHT STRESS ON CHROMOSOME 6 IN IR 20/ NOOTRIPATHU RI LINES.

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Drought stress is the major constraint to rice (*Oryza sativa* L.) production and yield stability in rainfed ecosystems. Identifying genomic regions (QTLs) contributing to drought resistance will help to develop rice cultivars suitable for rainfed regions through marker-assisted breeding. A large effect QTL for days to flowering under drought earlier identified in IR20xNootripathu RI lines between RM314-RM6836 markers (~4.9 Mb) has been fine mapped in this study. This QTL region was narrowed down to 565kb between the markers RM19715-RM19737. This fine mapped region is also associated with straw yield and total biomass under rainfed condition. The positive allele comes from Nootripathu, a drought resistant landrace. The fine mapped region can be introgressed in to elite varieties to escape drought.

Keywords: Drought, rice, marker, QTL

Abstract – 043

IDENTIFICATION OF DROUGHT INDUCED GENOME WIDE DNA METHYLATION IN RICE

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Cytosine methylation polymorphism plays a key role in gene regulation mainly in expression of genes in crop plants in response to biotic and abiotic stresses. In this study, the differential expression of cytosine methylation was analysed in 17 selected rice genotypes under 3 moisture regimes as control, drought stress and recovery at the panicle initiation stage of the plant using Methylation Sensitive Amplification Polymorphism technique. The similarity was recorded 50%, 38.63% and 45.45% in Control, Drought stress and Recovery.From control to stress condition higher proportions of de-methylation events were observed in the tolerant genotypes whereas for susceptible genotypes it was obtained under stress to recovery condition. A total of 14, 17 and 18 tolerant associated epiloci were identified under control, drought and recovery conditions.Four out of 14 in control, 5 out of 17 under drought and 5 of 18 were determined as Differentially Methylated Epiloci (DME) in the study. The DME generated from these genotypes could have higher probabilities for association with stress tolerance. The DME found in this study are suspected to be good epigenetic markers for the application in drought tolerant rice breeding.

Key words: Rice, drought and DNA

Abstract – 044

NUTRITIONAL VALUE OF VEGETABLES

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More than 70% people in developing countries depend on vegetables further regular dietary needs. Vegetables prevents human from several sever and chronic diseases. It is necessary to consume daily at least 400 g of vegetables including pulses, nuts and seeds. Vegetables are considered essential for well-balanced diets since they supply vitamins, minerals, dietary- fibers, and phytochemicals. Each vegetable group contains a unique combination and amount of these phytonutriceuticals, which distinguishes them from other groups and vegetables with in their own group. The major groups of phytochemicals include vitamin A, C, E and K, carotenpoid, terpenoid, flavonoids, polyphenols, saponins, enzymes and minerals. Since vegetables have

antioxidant properties they prevents human from cancer, cardio vascular diseases, diabetes, hyper tension, leprosy, rheumatism, epilepsy, liver and urinary disorder, stroke, paralysis etc. In the daily diet vegetables have been strongly associated with improvement of gastrointestinal health, good vision, and reduced risk of heart disease, stroke, chronic diseases such as diabetes, and some forms of cancer. More than 50 vegetables and leafy vegetables are identified for their antioxidant activity in terms of DPPH, FRAR, IC_{50}, ORAC values. All the vegetables may offer protection to humans against chronic diseases. Nutrition is both a quantity and a quality issue, and vegetables in all their many forms ensure an adequate intake of most vitamins and nutrients, dietary-fibers and phytochemicals which can bring a much-needed measure of balance back to diets contributing to solve many of these nutrition problems.

Key words: Vegetables, Nutrition and antioxidant.

Abstract – 045

BIOTECHNOLOGICAL APPROACHES IN CROP PRODUCTION TECHNOLOGY

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With increasing pressure on agriculture production, it has become difficult to cultivate a small piece of land in a judicious way. The heavy agricultural production has led to many unpleasant consequences one of such is degradation of soil. To overcome these obstacles, for producing high yielding and quality crops, many breeding techniques are used. But the disadvantage persists as the breeding programs are a long process due to which alternatives have to be looked for. Thus, biotechnological approaches have been used for production of crops with quantitative and qualitative traits. The approaches include haploid production, tissue culture, genetic transformation, marker assisted selection, molecular breeding, etc. These technological interventions can be used to produce crops with desired traits or in large quantity in short duration of time. But certain biosafety issues are related to biotechnology that cannot be neglected.

Key words: Crops, quantitative and qualitative

Abstract – 046

ASSESSMENT OF SOIL HEALTH AND SUSTAINANCE IN NORTH WESTERN HIMALAYAS

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Soil health and soil quality are defined as the capacity of soil to function as a vital living system within land use boundaries. In this review, we deal with soil health concept which includes interactions between plant inputs and soil in creating a healthy environment. Adverse effects on soil health arise from nutrient imbalance in soil and excessive fertilization processes that are increasingly becoming common in developing countries. To assess the soil quality we have to consider various physical, chemical and biological attributes referred to as indicators. These indicators may directly monitor the soil or monitor the outcomes that are affected by the soil. Soil quality indicators can also be used to evaluate sustainability of particular land-use and soil management practice in agro-ecosystems (Shukla et al. 2006). Assessment of soil health thus comprises three main steps, mainly: (1) selection, measurement and minimization of the set of relevant soil attributes; (2) quantification of the selected soil attributes through direct measurement and assigning an appropriate score; (3) integration among the scored attributes to construct the final index, by providing criteria for defining the weight of each attribute or group of attributes. The recent approach in assessing soil quality includes normalization of the data from measurements and conversion to a numeric value that is more than a static descriptor, called a 'soil quality index' (SQI). The soil quality index was maximum in treatment under continuous application of 100%NPK+FYM (Ram et al. 2016). Therefore, it can be concluded that integrated nutrient is viable proposition to maintain soil quality over a long period of continuous cultivation. Among the various treatments' 100% RDF + FYM not only had the highest soil quality index but it was found as the most promising approach from the view point of yield

sustainability, maintaining higher average yields under sorghum - wheat cropping sequence (Katkar, 2012). Under such farming systems combination of organic and chemical fertilizers may be a viable option to increase yield, improve nutrient availability, soil health and productivity in mid hills of North West Himalayan region in India.

Key words: Soil health, agro ecosystems and productivity.

Abstract – 047

SMART FARMING AND FUTURE OF AGRICULTURE

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Traditional farming techniques are mostly used in Indian agriculture from decades or centuries. These farming techniques are laborious and time consuming. Currently smart farming techniques are trending. It is a type of farming in which implementation of various high-tech farming techniques, latest Information and Communication Technologies into agriculture, to improve the quality and quantity of agricultural products. In the 21th century, Indian farmers have approaches to GPS, soil scanning, data management and internet of things technologies. This farming system can greatly increase the effectiveness of pesticides and fertilizers and use them more selectively. Similarly, by the using smart farming techniques, farmers can also monitor the livestock's and regulate their nutritional requirement. It can be helpful in preventing disease and improve livestock's health. So smart farming has great opportunities in future of Indian agriculture.

Keywords: Smart farming, Information, High-tech, Pesticides and livestock.

Abstract – 048

ANTIBIOTIC SUSCEPTIBILITY PATTERN OF ESBL PRODUCING BACTERIA FROM URINARY TRACT INFECTION (uti)

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Antibiotics inhibit bacterial cell wall synthesis, protein synthesis or nucleic acid replication. The antibiotic must have access to and bind to its bacterial target site. Whether antibiotic resistance is intrinsic or acquired, the genetic determinants of resistance encode specific biochemical resistance mechanism that may include enzymatic inactivation of the drug, alteration to the structure of the antibiotic target site and changes that prevent access of an adequate concentration of the antimicrobial agents to the active site. Klebsiella organisms are often resistant to multiple antibiotics. Current evidence implicates plasmids as the primary source of the resistance genes. the susceptibility pattern of different antibiotics to ESBL producing *Escherichia coli* and *Klebsiella spp*. isolated from urine samples and they found that most of infection caused by . E.coli (61.29%) found to be most common bacteria in urinary tract infection followed by Klebsiella spp. (45.16%). Isolates were highly resistance to Gentamicin followed by Tetracycline, Ampicillin and Amikacin. Gentamicin showed resistance against E.coli and Klebsiella spp were 89.47% and 85.71% respectively. While Tetracyclin and Ampicillin showed 80% and 78% resistance to E.coli and Klebsiella spp. The isolates were highly susceptible against imipenem and least susceptible to Ciprofloxacin and Norfloxacin against E.coli and Klebsiella spp. These antibiotics are considered as appropriate antimicrobials for empirical treatment of urinary tract infections. Most of the ESBL A producing isolates were multidrug resistant. During present study, when urine sample inoculated on selective media like EMB, CLED, MSA,PIA and CIA, the growth of isolates on the medium were obtained as *E. coli, Klebsiella pneumoniae , S.aureus* and *Pseudomonas aeruginosa.*

Key words: ESBL producing bacteria, urinary tract infection, antibiotic susceptibility, antibiotic resistance

Abstract – 049

ISOLATION AND PURIFICATION OF ANTIMICROBIAL COMPOUND FROM *RHEUM AUSTRALES*

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Plants based antimicrobials have enormous therapeutic potential. They are effective in the treatment of infectious diseases while simultaneously mitigating many of the side effects that are often associated with synthetic antimicrobials. The Central Himalayan region covers the new states of Uttarakhand, which includes the major divisions of Kumaun and Garhwal. The region supports about 1,386 medicinal plant species, out of which 1,338 are used to treat human diseases and disorders and about 364 plant species are used for veterinary diseases by the people of Uttarakhand. The hilly state has its unique geography and diverse climatic conditions. It harbours the highest number of plant species known for medicinal properties among all the Indian Himalayan states. The inhabitants of Uttarakhand are still dependent on the V*aidhyas* (traditional herbal practitioners) for treating disease due to isolation and relatively poor access to modern medical facilities. In the present investigation, solvent extracts (viz. hydro-alcoholic, aqueous and hexane) of Rheum australes were prepared and screened for antimicrobial activity against the pathogenic and drug resistant strains (viz. drug resistant *Staphylococcus aureus*, drug resistant *Pseudomonas aeruginosa*, *Micrococcus luteus*, *E. coli*, *E. coli mutans*, *Salmonella abony*, *Lactobacillus plantarum*, *Staphylococcus epidermidis*, *Candida albicans* and *Aspergillus niger*). The hydro-alcoholic extracts showed significant antimicrobial activity against all the bacterial strains studied and *Aspergillus niger* while no antifungal activity of hexane extract was observed against *Candida albicans*. The hexane extracts showed no antibacterial activity against drug resistant *Staphylococcus aureus*. The pure antimicrobial compound isolated and characterized from this plant was revandichinone. Compound, revandchinone, was isolated as bright yellow needles; its melting point was found to be 214^{0}C. The compound isolated was further subjected for antimicrobial screening against pathogens at varying concentrations. The Rf value (0.67) of the isolated compound was found to be similar as that of the standard. The IR spectrum showed absorption bands at 607.90 cm^{-1} (-OCH3), 1067.28 cm^{-1} (C-O), 1264.63 cm^{-1} (C-O stretch).

Keywords: Rheum australes, solvent extracts, antibacterial activity, antifungal activity, molecule isolation, characterization.

Abstract – 050

CHITOSAN and derivatives AS A NATURAL BIO-STIMULANT FOR ENHANCING AGRICULTURAL PRODUCTIVITY

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Chitin, a polysaccharide of animal origin, is obtained from waste material of seafood industries. It occurs in the skeletal material of crustaceans such as crabs, lobsters, shrimps, prawns and crayfish. Chitin is also the important component of exoskeleton of Arthropods. Chitin is also forming the important composition of fungus. Chitosan and chito-oligosaccharides (COS) are the derivatives of chitin. The chitosan is the de-acetylated form of chitin while chito-oligosaccharides (COS) are the breakdown units of chitin. The chitin and chitin based derivatives are reported to have significant pharmacological and agricultural importance. In the present study, the extraction and purified of chitin and chitin based derivatives (chitosan and chito-oligosaccharides) was performed from exo-skeleton of crabs and prawns and further utilized to assess the seed germination assay in mung bean and corn seeds in comparison to control. The results showed that, chito-oligosaccharides and chitosan showed significant growth promotion activity in germination of 92 % and 85 % mung bean and corn seeds in comparison to chitin and control (treated with sterilized distilled water), which showed only 82% and 75 % seed germination respectively. The results also showed that seeds treated with chitin and chitin based derivatives had no infection in later stages in comparison to control. Further, the study is in progress in order to determine it's worth as an effective seed dresser.

Keywords: Chitin, chitosan, chito-oligosaccharides (COS), seed germination assay, agricultural productivity.

Abstract – 051

COPPER-CHITOSAN FUSED NANOPARTICLES AS A BEST POSSIBLE REMEDY AGAINST FUNGAL PHYTO-PATHOGENS

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Copper (Cu) is known to have antibacterial and antifungal properties; also it is non-toxic to mammals. These properties thus make Cu-NP synthesis an attractive area. A number of methods for producing Cu-NPs have been developed using both physical and chemical approaches, which involves elevated temperatures, inert atmospheres, large amount of surfactants and organic solvents. However, the major limitations in the synthesis of CuNPs are their ease of oxidation to CuO or Cu2O during preparation and storage. Therefore, alternative methods have been developed to synthesize CuNP in the presence of polymers and surfactants as stabilizer. There are some recent reports on a successful synthesis of Cu-NPs in aqueous solution, using chitosan which involve additional reducing and stabilizing agents at various steps that are associated with environmental toxicity. In green synthesis method, preparation of Cu-NPs, colloidal stability in aqueous media using chitosan, a biopolymer as a reducing and capping agent. The choice of chitosan as a stabilizer of the Cu-NPs is because of its ability to chelate metals, which makes a perfect material for metal NP synthesis. The synthesis of NPs using polymer has been promising due to their ease of processing, solubility, biocompatibility, less toxicity and also because of the possibility of controlling the growth of the resulting NPs. The studies demonstrated that hydrophilic side chains of chitosan play a fundamental role in stabilization and dispersion of NPs, preventing their agglomeration. When Cu salts dissolve in acidified chitosan solution, Cu ion binds to the polymer chains via amino groups. The reduction of these ions takes place further, coupled with the oxidation of the hydroxyl groups. Thus NPs generated are strongly attached to the chitosan due to the chemical bond between the electron rich nitrogen present in the amino groups of the polymer and copper. The use of biopolymer as capping and or reducing agents represents an environmentally friendly alternative to hazardous organic solvents. The present study suggests the utility of Copper-chitosan fused nanoparticles as an effective fungicidal agent against phyto-pathogens. The results showed that, these particles are effective at three sprays at an interval of every 7 days and at thrice a month frequency.

Keywords: Copper-chitosan nanoparticles, antifungal potential, non toxic, biodegradable.

Abstract – 052

ANTIMICROBIAL AND ANTIOXIDANT ACTIVITIES OF solvent extracts of *BACOPA MONNIERI*

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Natural products and their derivatives represent more than 50% of the drugs in clinical use in the world. One of the paramount reasons for pursuing natural products chemistry resides in the actual or potential pharmacological activity to be found in alkaloids, terpenoids, coumarins, flavanoids, lignans, glycosides etc. Antimicrobial plant extracts have been recognized as a future source of new antimicrobials in the event of the current downturn in the pace at which these are being derived from micro-organisms. Medicinal plants are rich in antioxidants, which make them excellent sources for increased health benefits. Health advantages of diets rich in antioxidant plant compounds include lowering the risk of cardiovascular disease, certain cancers and the natural degeneration of the body associated with the aging process. In the present study, different solvent extracts of whole plant, *Bacopa monnieri* were prepared on the basis of increasing polarity viz. petroleum ether, hexane, methanol and distilled water. The solvent extracts were screened for antimicrobial and antioxidant activities at 150 mg/ml. The methanol and aqueous extracts of the plant showed maximum potency in comparison to petroleum ether and hexane extracts against the bacterial and fungal strains. The extracts showed maximum inhibitory effect against *Salmonella typhimurium*, *Staphylococcus aureus*, *Bacillus subtilis* and *Pseudomonas aeruginosa*, *Candida albicans* and *Aspergillus niger*. The non polar extracts didn't showed

significant activity against the strains studied. The results of antimicrobial activity of the potent methanol extract of the plant were screened by bio-autograohy screening. The clear zones on the chromatogram indicate areas of inhibition [zones where no active growth of pathogen has taken place]. The bio-autography screening of the extracts performed was also recorded. The methanol extracts and aqueous extracts showed MIC values at the range of 0.2 mg/ml to 0.5 mg/ml against all the pathogens studied while non polar extracts showed MIC values in the range from 1.25 mg/ml to 2.0 mg/ml. The order of total phenolic compound content obtained by different conventional solvent extractions from low to high was hexane, petroleum ether, water and methanol. The values of TPC in *Bacopa monnieri* (whole plant) were found to be 43.34, 56.25, 82.34 and 104.45 µg gallic acid equivalent/g of the plant material. The four extracts of *Bacopa monnieri* (whole plant) tested for antioxidant activity using DPPH radical scavenging was determined, the methanol and aqueous successive extracts showed the maximum antioxidant activity with IC_{50} values of 34.43 µg/ml and 45.23 µg/ml, respectively. The petroleum ether and hexane extracts also showed antioxidant activity with IC_{50} values of 65.45 and 68.12 µg/ml. Among the four extracts of *Bacopa monnieri* (whole plant) tested for antioxidant activity using Superoxide Anion radical scavenging method, the methanol and aqueous successive extracts showed the maximum antioxidant activity with 56.60 and 68.34 % inhibition. The petroleum ether and hexane extracts also showed antioxidant activity with 34.45 and 45.56 % inhibition. Ascorbic acid was used as the standard antioxidant which showed IC_{50} value, 85.34 µg/ml via DPPH radical scavenging method and 95.45 % inhibition of superoxide free radicals.

Keywords: Bacopa monnieri, solvent extracts, antimicrobial, antioxidant activity.

Abstract – 053

ANTICANCER PROPERTIES OF SOLVENT EXTRACTS OF *BERGENIA STRACHEYI*

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Cancer is a group of diseases caused by loss of cell cycle control. Cancer is associated with abnormal uncontrolled cell growth**.** Cancer is caused by both external factors (tobacco, chemicals, radiation and infectious organisms) and internal factors (inherited mutations, hormones, immune conditions, and mutations that occur from metabolism). Cancer is a significant worldwide health problem generally due to the lack of widespread and comprehensive early detection methods, the associated poor prognosis of patients diagnosed in later stages of the disease and its increasing incidence on a global scale. The anticancer activity of *Bergenia stracheyi* was determined against different human cancer cell lines like neuroblastima (IMR-32), and colon (HT-29). The potential of anticancer property of *Bergenia stracheyi* leaf extract was assayed by MTT method. The activity was done at different concentration like 100 and 200 µg/ml of the extract. It is observed that, 50% inhibitory concentration (IC50) is 200 µg/ml against neuroblastima (IMR-32), and colon (HT-29) cell lines for all the aqueous and ethyl acetate extracts. While increasing the concentration of extracts showed decrease in cell viability. Extracts of B. stracheyi showed dose dependent reduction of cell viability and induction of apoptosis in the neuroblastima (IMR-32), and colon (HT-29) cell lines. The results showed that, extracts of *B. stracheyi* contains some active compounds that might be responsible for anticancer activity.

Keywords: Bergenia stracheyi, solvent extracts, anticancer activity, cancer cell lines.

Abstract – 054

AMAROGENTIN: AN ANTIHELMINTHIC MARKER IN SWERTIA CHIRAYTA

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In the ethno-pharmacological approach, local knowledge about the potential uses of the plants is very useful as compared to the random approach where indigenous knowledge is not taken into consideration. Compounds for different pharmacological activities have been isolated from plants. Plants are capable of synthesizing an overwhelming variety of low molecular weight organic compounds usually unique and complex in structure.

Phytochemicals produced in plants are secondary compounds responsible metabolic activities and defense in purpose. In the present investigation, a significant biomarker, amarogentin was isolated from the gradient column fractionation of hydro-alcoholic extract of *Swertia chirayta*. The compound was obtained as a pale yellow powder after drying and was found to be a iridoid glycoside. The compound showed Rf value of 0.75 when compared to standard. The compound demonstrated paralysis as well as death of worms in a less time at 20 µg/ml as compared to piperazine citrate and albendazole (15 mg/ml). The results showed the significant potency of amarogentin as a significant anti-helminthic.

Key words: Swertia chirayta, amarogentin, hyfro-alcoholic extract, glycoside.

Abstract – 055

PHARMACOLOGICAL PROFILE OF *RHEUM WEBIANNUM*

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Rheum is medicinally important as it has hepatoprotective, spasmolytic, anticholesterolaemic, antitumor, antiseptic, antifungal, anti-microbial, anti-Parkinson's, anti-proliferative, immuno-enhancing, antiviral and antioxidant properties. A huge array of bioactive compounds has been so far isolated from *Rheum*. This emphasizes on the need of extensive study for the survey of literature regarding the information on the medicinal importance of various species of genus Rheum. The rhizome of *Rheum webbianum* has been traditionally used as a medicine since ancient times. It is used for the treatment of indigestion, abdominal disorders, boils, wounds and flatulence. *Rheum webbianum* root contains a large proportion of crysophanic acid, sometimes called crysophan, an allied substance emodin, a glycoside rhaponticin, a tannin called rheo-tannic-acid, several resins, an albuminoid principle, mucilage, extracts, tannic and gallic acids, sugars, starch, pectin, lignin, calcium oxalate, oxalic acid and various inorganic salts. The studies also suggest that, *Rheum webbianum* is a potential source of dietary fiber with lipid lowering effect. It is suggested that rhubarb exerts its effect on cholesterol by inhibition of enzyme squalene epoxidase. This enzyme is thought to catalyze the rate limiting step of cholesterol biogenesis. The main secondary metabolites present in *Rheum webbianum* to which it owes its medicinal importance are anthraquinones like rhein, emodin, aloe-emodin, physcion and chrysophanol. Besides anthraquinones various stilbene glycosides like rhaponticin and tannins like sennosides, catechins, gallic acid and cinnaminic acid are also present. Due to the presence of these active components it is used to cure various diseases like cancer, renal disorders, and hyperlipedemia and improves the memory of senile patients. The studies also showed action of anthraquinones present in *Rheum webbianum* is helpful in managing cancer. Rhubarb extract has been found to have antitumour and antiangiogenic action. Apoptopsis and cell cycle inhibition of many human cancer cell lines has been observed in vitro. Rhubarb extract is also suggested as an adjunct to chemotherapy. It has several medicinal properties which prove the plant as a strong pharmacological agent.

Keywords: Rheum webiannum, rhizomes, leaves, pharmacological profile.

Abstract – 056

IMPACT OF THE MICRONUTRIENTS ON GROWTH, YIELD, QUALITY ATTRIBUTES AND NUTRIENT CONTENT OF ONION (*Alliumcepa*)

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A field investigation was conducted at All India Network research project on Onion and Garlic, college of Horticulture, OUAT, Chiplima during the year2013-2014 to acess the influence of micronutrients on growth, yield, quality attributes and nutrient uptake of the onion (Allium cepa L.). The experiment designed with 6treatment combinations (T_1-Soil application of Zinc sulphate @ 10.0 kg ha-1, T_2 Foliar application of Zinc sulphate @ 0.5 % at 30 & 45 days after planting (DAP) T_3-Soil application of Borax @ 10.0 kg ha-1 T_4 -Foliar

application of Borax @ 0.25% at 30 & 45 DAP T_5 -Foliar application of Micronutrient Mixture 0.5% at 30 & 45 DAP, T_6 -Control (Without application of any micronutrients)) replicated by 4 time in randomized block design. significantly optimum plant height 63.00 cm, polar diameter 56.20 mm, equatorial diameter 46.38 mm, neck thickness 9.77mm were recorded with foliar application of micronutrient mixture @ 0.5 % @ 30 and 45 DAP (Composition: Fe- 2.5 %, B- 0.50 %, Zn-3.0%, Cu-1.0 %, Mn- 1.0 %), i.e; T_5, closely followed by foliar application of Zinc @ 0.5 % @ 30 and 45 DAP in the form of $ZnSO_4$ (T_2). Similarly, the treatment T_5 showed highest marketable yield (206.05 qha^{-1}) and total bulb yield (268.28 qha^{-1}) followed by marketable yield (176.06 qha^{-1}) and total bulb yield (239.37 qha^{-1}) in T_2.And the same treatment had maximum TSS (13.11), Protein content (12.60%) and N (1.68, 1.96%), P(0.62, 0.94%), K(2.46, 1.10%)concentration by leaf as well as by bulb. However, T_5 is the best treatment for maximum growth, yield, quality and nutrient content of the onion crop.

Key words: Onion, nutrient uptake and foliar application.

Abstract – 057

A COMPARATIVE EVALUATION OF ANTIBACTERIAL ATTRIBUTES OF AQUEOUS AND CHLOROFORM EXTRACTS OF *Carica papaya*Linn. LEAVES AND SEEDS

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Two types of extracts (Aqueous and chloroform) were prepared to test the efficacy of antibacterial action of *Carica papaya* leaves and seeds on *Staphylococcus aureus, Pseudomonas aeruginosa, Escherichia coli* and *Salmonella typhi* through in vitro agar well diffusion assay. The concentrations used were 25%, 50%, 75% and 100%(neat) of the aqueous and chloroform extracts of leaves and seeds (dried). Chloroform extract of leaves failed to show any inhibition at any concentrations while Aqueous extract was inhibitory to all at 100% concentration and effective at 25%, 50% and 75% for *S. aureus, Pseudomonas aeruginosa*, and *Escherichia coli* while it failed to inhibit *Salmonellatyphi* at these concentrations of aq. Extract of leaves of papaya. Lowest inhibition were seen at 25% aq. Extract of leaves of *Caricapapaya* and highest were at 100% concentration. The seed extract of both kind i.e aqueous and chloroform was effective to inhibit all tested bacteria except for *Salmonella typhi* but it was also inhibited at 100% (neat) concentration of both extracts. The zone of clearance was recorded in mm scale. In conclusion the aqueous extract of *Carica papaya* is powerful to inhibit the aforementioned bacteria while its seed extracts (aqueous and chloroform) is effective to most of the bacteria tested.

Key words: *Carica papaya*, antibacterial activity, agar well diffusion assay, aqueous and chloroform extracts

Abstract – 058

DOUBLING FARMER'S INCOME BY 2022: A CRITICAL APPRAISAL

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Agricultural strategy in the country during the planned development era has been to ensure food security and farmers have responded to the nation's needs well and adopted Green Revolution technology because of which the country achieved commendable position in food production. Farming itself turned non-profitable overtime due to rising costs and uneconomical holdings. The contagion of farmers' distress across the country has shaken the agrarian foundations, so enhancing incomes of the farmers and ensuring their income security, thus, has been of concern to all. The government of India in its annual budget of 2016-17 set a policy target of doubling farmer's income by 2022 with the objective to double the real income of farmers, not output or value added or the GDP of the agriculture sector. Targeted income includes income from agricultural as well as allied activities. Achieving the goal of Doubling Farmers' income by 2022 help to reduce persistent disparity between farm and non-farm income, alleviate agrarian distress, promote inclusive growth and infuse dynamism in agriculture sector. It will also attract youth towards farming profession and ease the pressure on non-farm jobs. To achieve

this, the government has announced a number of innovative measures that include improving farmers' access to institutions, infrastructure development, restoring soil health, improving efficiency of agricultural markets, expanding dairy processing facilities and enhancing farmers' capacity to diversify into nonfarm activities. In conclusion, doubling farmers' income in a short period is a challenge, but not insurmountable if the stakeholders follow a comprehensive, multi-pronged and targeted approach encompassing income opportunities and their enabling conditions including investment in agricultural research and infrastructure, and development of institutions and human resources.

Key words: Farmer income, GDP and human resources.

Abstract – 059

MICROBIAL DEGRADATION OF PESTICIDES FOR ENVIRONMENTAL CLEANUP

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Plant protection using synthetic chemicals/pesticides has become one of the essential components of modern agriculture as pesticides have made a significant impact on farmer's economy by preventing and reducing the agricultural losses due to pests, improving yield and quality food in terms of cosmetic demand. However, pesticides are one of the major pollutants as these causes the pollution of soil and water and creates a variety of toxic effects in living beings. The physico-chemical treatment methods for pesticides contaminated sites are highly expensive and not eco-friendly. In this regard, the bioremediation approach can be a suitable alternative over the conventional treatment methods for the treatment of pesticides-contaminated sites. Bioremediation is the use of microorganisms, fungi or their enzymes to degrade and detoxify the pollutants from the environment. Bioremediation is a cheap and environmental friendly approach for the degradation and detoxification of pesticides.

Keywords: Bioremediation, Pollutants, Microbes, Degradation, Pesticides.

Abstract – 060

EXOGENOUS APPLICATION OF AMINO ACIDS TO IMPROVE FRUIT GROWTH OF PEACH cv. FLORDA PRINCE

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The present investigations entitled "Exogenous application of amino acids to improve fruit growth of peach cv. Florda Prince" were carried out at Fruit Research Farm, Department of Fruit Science, Punjab Agricultural University, Ludhiana during the years 2016 and 2017. Different foliar treatments of amino acids (0.25 % and 0.50 % concentrations of amino acids viz. Peptone P1 023) were applied to the peach trees of cultivar 'Florda Prince' at 7 and 14 days after full bloom and repeated after 15 and 30 days. Four branches on each tree were tagged in north, south, east and west directions and two fruits on each branch were tagged. The diameter of the tagged fruits were measured with digital Vernier's Caliper at 15 days interval during fruit growth period starting from 15 days after fruit set. The treatments were single spray treatments (T_1 to T_4), double spray treatments (T_5 to T_8) and triple spray treatments (T_9 to T_{12}) of amino acids. Different amino acid applications had a significant effect on fruit growth recorded at different dates during fruit development in peach.In 2016, on March 30, the maximum fruit size (3.62 cm) was recorded in T_8 (2 sprays @ 0.50 %) and minimum fruit size (3.08 cm) was recorded in control trees. Likewise, on April 10, the maximum fruit size (4.60 cm) was recorded in T_8 while the minimum was recorded in control. On April 20, maximum fruit size (5.43 cm) was recorded in T_8 while the minimum was recorded in plants sprayed with triple sprays of amino acids (T_9 to T_{12}). Similar trend was followed in the year 2017 also. On April 9 and 24, the maximum fruit size (4.17 cm and 5.35 cm, respectively) was recorded in T_8 while the minimum was recorded in plants sprayed with triple sprays of amino acids. Therefore, application of double sprays of amino acids registered maximum fruit growth whereas minimum was recorded in control and plants sprayed with triple sprays of amino acids.

Key words: Peach, growth and amino acids.

Abstract – 061

OYSTER MUSHROOM CULTIVATION ON DIFFERENT SUBSTRATES (WHEAT, RICE & BAGASSE)

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The cultivation of edible fungi is controlled bio-conservation of agro industrial lingo-cellulosic waste and residues. Mushroom cultivation fits in very well with sustainable farming and has several advantages. It uses agricultural waste products. A high production per surface area can be obtained, after picking the spent substrate is still a good soil conditioner. The mushroom can be a good cash crop. The development of oyster mushroom (gray & pink) production methodologies on agricultural waste like paddy straw & wheat straw gives very high yield as well as nutritional condition like carbohydrate, protein, ash, calcium, magnesium, crude fibre & lipid were checked. Cooperative study on cultivation and yield performance of oyster mushroom on pure and mixed substrate of wheat, rice straw and bagasse (sugarcane straw) and identified which substrate are best for oyster mushroom cultivation. Mushroom cultivation is profitable agribusiness. Incorporation of non-conventional crops in existing agricultural system can improve the economic status of the farmer. Mushroom are the source of vitamins, proteins, minerals and are anti-cancerous, anti-cholesterol and anti-tumorous (Debukumar Bhattacharya *et al*, 2014). Furthermore, the results revealed that mixed bag of three substrate rice straw, wheat straw and bagasse in equal amount give the maximum yield percentage on fresh and dry weight basis.

Key words :- bio-conservation, crude fibre, anti-cancerous, anti-cholesterol, anti-tumorous

Abstract – 062

THE IMPACT OF CLIMATE CHANGE ON PLANTS AND PLANET

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In the atmosphere, gases such as water vapor, carbon dioxide, ozone, and methane act like the glass roof of a greenhouse by trapping heat and warming the planet. These gases are called greenhouse gases. The natural levels of these gases are being supplemented by emissions resulting from human activities, such as the burning of fossil fuels, farming activities and land-use changes. As a result, the Earth's surface and lower atmosphere are warming. Even small rises in temperature are accompanied by many other changes. Rising levels of greenhouse gases are already changing the climate. Warming temperatures associated with climate change will not only have an effect on crop species; increasing temperature also affects weeds, insect pests, and crop diseases. Weeds already cause about 34% of crop losses with insects causing 18% and disease 16%. Climate change has the potential to increase the large negative impact that weeds, insects, and disease already have on our agricultural production system. However, a study in nature communications examined a stabilization of atmospheric carbon dioxide increases, which has been attributed to the additional intake o the ground. The belief is that plants' being spurred on by climate change is causing it to slow, at least temporarily, because of more carbon dioxide being taken up. The study estimated in the late 20th century, 50 percent of human CO^2 emissions were being removed, but up to 60 percent may now be in the process of being absorbed by vegetation. Researchers also found that increased carbon dioxide concentrations help speed up photosynthesis by as much as 40 percent. Add the hindering of plant growth to the long and growing list of the ways climate change may affect life on our planet. The number of days when plants can grow could decrease by 11% by 2100 assuming limited efforts to stall climate change, affecting some of the world's poorest and most vulnerable people.

Key words :- Climate change, emissions, Weeds, photosynthesis, vulnerable

Abstract – 063

EFFECT OF CLIMATE CHANGE ON ECO-SYSTEM AND PLANTS

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In the atmosphere, gases such as water vapor, carbon dioxide, ozone, and methane act like the glass roof of a greenhouse by trapping heat and warming the planet. These gases are called greenhouse gases. The natural levels of these gases are being supplemented by emissions resulting from human activities, such as the burning of fossil fuels, farming activities and land-use changes. As a result, the Earth's surface and lower atmosphere are warming, and this rise in temperature is accompanied by many other changes. Most of these observed changes are modest, which is possibly due to the limited change in climate that has occurred. However, future projected changes in climate are much larger. The approximately 10% of species assessed so far will be at an increasingly high risk of extinction for every 1°C rise in global mean temperature, within the range of future scenarios modeled in impacts assessments. Aquatic freshwater habitats and wetlands, mangroves, coral reefs, arctic and alpine ecosystems, and cloud forests are particularly vulnerable to the impacts of climate change. Potential impacts of climate change on genetic diversity are little understood, though it is thought that genetic diversity will increase the resilience of species to climate change. Modeling studies on the potential impact of climate change on species indicates pole ward shifts and changes in altitude, range expansions or contractions corroborating the current evidence in the most part. However, such studies highlight the individualistic nature of species' responses to climate change, which is likely to have a large impact on future composition of ecosystems. Structure of ecosystems may also change. Models suggest this may have an impact on ecosystem function. For example, modeling suggests increases in net primary production in northern Europe but decreases in areas where water is a limiting resource. Changes in productivity are likely to change services such as nutrient cycling due to changes in litter fall. Other potential changes to ecosystem services due to climate change, include changes to the provisioning services, carbon storage and sequestration, water regulation and disease regulation. Changes to ecosystems as a result of climate change are likely to have significant and often negative social, cultural and economic consequences. However, there is still uncertainty about the extent and speed at which climate change will impact biodiversity and ecosystem services, and the thresholds of climate change above which ecosystems are irreversibly changed and no longer function in their current form. Tipping points are points at which a system passes from one steady state to another.

Key words: ozone, global mean temperature, extinction, sequestration,

Abstract – 064

CLIMATE CHANGE EFFECTS ON SOILS AND WATER RESOURCES

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The fourth assessment report of Intergovernmental Panel on Climate Change (IPCC) made it clear that the global average temperature has increased by 0.74°C over the last 100 years and projected increase is about 1.8 to 4.0°C by 2100. Climate change poses many threats to agriculture, including the reduction of agricultural productivity, production stability and incomes in areas of the world that already have high levels of food insecurity and limited means of coping with adverse weather. It's has an effect on soil physical chemical biological properties and water bodies. Though, climate change is a slow process involving relatively small changes in temperature and precipitation over long period of time, nevertheless these slow changes in climate influence the various soil processes particularly those related to soil fertility. The effects of climate change on soils are expected mainly through alteration in soil moisture conditions and increase in soil temperature and CO_2 levels as a result of climate change. It has an effect in various soil physical parameters like soil formation, soil development, soil processes ,soil moisture regime and soil temperature. In addition to the physical parameters climate change posses threats in biological ecosystem. However, changes in ecosystems and migration of vegetation zones may seriously affect less migratory soil flora and fauna through increased temperature and rainfall changes. A further

significant impact of climate change on soil fauna and flora is through enhanced CO_2 levels in the atmosphere. The most rapid processes of chemical or mineralogical change under changing external conditions would be loss of salts and nutrient cations where leaching increases and salinization where net upward water movement occurs because of increased evapo transpiration or decreased rainfall or irrigation water supply. It leads to alkalization, salinization and sodification problems in soil. Soil moisture regime plays a distinguished role and determines the water supply of plants, influences the air and heat regimes, biological activity and plant nutrient status of soil. Soil moisture deficit directly impacts crop productivity but also reduces yields through its influence on the availability and transport of soil nutrients. Adaption measures for climate change should follow for agricultural soils Being able to transform agriculture to feed a growing population in the face of a changing climate without hindering the natural resource base will not only achieve food security goals but also help mitigate the negative effects of climate change. The main climate change consequences related to water resources are increases in temperature, shifts in precipitation patterns and snow cover, and a likely increase in the frequency of flooding and droughts. Climate change affects groundwater recharge rates . Rising temperatures are likely to lower water quality in lakes through increased thermal stability and altered mixing patterns, resulting in reduced oxygen concentrations and an increased release of phosphorus from the sediments. Integrated water resources management should be an instrument to explore adaptation measures to climate change, but so far it is in its infancy. Successful integrated water management strategies include, among others: capturing society's views, reshaping planning processes, coordinating land and water resources management, recognizing water quantity and quality linkages, conjunctive use of surface water and groundwater, protecting and restoring natural systems, and including consideration of climate change. This chapter aims to cover the effect of climate change in soil water and in agriculture and also how to mitigate the adverse effect of climate changes by adopting various management strategies.

Key word : IPCC, salinization, sodification, Integrated water resources management.

Abstract – 065

AN INTRODUCTION OF HIGH DENSITY APPLE ORCHARDS FOR LIVELIHOOD ENHANCEMENT AND REDUCTION OF CARBON AMOUNT AMONG BHOTIYA TRIBAL COMMUNITY OF UTTARKASHI DISTRICT OF UTTARKHAND STATE.

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Uttarkashi district is located in the catchment of two major river system of India i.e. Ganga and Yamuna and tributaries. The district lies between N 300 27' latitude and E 780 54' to 790 25' longitude and has a total geographical area approximately 8016 sq. km. Among of which 21% of the total land is agricultural or Horticulture land where traditional crops like cereal plants *Tritium vulgare* (wheat), *Oryza sativa* (rice) and that make about 75% of total cereals of Uttarkashi . The minor cereal plants viz *Elusine Corsicana* (samak) etc. and pseudo cereals like *Fagopyrum esculentum* (kutu), *Amaranthus causation* (Ramdana) etc are included in remaining 25% of cereals. More than eight species of family Papilionaceae viz. *Dolichos lab lab* (Sem), *Glycine max* (soybean), *Pisum sativum* (matar), *Lens esculentum* (masoor), *Phaseolus munga* (urd), *Phaseolus radiatus* (moong), *Vigna sinensis* (Rajama) etc were produced by organic methods except Rice and wheat , Nowdays, due to infertile soil farmers are using fertilizers, pesticides rich in which is further decreasing the fertility of land day by day.

Key Words: - Climate change, Green Earth surface, Apple, High Density, Economic assistance, Bhotiya Tribe, Harsil, Uttarkashi

Abstract – 066

Effect of Timely, Late sown environments and Pooled conditions on Heterosis for seed yield in Indian Mustard (*Brassica juncea* L. Czern & Coss.)

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An investigation involving 55 genotypes (10 parents & 45 F_1s, excluding reciprocals) to identify high heterotic crosses in *Brassica juncea* L. was undertaken under two environmental conditions *i.e.* Timely sown (E_1), and Late sown, (E_2), High heterosis over mid parent for length of main raceme, 1000-seed weight and seed yield /plant was exhibited by the cross RH-0512 x SKM-0526, number of siliquae on main raceme RGN-229 x RKM-3, for seeds/siliqua, oil content HUJM-05-03 x SKM-0526, while High heterobeltiosis for oil content Purple mutant x HUJM-05-03, HUJM-05-03 x SKM-0526, length of main raceme was exhibited by the cross Purple mutant x SKM-0526, for seeds/siliqua Purple mutant x RKM-3, RKM-3 x Varuna in E_1, E_2 and pooled, respectively. For number of siliqua on main raceme RH-0152 x RK-08-02, RGN-229 x RKM-3 in E_1 and pooled, Maya x Varuna in E_2, for 1000-seed weight, seed yield per plant HUJM-05-03 x RKM-3, RH-0512 x SKM-0526, No cross combinations could stamp heterosis over the mid-parent and better parent for all parameters studied.

Key Words: relative heterosis, heterobeltiosis

Abstract – 067

PREDICTION OF GROSS CROPPED AREA IN MADHYA PRADESH THROUGH A MULTIPLE REGRESSION APPROACH

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Land use is an important natural resource which embraces the elements like overlying temperature, moisture, topography, soil matrix and physical structure. It is certainly a manifestation of past and present human activities. Therefore land use pattern is directly concerned with the problem arising in the process of deciding upon and carrying out into action for the optimum use. Indian agriculture is a land-based activity and as such water and land have been the basic elements of life support system and is an important resource for the economic life of a majority of people in the country. The pattern of land use is not uniform but it changes from place to place and time to time. The present study is confined to the Madhya Pradesh state which is the center region of India. It is sub-tropical area in nature of climatic condition. Secondary data of gross cropped area (Y), forest area (x1), area under not cultivation (x2), other uncultivable land (x3) and fallow land (x4) in M.P. for 31 years starting from 1983-84 to 2013-14 have been considered and were collected with the Collaboration of Agro-Economic Research Centre, J.N.K.V.V. Jabalpur (M.P.) and with other sources. The multiple Regression model may describe the pattern and projection of total cropped area based on predictor variables (x1, x2, x3, x4). In order to get evidence about the applicability of multiple regression procedure, Jarqua-Bera (J.B.) test, histogram of residuals, normal probability plot to test normality of errors, spearman's rank correlation test for homogeneity of errors and Durbin-Watson 'd' statistic to test the independence of autocorrelation in error terms have been applied on secondary data of variables (y, x1, x2, x3, and x4) in M.P. state for 31 years.

Keyword:- Autocorrelation, Normality and homogeneity of residuals, Multiple Regression Procedure.

Abstract – 068

CITRUS SANITATION BY IN-VITROSHOOTTIP GRAFTING

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Indian citrus industry is under threat of many devastating diseases, from which some are cause by virus and viroid which are graft-transmissible. The virus like Indian citrus ringspot virus (ICRSV), psorosis, xyloporosis(cochexia), exocortis (viroid),tristeza, citrus leaf blotch virus, etc are most common in citrus which can be prevented by using in-vitro shoot tip grafting. Shoot tip is free from the viruses is shown by morel and martin in Dahlia by shoot tip culture. In shoot tip grafting the scion of 0.2 mm to 0.3 mm is used to graft on the decapitated rootstock which is two week old and raised under etiolated, asepticand controlled conditions. As the citrus sanitation work done in Spain by using in-vitro shoot tip grafting giving 20% extra grade a quality yield than normal. Citrus sanitation program is long term program for improvement of mother block, which is the main source for infection of viruses which are graft-transmissible. The virus diagnosis after grafting is done by using ELISA (enzyme-linked immunosorbent assay) and by using RT-PCR (reverse transcriptase polymerase chain reaction). Some techniques like chemotherapy, thermotherapy and phytotherapy are also coupled with in-vitro shoot tip grafting for elimination of viruses.

Key word : Citrus, disease, sanitation, ELISA, immunosorbent

Abstract – 069

COMBINING ABILITY AND HETEROSIS FOR GRAIN IRON AND ZINC CONTENT IN PEARL MILLET (*Pennisetum glaucum* (L.) R. BR)

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Pearl millet [*Pennisetum glaucum* (L.) R. Br.] is a major warm-season cereal, grown primarily for grain production in the arid and semi-arid tropical regions of Asia and Africa. Iron (Fe) and zinc (Zn) deficiencies have been reported to be a food-related primary health problem affecting nearly two billion people worldwide. Improving Fe and Zn densities of staple crops by breeding offers a cost-effective and sustainable solution to reducing micronutrient malnutrition in resource poor communities. An understanding of the genetics of these micronutrients can help to accelerate the breeding process, but little is known about the genetics and heterosis pattern of Fe and Zn densities in pearl millet. In the present study, ten inbred lines and their full diallel crosses were used to study the nature of gene action and heterosis for these micronutrients. The general combining ability (GCA) effects of parents and specific combining ability (SCA) effects of hybrids showed significant differences for both of the micronutrients. However, the predictability ratio ($2\sigma 2gca/(2\sigma 2gca + \sigma 2sca)$) was around unity both for Fe and Zn densities, implying preponderance of additive gene action. Further, highly significant positive correlation between mid-parent values and hybrid performance, and no correlation between mid-parent values and mid-parent heterosis confirmed again the predominant role of additive gene action for these micronutrients. Barring a few exceptions with one parent, hybrids did not outperform the parents having high Fe and Zn levels. This showed that there would be little opportunity, if any, to exploit heterosis for these mineral micronutrients in pearl millet. In general, high Fe and Zn levels in both of the parental lines would be required to increase the probability of breeding high Fe and Zn hybrids.

Key words: Combining ability, Grain iron and zinc, Heterosis, Pearl millet, *Pennisetum glaucum*

Abstract – 070

STUDY OF GENETIC DIVERGENCE IN FABA BEAN (*VICIA FABA* L.) IN THE MID HILLS OF UTTARAKHAND

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The present investigation was conducted at Crop Improvement Research Block of VCSG Uttarakhand University of Horticulture and Forestry, Ranichauri Campus with 73 diverse genotypes of faba bean. The 73 genotypes including three checks *viz*., Vikrant, PRT-7 and PRT-12 were planted in an augmented design during. Genetic divergence was studied for characters *viz*. field emergence, days to 50% flowering, days to maturity, plant height (cm), number of pods per plant, pod length (cm), number of seeds per pod, 100- seed weight (g) and seed yield per plant (g). Data were analysed statistically for genetic divergence. In genetic divergence, all seventy-three genotypes were grouped into 6 clusters irrespective of geographical and genetic diversity. The highest inter cluster distance was observed between cluster II and cluster VIII followed by cluster IV and cluster VIII, cluster I and cluster VIII suggesting wide diversity among these groups. Considering cluster mean and genetic distance the crossing between HB-69, EC- 331564, HB-76, HB- 87 and HB-10, HB- 16, HB-18 genotypes suggested to recombine the gene for high seed yield for temperate conditions like mid hills of Uttarakhand.

Key Words :- Genetic divergence, clusters, inter cluster distance, genetic distance.

Abstract – 071

ROLE OF ORGANIC FARMING IN CONSERVATION OF AGRICULTURAL BIODIVERSITY AND FOOD SAFETY

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Modern agriculture posesa dramatic threat to the global biodiversity today on account of its extension and intensification. 20th century during its last quarter observed breathtaking shrinkage in terms of both range and abundance of many species associated with farmland which accentuated a concern over the sustainability of ongoing intensive farming practices. Alternatively, organic farming is now viewed as a possible solution to this endless loss of biodiversity. It is a holistic approach which relies mainly on organic fertilizers viz compost manure, green manure and bone meal and agronomic practices like crop rotation and companion planting. Moreover, biological pest control, ecological engineering, mixed cropping and the fostering of insect predators is also emphasized. Prohibition of synthetic substances and use of only naturally occurring substances is regulated by organic standards. Organic farming not only advocates sustainability, self-sufficiency, autonomy, health, food security, food safety but also promotes crop diversity in terms ofpolyculture. On an average more than 30% species inhabit organic farms and it was seen that birds, butterflies, soil microbes, beetles, earthworms, spiders and vegetation caused an increase in species richness in organic farming systems. Due to inhibition of herbicides and pesticides,a boost in biodiversity fitness and population density is observed. Organic farming not only builds healthy soil but also helps combat erosion, supports water conservation and water health. Food safety is also ameliorated on account of lower nitrogen application, minimal use of pesticidesand chemical fertilizers which in turn reduces the incidences of cancer, coronary heart disease and stroke. Organic food is healthier, tastier, authentic, natural, free from pesticides, antibiotics and GMO, low in nitrate content, safe and certified over non-organic food. Organic farming has the potential to support biodiversity conservation by augmenting the number plus the diversity of the wild species on farms, maintaining healthy soils and thus soil flora and fauna, reducing the risk of water pollution and being energy efficient .There is a pressing need for longitudinal and system level research in order to address the impacts of organic farming in biodiversity conservation in agro-ecosystems and food safety. Therefore, organic farming should not be seen as an isolated technology but as a systematic approach that embodies principles of human ecology and sustainable development.

Keywords: organic farming, biodiversity, food safety, organic food, polyculture, sustainability

Abstract – 072

NATURAL PROCESSES LEADING TO GREENHOUSE GASES PRODUCTION AND EMISSIONS OF GHGs FROM INDIAN AGRICULTURE

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Greenhouse gases entrap infrared radiation (heat) from the earth's surface and increase the temperature of the earth. Without this natural "greenhouse effect," temperatures would be about 33ºC (60ºF) lower than they are now, and life as we know it today would not be possible. During the past century, humans have substantially added to the amount of greenhouse gases in the atmosphere through activities such as burning fossil fuels and deforestation. Emissions of CH_4 and N_2O from wetlands to the atmosphere are a small residual of the much larger amounts produced and consumed in wetland soils.Riparian zones, located at the interface of terrestrial and aquatic environments, are often permanently wet and rich in organic matter, with saturated soil conditions and microbially available carbon that contribute to higher rates of production of N_2O than dry upland soils. In the open ocean, enhanced CH_4 production and flux can be found in upwelling areas, which are areas where the prevailing winds and currents bring nutrient-rich deep water to the ocean surface.CH_4 fluxes from water bodies are typically calculated from surface dissolved concentrations and wind speeds. These emissions are also found in permafrost and lake.CH_4 and other hydrocarbons can seep naturally from geologic sources deep within the earth's crust. Some geologic CH_4 emissions are produced via macroseepage, which includes relatively large localized emissions from identified geologic features and events such as mud volcanoes and localized vents.In addition to it,wildfires release a number of greenhouse gases, particulates, and other air pollutants. Mitigation of CO_2 emission from agriculture can be achieved by increasing carbon sequestration in soil through manipulation of soil moisture and temperature, setting aside surplus agricultural land and restoration of soil carbon on degraded lands.This chapter mainly focuses on greenhouse gas emission and it's mitigation in agriculture.

Key word : Green House, Emissions, Mitigation.

Abstract – 073

VARIETAL SCREENING OF GROUNDNUT CULTIVAR AGAINST *SCLEROTIUM ROLFSII* IN CAGE HOUSE UNDER ARTIFICIAL INOCULATION

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Groundnut is an important oilseed crop in India, grown extensively in various parts of the country in *rabi, kharif* and summer seasons. It has wide range of cultivation in tropical and subtropical countries of the world. It is a major source of edible oil and the kernel contains 44 to 50 per cent oil and 25 to 30 per cent protein. The biological value of groundnut protein is highest as compared to all the vegetable proteins. Groundnut is a good source of fat soluble vitamin A, D, E, K and carotene. Groundnut is infected by several fungal, bacterial and viral diseases but Stem rot caused by *Sclerotium rolfsii* is considered as one of the most devastating disease. Among different groundnut cultivars minimum disease incidence in GTBD-4 was 20.83% and maximum disease incidence in Pratap Raj Mungphali was 72.5%.

KEY WORDS: Varietal Screening, Biological Value, Cultivars, Pratap Raj Mungphali

Abstract – 074

STUDY OF EFFECTIVENESS OF DIFFERENT BIO-FERTILIZERS IN INCREASING THE YIELD OF CAPSICUM IN CONTROL CONDITION.

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The Present investigation was conducted at Vegetable Research Block of Veer Chandra Singh Garhwali Uttarakhand University of Horticulture and Forestry, Ranichauri Campus, Tehri-Garhwal in polyhouse equipped with thermo censored exhaust fans and drip irrigation system. The experiment was laid out in two factors RBD with five replications. The treatments in first factor included two methods of application of NPK *viz*., soil dressing (A1) and drip fertigation (A2) whereas second factor included four nutrient packages viz., N: P:K + FYM + lime + PSB + *Azotobacter* + Boron + Zinc. Observations were recorded on plant growth and fruit yield characteristics *viz*. number of fruits per plant, fruit yield per plant (g). The results indicated that the drip fertigation of NPK (A2) appeared to be the most promising treatment in polyhouse grown capsicum for fruit yield. $F_{1,}$ as far as interaction between application method of NPK and nutrient combination is concerned, maximum value of fruit yield/m^2 area was found in drip fertigation of NPK + F_2 (7.71 kg) followed by at par values of drip fertigation of NPK + F_1 and drip fertigation of NPK + F_2 . Drip fertigation of NPK and inclusion of biofertilizers and micronutrients as basal and/or foliar spray in nutrient package had inducing effect on fruit yield in polyhouse grown capsicum crop. So, The following cultural operations can be suggested to the growers for the better production of open cultivar of capsicum PRC -1 in control condition.

Key words: *Capsicum, drip fertigation, soil dressing, nutrient packages, polyhouse.*

Abstract – 075

ESTIMATION OF GENETIC VARIABILITY FOR YIELD AND ITS CONTRIBUTING TRAITS IN BREAD WHEAT (*Triticum aestivum* L.em. thell) GENOTYPES

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The present investigation was carried out during Rabi 2017-2018 were evaluated for heritability, genetic advance and expected genetic advance in bread wheat for yield and its contributing traits at Norman E. Borlaug Crop Research Centre, G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand. The experiment was carried out in Randomized Block Design (RBD) with three replications and observations were recorded on fifteen characters. Significant genotypes difference for various characters showing adequate genetic variability in the material studied. In general, PCV was higher than GCV for all the characters studied. GCV was higher than ECV for most of the characters. The magnitude of PCV and GCV was highest for phenol color reaction followed by number of effective tillers per plant and number of grains per spike. High heritability was obtained for grain yield per plant, grain weight per spike and biological yield per plant. Higher genetic advance as per cent of mean value was observed for number of grains per spike, thousand grain weight and plant height. High heritability with high genetic advance is helpful for improvement through mass selection by fixing additive gene action while high heritability with low genetic advance showed the preponderance of non-additive gene action due to high influence of environment.

Keywords: Genetic variability, heritability, genetic advance, yield, quality, bread wheat.

Abstract – 076

EPIDEMIOLOGY OF RHIZOCTONIA AERIAL BLIGHT DISEASE AND STUDY OF RELATIONSHIP OF WEATHER VARIABLES IN PROGRESSION OF DISEASE IN TARAI REGION OF UTTARAKHAND

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Rhizoctonia Aerial blight (RAB) caused by *Rhizoctonia solani* is one of the most important diseases of soybean in Uttarakhand causes heavy loss of crop yield every year. RAB of soybean was undertaken in relation to its occurrence, pathogenicity, epidemiology, and management of the disease. The study was conducted in G.B.P.U.A.T. Pantnagar Uttarakhand. The region was considered as a hotspot for this disease. Total sixteen cultivars were studied namely JS-7244, JS-7546, JS-7105, JS-72-220, PK-262, Pk-472, MACS-58, JS-93-05, Pb-1, Bragg, Monetta, Khsb-2, NRc-7, VLS-58, JS-335 and Shivalik.. Infection rate, disease index and area under disease progerssie curve were calculated. Infection rate was found to be maximum for cultivar and minimum for cultivar. It was maximum for cultivar VLS-58 (424.19) and minimum for cultivar PK-262 (160.99). Infection rate was calculated on the basis of disease index. Maximum infection rate was found to be cultivar JS-7244 (0.317 unit/day) and minimum for Shivalik (0.0008). Disease progression of RAB was started in the third week of September. In initial phase, the disease progression was quite high month of October; however it slowly declined later on. September and October are suitable months for initiation, development and progression of RAB disease. Disease progression was maximum for full seed to beginning of maturity (51-34 percent) phase. The PDI of all varieties exhibited negative correlated with temperature, relative humidity, rainfall and wind speed but significant, it was positive only for bright sunshine hours and evaporation but non significance for weather data on same day of disease incidence. By using these prediction equations for different cultivars, it is now possible to predict the disease index in advance and it provides sufficient time for contingency plan with plant protection input to restrict and manage RAB growth and its development.

Key word :- Rhizoctonia, Disease progression curve, Disease incidence, PDI

Abstract – 077

IMPACT OF CLIMATE CHANGE ON AGRICULTURAL PRODUCTION AND PRODUCTIVITY IN INDIA

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Impact of Climate change in agriculture is may be harfull for the any agricultural production and productivity. Climate change and agriculture are interrelated processes, both of which take place on a global scale. Climate change affects agriculture in a number of ways, including through changes in average temperatures, rainfall, and climate extremes (e.g., heat waves); changes in pests and diseases; changes in atmospheric carbon dioxide and ground-level ozone concentrations; Climate change is already affecting agriculture, with effects unevenly distributed across the world. Future climate change will likely negatively affect crop production in low latitude countries, while effects in northern latitudes may be positive or negative. Climate change will probably increase the risk of food insecurity for some vulnerable groups, such as the poor. Animal agriculture is also responsible for greenhouse gas production of CO_2 and a percentage of the world's methane, and future land infertility.More favourable effects on yield tend to depend to a large extent on realization of the potentially beneficial effects of carbon dioxide on crop growth and increase of efficiency in water use. Decrease in potential yields is likely to be caused by shortening of the growing period, decrease in water availability and poor vernalization. Crops like wheat, soybeans, and corn. While warmer temperatures create longer growing seasons, and faster growth rates for plants, it also increases the metabolic rate and number of breeding cycles of insect populations. Insects that previously had only two breeding cycles per year could gain an additional cycle if warm growing seasons extend, causing a population boom. So this is very important for the agricultural production and productivity to how the minimize this impact for future generation. Sustainable agriculture may be help to minimize and balance the production and productivity.

Key words – Climate, Change, Agriculture Production.

Abstract – 078

Contributions of *Acacia nilotica* a woody legume in sustenance of crops against climatic conditions and as service to living beings

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Acacia nilotica which is also known as "babul" is a medium sized plant that befalls under semi-arid region of our country India. It is eminently used in different purposes such as enormous rapid nitrogen fixation in drought soil for recuperation of prone waterless arid lands as well as combating abiotic stress due to salinity, cold stress and wet stress during climatic change and production of metabolites such as gums, tannins, timber as fodder in agroforestry system. Our review focuses the etiologic aspects, ecology, distribution and contributions of *Acacia nilotica* on broader bases for sustenance of crops under extreme climatic conditions and as a service for living population.

Key words: *Acacia nilotica,* Abiotic stress and service to human beings

Abstract – 079

APPLICATIONS OF ULTRASOUND IN FOOD PRESERVATION

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Ultrasound is a branch of acoustics dealing with inaudible waves above 20 kHz. The field of ultrasound comprising low and high intensity waves is now considered to be an emerging and expanding one covering a wide range of applications. Specifically the application of ultrasound is very promising in food technology since it is a non ionizing, non contaminating green mechanical energy that assures sustainability of processes. However, the introduction of ultrasonic technology in the food area is slow. This may be partly due to the limited diffusion of this discipline in the food field the basic principles of ultrasound to help food sector specialists better understand the ultrasonic mechanisms that can be exploited in food processing. Ultrasound is considered to be an emerging technology in the food industry. It has advantages of minimizing flavor loss, increasing homogeneity, saving energy, high productivity, enhanced quality, reduced chemical and physical hazards, and is environmentally friendly. When it is applied with pressure and/or temperature its efficiency increases but cautions needed to determine and control nutritional loss. Also, process parameters and applied material change the results. Consequently, ultrasound is a good alternative method for the food preservation and processing and also no adverse effect on human health has been proven. Although there are many studies relating ultrasonic application in laboratory scale, its application in the food industry is not sufficiently common. Future studies should be focused on scale-up and standardization of treatment processes.

Keyword: Ultrasound, emerging, food preservation.

Abstract – 080

IMPORTANCE OF OSMOTIC DEHYDRATION IN FRUITS AND VEGETABLES

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Fruits and vegetables are important sources of digestible and indigestible minerals, carbohydrates and certain vitamins, particularly vitamins A and C. The moisture in most of the fruits above 75% and fruits are prone to spoilage by molds and yeasts. Osmotic dehydration (OD) is one of most important complementary treatment and food preservation technique in the processing of dehydrated foods, since it presents some benefits such as reducing the damage of heat to the flavour, colour, inhibiting the browning of enzymes and decrease the energy costs. Osmotic dehydration results in increased shelf-life, little bit loss of aroma in dried and semidried food stuffs, lessening the load of freezing and to freeze the food without causing unnecessary changes in texture. The concentration of osmotic dehydration an important tool to reduce the water content with little bit damage on the

quality of fresh products. Osmotic dehydration is an operation used for the partial removal of water from plant tissues by immersion in an osmotic solution. This is a useful technique to extend the shelf life and decrease the energy cost. It also helps to improve the sensorial, nutritional and organoleptic properties of foods. Osmotic concentration is the process of water removal from fruits and vegetables, because the cell membranes are semi-permeable and allow water to pass through them more rapidly than sugar. During osmosis small quantity of fruit acid is removed along with water. It isa dynamic process, in which water and acid are removed at first and then move slowly, while sugar penetration is very slight at first but increases with the time.

Keyword: Osmotic dehydration, Fruits and vegetables, preservation

Abstract – 081

STUDIES ON CULTIVARS, DIFFERENT SPACING AND TIME OF FERTIGATION ON PARTHENOCARPIC CUCUMBER (*Cucumis sativus* L.) UNDER INSECT-PROOF NET HOUSE CONDITION.

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An investigation was conducted on two consecutive years during 2016-17 & 2017-18 to studies on cultivars, different spacing and time of fertigation on parthenocarpic cucumber (*Cucumis sativus* L.) under insect-proof net house condition at…Quantum University, Roorkee. The whole experiment was arranged 12 treatments consisting of three cultivars V_1- Kafka, V2 - Kian and V_3 -Hilton along with two levels of spacing S_1- 50 × 30 cm, S_2 – 60 x 60 cm and 2 levels of fertigation F_1 -once in a week, F_2- once in a 10th days interval (recommended dose of N P K-8:3.5:9 kg/500m^2.The experiment was laid out in factorial completely randomized design with three replications. The results showed that all vegetative characters under study were significantly influenced by various cultivars along with levels of spacing and time of fertigation. The effects of cultivars, spacing and time of fertigation were significant for most of vegetative characteristics except weight fruit[1]. The variety isatish was found to be significantly superior in respect of yield and yield attributing traits having maximum values of 2.61 kg and 15.66 kg yield per vine and per square meter, respectively. The characters like vine length, intermodal distance, leaf are, days to flower bud initiation, fruit set (%), fruit drop (%), no. of fruit per vine, fruit length, fruit width, yield per vine and yield per m^2 were significantly influenced by interaction effect of variety, spacing and time of fertigation. The treatment of $V_1S_1F_1$ registered significantly highest vegetative and yield attributing characters. However, treatment combination of $V_3S_2F_2$ registered lowest yield per vine and per square meter (1.31 & 7.86kg, respectively).

Keyword: Fertigation, RBD, cultivars, traits.

Abstract – 082

RNAi TECHNOLOGY FOR PAPAYA RINGSPOT VIRUS (PRSV) RESISTANCE IN PAPAYA

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Papaya (Carica papaya) is severely damaged by the papaya ringspot virus (PRSV). So that plant biotechnologist is focuses on the development of PRSV resistant transgenic papaya through gene technology. Varieties of transgenic papaya were first introduced commercially in Hawaii in 1998.The genetic diversity of PRSV depends upon geographical distribution and the influence of PRSV disease management on a sequence of PRSV isolates. The concept of pathogen-derived resistance has been employed for the development of transgenic papaya, using a coat protein-mediated, RNA-silencing mechanism and replicase gene-mediated transformation for effective PRSV disease management. The development of PRSV-resistant papaya via post-transcriptional gene silencing is a promising technology for PRSV disease management. PRSV-resistant transgenic papaya is environmentally safe and has no harmful effects on human health. Recent studies have revealed that the success of adoption of transgenic papaya depends upon the application, it being a commercially viable product, bio-safety regulatory issues, trade regulations, and the wider social acceptance of the technology. This review discusses the genome and the genetic diversity of PRSV, host range determinants, molecular diagnosis, disease management strategies,

the development of transgenic papaya, environmental issues, issues in the adoption of transgenic papaya, similar approach to control cucumber mosaic virus (CMV). RNAi powerful tool for developed transgenic varieties resistant to this PRSV and CMV like virus effective tool in managing production and increasing yield of papaya and crop improvement of other agriculture crop .

Key word: RNAi , PRSV , CMV , Papaya , gene technology

Abstract – 083

QUALITY ASPECTS OF ORGANIC FOODS

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Public concern about food quality has intensified in recent years and prompted heated debate about the integrity and safety of food. Demand for organically produced food has grown rapidly, with 'It's better for you' a key motivation for purchase. To assess the accuracy of this statement, attention must be focused on those aspects of food quality that directly affect health – biological value and nutritional quality, though when comparing foods on these aspects alone, it should be remembered that they represent only a part of a wider concept of food quality. The FDA and the USDA clearly mention that non-organic food is as healthy as organic food. However, there are some scientific studies that have proved organic milk and organic tomatoes to be better than the non-organic varieties. Studies are also ongoing about a variety of other types of organic food that may have additional health benefits compared to the non-organic varieties. Organic Facts is a strong proponent of organic food; this article will explain which aspects of organic food are actually beneficial for your health, and which ones have been misrepresented in recent years.

Key words: Biological value, nutritional quality, organic food.

Abstract – 084

POTENTIAL IMPACT OF CLIMATE ON FRUIT CROPS

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The Earth's climate was although relatively stable for the past 10,000 years or so and it has always been changing, mainly due to natural causes such as volcanic activity, ocean currents, continental drifts or earths' tilt. But since the 1900s more rapid changes have been observed because of industrializationwhich has led to increase in temperatureby 0.74 °C.Changing Climate has become big threat to human food supply.According to IPCC report it has been projected that; there is a probability of 10–40 % loss in crop production in India by 2080-2100 due to global warming.Climate change, particularly increasing temperatures, shifting seasonal rainfall patterns and more severe precipitation events and related flooding have severe effect on crop physiology, flowering, yield, qualityand abiotic and biotic stress in crops. Climate change impacts winter chilling of temperate fruits with negative consequences on fruit yield and quality as they require adequate winter chilling for normal production in forthcoming season. Mitigation and Adaptation are the important measures to overcome the devastating effect of climate change to fruit crops. Likewise, crop modelling can also be used to study the potential impact of climate change and climate variability on crop production beforehand so that timely measures can be taken on time.

Keywords: Climate Change, Fruit Crops, Impact, Adaptation, Mitigation, Crop Modelling.

Abstract – 085

NEED OF PADDY PARBOILING FOR BETTER QUALITY OF RICE

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Parboiling of paddy is also done in three steps, Soaking, Steaming and Drying. Soaking means paddy is penetrates in to water. The main objective of soaking is to achieve quick and uniform water absorption. This water absorption may be increased to obtain a desirable moisture content of the soaked paddy, either by increasing the duration of soaking or soaking at an elevated temperature. Parboiling is a hydrothermal treatment applied to raw paddy. During this process, grain changes its physical properties as starch gelatinizes because of the heat treatment in the presence of water. Parboiled paddy provides a higher milling yield and reduces nutrient loss during milling and cooking Parboiling with gelatinizing of rice starch and elimination and filing rice seed chaps, results in improved resistance of seeds against exerted tensions during paddy threshing operations. The parboiled rice contains less starch and more oil than row rice bran. This indigenous technique is done to have easy milling as well as reduce breakages during milling. Parboiled rice needs the double time than row rice to attain same level of softness in cooking. The drying process is an important process affecting product quality and there are many methods to reduce moisture content such as hot air drying (HA), infrared drying (IR).

Keywords: Paddy, Hot water, Sun light, Hot air, Drier, soaking tank and physical properties etc.

Abstract – 086

APPLICATION OF AGRICULTURAL WASTE FOR BIO FUEL

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The application of agricultural waste to produce bio fuel proves to be an alternative energy source for the limited non renewable energy and a dependable substitute for food crops. In India people are trying to produce bio fuels from various sources such as *Jatropha curcas*, *Pongamia pinnata*, *Azadirachta indica*, *Madhuca indica* etc. Ethanol fuel is ethanol (ethyl alcohol), the same type of alcohol found in alcoholic beverages. It is most often used as a motor fuel, mainly as a bio fuel additive for gasoline. Much emphasis is being given to the production of ethanol from agricultural and forestry residues and other forms of biomass since they are most abundant and renewable resources on earth, which makes them attractive for production of ethanol. Agricultural waste consists of plant biomass wastes (cellulose, hemicelluloses and lignin) grouped into different categories such as wood residues, grasses, waste paper, agricultural residues and food industries. Due to rise in food prices, energy crops are been discouraged from its use to produce bio fuels due to current world wide rise in food prices. It is mostly wasted in the form of pre-harvest and post-harvest agricultural handling in the food processing industries. Bio ethanol, unlike petroleum, is a form of renewable energy that can be produced from agricultural feed stocks. It can be made from very common crops such as sugar cane, potato, manioc and maize. However, there has been considerable debate about how useful bio ethanol will be in replacing gasoline.

Keywords: Agricultural Waste, Bio Fuel, Ethanol and Gasoline etc.

Abstract – 087

MOLECULAR BREEDING FOR SUGAR GENE AND MODIFICATION OF SUCROSE METABOLIC PATHWAY ENZYMES.

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Sugarcane is an important tropical crop and has served as a source of sugar for hundreds of years. With originally soft, watery culm sugarcane acquired through human selection a distinctive feature of partitioning carbon into sucrose in the stem. The striking ability of accumulating levels of sucrose that can reach around 0.7M in mature internodes is an almost unique feature in cultivated plants. Sugarcane is cultivated in more than 20 million hectares in tropical and subtropical regions of the world, producing up to 1.3 billion metric tons of crushable stems. It is generally used to produce sugar, accounting for almost two thirds of the world's production and has recently gained increased attention because ethanol derived from cane sugar represents an important renewable biofuel source, which could turn it into a global commodity and important energy source. Sugarcane bagasse (the major waste product generated by sugar mills after extraction of the sucrose from cane juice) is largely used for energy cogeneration at the mill or for the production of animal feed increasing the overall efficiency of the crop system. Recently, there has been increased interest in using bagasse for processes such as paper production, as a dietary fiber in bread, as a wood substitute in the production of wood composite, and in the synthesis of carbon fibres. It is expected that enzymatic and hydrolytic processes that allow the bagasse carbon units from cellulose and hemicelluloses to be fermented, will soon be scaled up for ethanol production, turning sugarcane into an efficient crop for energy production. Commercial sugarcane relies on vegetative propagation through stem cuttings to generate a new clonal plant, resulting from lateral bud growth, and subsequently stools, with a large number of tillers. In 12 months the plant will reach 4-5 meters, with extractable culms measuring 2-3 meters and a sugar content of 13–16%. After harvest, underground buds will sprout starting a new crop season. In most situations 4– 6 harvests are possible before the field is renewed. After each harvest, leaves and plant toppings removed from the stems are left in the fields allowing for nutrient recycling, soil protection and growth without crop rotation. Sugarcane belongs to the genus *Saccharum* L composed of hybrids derived from *Saccharum officinarum* (Noble clones), *S. sinense* (Chinese clones), *S. barberi* (North Indian clones), and *S. spontaneum*. The hybrids are highly polyploidy and aneuploid and on average contain 100–120 chromosomes with an estimated somatic cell size of 10,000 Mbp. The number of chromosomes can vary in commercial cultivars. The basic genome size ranges from 760 to 926 Mbp, which is twice the size of the rice genome (389 Mbp) and similar to sorghum's (760 Mbp). Even in the face of the economic importance, it represents to many countries, the complexity of the sugarcane genome inhibited large efforts and investments in the development of biotechnology and genetic tools for this crop. Cultivar improvement has been achieved over the years using traditional breeding, which can take up to 15 years of selections. Nevertheless sugarcane transgenics are still lagging behind. Herbicide and viral-resistant transgenic plants have been reported but so far there has been no commercial release. This is probably due to intellectual property and regulatory issues, but may also be related to the fact that for complex traits, such as sucrose content, the genes to be used have not yet been proved ideal for improving agronomic performance. Gene discovery and identification is essential for breeding programs, either for transgenic plant development or for marker-assisted breeding.

Key word : Transgenic, Marker, polyploidy, aneuploid, herbicide.

Abstract – 088

NATURAL MATRIX METALLOPROTEINASE INHIBITORS: A STEP TOWARDS NATURAL ANTICANCER DRUGS

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The natural protection against cancer has been receiving a great deal of attention and most of the current studies are focused on the identification of MMP targets in tumors. In view of their specific implication in malignant tissues, several natural compounds are being tested, and the results are so satisfactory as to encourage application of several molecular modeling techniques in order to improve efficacy and to reduce the side effect of the compound. Molecular docking and Quantitative Structure Activity Relationship (QSAR) study of the three-dimensional structure of some natural compounds based on energetic complementarities and docking scoring function will show the nature of the drug. All of the bonded and non bonded interactions will be evaluated computationally to explore the receptor-ligand interactions. To investigate how well molecular docking can identify the effectiveness of compound the generation of the "standard" scoring function based on classical mechanics will be primary task. Bases on scoring function, free energy of binging, Docking energy and estimated inhibition constants will be calculated which will prove the effectiveness of the drug.

Key word: Cancer, molecular docking, MMP, ligand

Abstract – 089

RNAi TECHNOLOGY: GENE SILENCING IN PLANTS

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RNA interference (RNAi) is a recently observed and relatively unexplored area in molecular biology and functional genetics. Gene silencing by siRNA (short interfering RNA) is a developing field in biology and has evolved as a novel post-transcriptional gene silencing strategy with therapeutic potential as well as in genetically modified plant technologies. RNA interference (RNAi) represents an evolutionarily conserved cellular defense for controlling the expression of foreign genes in most eukaryotes including humans. With siRNAs, virtually every gene in the plant genome contributing to a disease becomes amenable to regulation, thus opening unprecedented opportunities for drug discovery. RNAi is triggered by double-stranded RNA (dsRNA) and causes sequence-specific mRNA degradation of single-stranded target RNAs homologous in response to dsRNA.
The mediators of mRNA degradation are small interfering RNA duplexes (siRNAs), which are produced from long dsRNA by enzymatic cleavage in the cell. siRNAs are approximately twenty-one nucleotides in length, and have a base-paired structure characterized by two nucleotide 3'- overhangs. This powerful tool for gene silencing and has been used extensively to help determine host gene function and create or improve existing plant traits associated with stress tolerance.

Keywords: RNAi, miRNA, siRNA

Abstract – 090

NOVEL FOOD PACKAGING TECHNOLOGIES

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Packaging is one of the most important and innovative areas in food processing.Novel food technologies are a new trend in food processing. It has innovative methods to transform, preserve, and tailor foods with improved functional and nutritional values has created global interest in their development. It processed food in a less-severe manner can be safer, fresher, more natural, and additive-free.Another important reason for innovative food packaging is the rising issues of food borne microbial outbreaks which demands the use of packaging with antimicrobial effects along with retention of food quality. The novel food packaging techniques include active packaging, intelligent packaging and bio active packaging which involve intentional interaction with the food or its surroundings and influence on consumer's health has been the major innovations in the field of packaging technology. It helps in prolonging the shelf life, enhancing or maintaining the quality, providing indication and to regulate freshness of food product. The advancement in novel food packaging technologies involves retardation in oxidation, hindered respiratory process, prevention of microbial attack, prevention of moisture infusion, use of CO_2 scavengers/emitters, ethylene scavengers, aroma emitters, time-temperature sensors, ripeness indicators, biosensors and sustained release of antioxidants during storage. Active packaging is a deliberate addition of some components in or packaging material or packaging headspace to intensify properties of packaging system. This technique uses oxygen and other scavengers, moisture regulation and antimicrobial packaging in food preservation. Intelligent packaging uses time-temperature and freshness indicator to give information to the producer, retailer and consumer about quality and surrounding environment.

Keywords: Packaging, Active Packaging, Intelligent Packaging, Food, Processing

Abstract – 091

PLANT GROWTH REGULATORS AND THEIR RESPONSE IN HORTICULTURAL CROPS

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In plants, many behavioral patterns and functions are controlled by hormones. These are "chemical messengers" influencing many patterns of plant development. Plant hormones – a natural substance (produced by plant) that acts to control plant activities. They include growth promoting and growth retarding substances. Chemical messengers (Plant growth hormones)are produced in one part of a plant and then transported to other parts, where they initiate a response. They are stored in regions where stimulus are and then released for transport through either phloem or mesophyll when the appropriate stimulus occurs. According to Sinha (2004), Growth hormones differ from growth regulators. Plant growth regulators – include plant hormones (natural & synthetic), but also include non-nutrient chemicals not found naturally in plants that when applied to plants, influence their growth and development. Plant Growth Regulators (PGR) known as bio-stimulants or bio-inhibitors modifies physiological processes in plant. These organic compounds act inside plant cells to stimulate or inhibit specific enzyme or enzyme systems to regulate plant metabolism. These growth regulators are naturally produced in plants to control the growth and other physiological functions. They act even in very minute quantities.

Keywords: Plant growth regulators, chemical messenger, bio stimulants.

Abstract – 092

IMPACT OF CLIMATE CHANGE IN INDIAN AGRICULTURE AND OVERCOMING STRATEGIES: AN OVERVIEW

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In Indian scenario the symptoms of climate changes are already exists. Some of the major crops like wheat, maize and rice show the adverse impact of climate change with respect to the growing period, growing season and in the form of yield. Climate change shows the economic impact on the agriculture field. Thermal stress can be easily observable phenomena in rice crop due to temperature variation. Climate change shows its impact on soil, crop physiology, crop penology, weed and pest management. Climate change can be affecting the rate of chemical and physical weathering. It can be change the potential evapotranspiration and the hydrology of the crop. A number of crop simulation models are available to study the impact of climate change and food security. By using these simulation models information will provide to the farmer about the management and strategies by which they can protect their crop against disease and adverse effect of climate change. By applying some strategies the loss of climate change will be reduce some training and general information will be provided to the farmers bout he cause and dealing of climate. Development of some advanced varieties which have less yield loss. More alternative options will be generated for overcoming this problem. In present scenario the advance use of computer technology in agriculture may reduce the loss caused by climate change.

Key word: Climate change, crop penology, evapotranspiration, physical weathering

Abstract – 093

COLLECTIONS OF FRENCH BEAN ACCESSIONS FOR GENETIC DIVERSITY USING MORPHOLOGICAL MARKERS FROM GARHWAL REGION OF UTTARAKHAND

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The state of Uttarakhand is a very rich source of French bean Diversity in seed colour, seed shape, plant type and other important traits but the main drawback is low production due to narrow varietal profile, inefficient plant architecture, higher rate of flower drop, non-synchronous maturity and susceptibility to diseases and pests. Genetic diversity has the evolutionary significance for the survival and adaptation of species in different agro-climatic conditions. It is one of the prerequisites for crop improvement programs. Selection of the improved genotypes depends upon the proportion of genetic variability within the available genotypes. The genetic diversity of bean (*Phaseolus vulgaris* L.) is important for in-situ conservation. Hence it is important to know the extent of existing genetic variations in the plant material. In the present study, variations and their differentiation in common bean is based on seed morphological characteristics. A finding of the present work is based on the pattern of variation in seed morphological traits. More than one hundred Germplasm accessions have been collected from the different villages of 6 Districts of Garhwal region of Uttarakhand. Marked variations have been observed with respect to colour, shape, size, coat pattern, in respect to seed and pod colour, stem colour, days of flowering, flower colour, leaves colour of French bean. Kidney shape is the predominant trait. There has been drastic variation between seed coat colour in all the accessions. Some accessions collected from different village of varied districts were found to be identical while some collected from villages of same district were different. Majority of them did not follow any seed coat pattern but variation existed *viz.*, broad striped, constant mottled, marginal colour pattern, mottled, rhomboid spotted, speckled, striped and circular mottling. Most of the accessions found with shiny seeds. The range of seed length have been observed was 0.5cm (accession no.12) to 2.2cm (accession no.94) while the range of seed breadth recorded 0.2cm to 0.5cm.
It is an important vegetable as well as pulse crop cultivated in a wide range of agro-climatic condition from plains (300m) to the high hills (2,500amsl) in different parts of the country. Present work is based on the estimation of genetic diversity by morphological markers of French bean Germplasm *(Phaseolus vulgaris* L.) after the survey and collections from Garhwal region.

Key word :- French bean, genetic diversity, molecular markers

Abstract – 094

CRISPR: A NEW APPROACH FOR CROP IMPROVEMENT

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Genetic manipulation techniques using physical, chemical and biological (T-DNA insertion/ transposons) mutagenesis have contributed majorly in studying the role of genes and identifying the biological mechanisms for the improvement of crop species in the past few decades. The discovery of CRISPR/Cas9 gene editing system has revolutionized research in animal and plant biology with its utility in genome editing being first demonstrated in 2012 in mammalian cells CRISPR-Cas9 module, several modified Cas9 cassettes have been utilized in crop plants for improving target specificity and reducing off-target cleavage and the availability of Cas9 enzymes from additional bacterial species has made available options to enhance specificity and efficiency of gene editing methodologies. crop improvement using CRISPR/Cas9 based genome editing tools and also presents studies where CRISPR/Cas9 has been used for enhancing biotic and abiotic stress tolerance. Application of these techniques will result in the development of non-genetically modified crops with the desired trait that can contribute to increased yield potential under biotic and abiotic stress conditions.

Key word :- CRISPR, Genetic manipulation, enzymes, transposons.

Abstract – 095

pH VARIATION OFRHIZOSPHERIC SOILWITH DIFFERENT FORMS OF NITROGEN UNDER AEROBIC AND ANAEROBIC CONDITION IN RICE

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Rhizospheric pH is very important for nutrient availability, microbial activity which has direct impact on plant growth and development. To understand the variation in soil pH under aerobic and anaerobic condition, pot experiment was conducted with 4 rice genotypes and one blank pot inthree nitrogen forms (*viz.* nitrate form, ammonical form and control i.e. without nitrogen)under aerobic and anaerobic conditions. Rhizospheric soil pH was recordedby 1:2 dilution method.The overall pH in aerobic condition was significantly higher than the anaerobic conditionbecause under aerobic condition, the nitrate form of nitrogen in predominantly available and absorbed and the plant releases OH^- ions in order to compensate the charge. Variation in pH among the treatments in anaerobic condition was very less compared to the aerobic condition.This might be due to highbuffering capacity of soil and water under anaerobic condition. ThepH in ammonical treatment was found to be significantly lower than other two treatments within one growth condition. This is because when the cation is absorbed, H^+ ion is released in order to balance the cytosolic charge.pH in the other two treatments i.e., nitrate and control was higher in the pots having the plant compared to pots without plant.A significant change of pH was observed in all the treatments .Analysis of pH effect showed significant variation among genotypes, treatments, and their interaction. This study of variation in pH ofrhizospheric soil in different genotypes indicates the importance of nitrate form of nitrogen under aerobic conditions as well as role of exudates in maintenance of soil and plant pH.The differential behaviour of varieties can be related to the nitrogen use and assimilation under aerobic / drought conditions.

Keywords: rhizosphere, pH, aerobic, anaerobic.

Abstract – 096

SCREENING OF SAFFLOWER GERMPLASM FOR HIGHER OLEIC ACID CONTENT

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The oil of Safflower (*Carthamustinctorius L*) is considered very good for cardiac patients since it contains high amount of mono and poly unsaturated fatty acids, which contains oleic acid, Linoleic acid and Linolenic acid. The presence of unsaturated fatty acids in diet reduces the probability of accumulation of cholesterol in blood veins. In general safflower high yielding varieties contains 28-30% oil which can be increased by using exotic gene pool in crossing programme. There varieties are having 18-20% oleic acid content which is very less. Screening of indigenous safflower germplasm has been done which indicates some of the lines of Safflower having oleic acid percentage upto 80%. There is negative association between oleic acid concentration and oil yield.The presence of lines with high oleic acid are valuable and can be used in crop improvement programme since every year India is using 70 million dollars to import oleic acid oil from abroad.

Keywords: *Carthamustinctorius* , unsaturated fatty acid , germplasm , negative association.

Abstract – 097

Impact of hurdle technology to maintain the quality of foods

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Food quality is an important concept because the food people choose depends largely on quality. Consumer preference is important to the food manufacturer, who wants to gain as wide a share of the market for the product as possible. Quality is difficult to define precisely, but it refers to the degree of excellence of a food and includes all the characteristics of a food that are significant and that make the food acceptable. Refrigeration is a common method of meat preservation. However, refrigeration is an energy consuming and costly process which is not always practicable in many developing countries like India which is having enormous geographical area with tropical climate. Hurdle technology has made it possible to devise somesemi-moist, ready-to-eat, shelf stable, sound and convenient meat and meat products to meet the requirements of a special class of people like space scientists, mountaineers and defense personnel especially as combat ration with light weight. It has been possible to produce various types of shelf stable and intermediate moisture food products with hurdle technology. The shelf-life of beef is of significant importance in the retail marketplace. Shelf-life is defined as the period of time between packaging of a product and its end use when product properties remain acceptable to the product user. Shelf-life properties may include appearance, texture, flavor, color and nutritive value. Simply shelf-life is the amount of time that passes before food becomes unpalatable or unfit for human consumption because of the growth of spoilage organisms. Microbial, chemical and enzymatic activities can be controlled by low temperature storage and chemical techniques in the industry. The quality of food products degrade as a result of digestive enzymes, microbial spoilage and fat oxidation. Lipid oxidation, protein degradation and the loss of other valuable molecules are the consequence of food spoilage process.

Keywords: Food, Quality, Storage, Microbial, Hurdle technique, Self-life.

Abstract – 098

IN VITRO ANTIMYCOBIOTIC ACTIVITY OF CRUDE EXTRACTS OF *BLEPHERIS EDULIS* SEEDS & *CYPRUS SCARIOSUS* ROOTS

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The search for new bio-fungicides which are effective, biodegradable and eco-friendly is the need of the hour. Such natural bio-fungicides with greater selectivity are necessary to face chemical related problems as chemicals are toxic to the environment. Natural plant derived products are safe and display antifungal activity without being toxic to environment. Therefore, this study was conducted to evaluate the *in vitro* effects of aqueous and ethanolic extracts of seeds of *Blepharis edulis* and roots of *Cyperus scariosus* on some phytopathogenic fungi (*Alternaria alternata, Fusarium flocciferum,* and *Helminthosporium oryzae)*. Different concentrations (25, 50, 75, and 100%) prepared from these extracts inhibited the growth of the test pathogens and the effect gradually increased with concentration except in case of *A. alternata* in which growth was not inhibited. The 100% aqueous extract of seeds of *B. edulis* had the strongest inhibition against *F. flocciferum* (59.43%). Minimum inhibition percentage (1.48%) was shown by 25% aqueous extract of *B. edulis* against *H. oryzae* and the 100% aqueous extract of roots of *C. scariosus* shown the strongest inhibition (52.63%) against *F. flocciferum*. The aqueous extract (25%) of *C. scariosus* roots showed minimum inhibition (9.75%) against *H. oryzae.* Ethanolic extract of both plants showed complete inhibition against all tested fungi. *A. alternata* growth was not inhibited by aqueous extract seeds of *B. edulis*. This experiment revealed that *F. flocciferum* was more sensitive to the plant extracts as compared to other fungi used in the experiment. *H. oryzae* was less sensitive to plant extracts. Tagstin (Carbendazime) fungicide at 0.1% concentration was used as positive control for test fungi. It completely inhibited the growth of *F. flocciferum* but growth of *A. alternata* and *H. oryzae* was moderately inhibited by this fungicide. Thus, these results strengthen further investigation on these plant extracts for production of natural bio-fungicides. Further studies are needed to determine the chemical identity of the bioactive compounds responsible for antifungal activity in these plants.

Keywords: *Alternaria alternata,* Ethanolic extract, *Fusarium flocciferum, Helminthosporium oryzae*, Inhibition percentage.

Abstract – 099

SUITABLE AGE OF ROOTSTOCK FOR SOFTWOOD GRAFTING IN JACKFRUIT (*Artocarpush eterophyllus* L.) VAR.PALUR-1

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Tropical fruits are important constituents in the daily diets of billions of people. One of such fruit crop is jack. The area under jack is increasing day by day due to its popularization. Palur-1 a jackfruit variety in Tamil Nadu, released by Tamil Nadu Agricultural University has gained wide popularity amongthe jack fruit growing farmers. Lack of availability of suitable clonal planting materials is one among the major constraint which restricted the significance expansion of this variety in Tamil Nadu. The different age of the rootstock *viz*., 15, 30, 45, 60, 75, 90, 105, 120 and 135 days olds were kept under the mist chamber, for evaluation of graft success rate. The observations recorded were on *viz*., number of days taken for graft union (days), days taken for sprouting (days), number of sprouts per graft, and length of sprouts (cm).Among the above observations, the best result wasobserved at grafting on 30 days old rootstock (i.e. A2-30 days old rootstock). Number of days taken for graft union (days) is least on grafting done on 30 days old rootstock (24.07 days), where as the maximum number (27.96 days) taken for 135 days old rootstock. Number of days taken for sprouting was observed 19.48 days (minimum) and 20.58 days (maximum)in 30 and 135 days old rootstocks, respectively. Number of sprouts

recorded on 30, 60 and 90 days after grafting was 1.00, 1.28 and 2.08 sprouts per graft, respectively.Similarly, length of sprouts per graft was 2.87, 3.67 and 3.94 cm on 30, 60 and 90 days, respectively.

Keywords: Days old rootstock, Graft union, Palur-1, Mist chamber

Abstract – 100

EMPOWERMENT OF WOMEN THROUGH MUSHROOM PRODUCTION

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Mushroom production is famous enterprise and gaining importance with the passage of time worldwide, owing to its various health benefits. There is a dire need to make rural farm women economically independent and as such entrepreneur development for them is suitable approach. To empower a women is to empower next generation and besides other allied agriculture fields, that have the ability to empower women, mushroom is one of the best alternatives for women of farming community as they can easily get engaged in it for the betterment of their economy and in turn for the overall economic development of country. Trainings on Mushroom Production are being conducted in SKUAST-Kashmir under different schemes. Participants are allowed to lay the mushroom production trail by themselves which provides them necessary skill and confidence to start their venture. An assessment was carried out to see the result of these trainings on the farming community and it has been observed that more and more farmers are taking up this venture and women folk of their families are actively participating in the successful production of mushroom.

Keywords: Mushroom, Women, Empowerment, farming

Abstract – 101

ZERO BUDGET NATURAL FARMING

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The neoliberalization of the Indian economy led to a deep agrarian crisis that is making small scale farming an unviable vocation. Privatized seeds, inputs, and markets are inaccessible and expensive for farmers. Indian farmers increasingly find themselves in a vicious cycle of debt, because of the high production costs, high interest rates for credit, the volatile market prices of crops, the rising costs of fossil fuel based inputs, and private seeds. Under such conditions, 'zero budget' farming promises to end a reliance on loans and drastically cut production costs, ending the debt cycle for desperate farmers. The word 'budget' refers to credit and expenses, thus the phrase 'Zero Budget' means without using any credit, and without spending any money on purchased inputs. Zero Budget Natural Farming (ZBNF) is a farming practice that believes in natural growth of crops without adding any fertilizers and pesticides or any other foriegn elements. There are four main aspects of ZBNF which are considered as four wheels on which the entire farming system rests: Bijamrita (Seed Treatment using local cowdung and cow urine), Jiwamrita (applying inoculation made of local cowdung and cow urine without any fertilizers and pesticides), Mulching (activities to ensure favorable microclimate in the soil), and Waaphasa (soil aeration). A ZBNF practicisng farmer has lower cost of inputs and thus has better capacity to increase the incomes. At the same time, ZBNF crops helps in retaining soil fertility and is climate change resilient.

Key word :- Natural farming, ZBNF, Seed treatment, Neoliberalization.

Abstract – 102

MOLECULAR DIVERSITY ANALYSIS OF PIGEONPEAGENOTYPES FOR *FUSARIUM* WILT USING MOLECULAR MARKER.

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In the present investigation a set of 19 elite pigeonpea genotypes,along with wilt susceptible variety Bahar were evaluated for *Fusarium* wilt resistance by using SSR markers. Test genotypes were screened in a wilt-sick plot at GBPUAT Pantnagar,Norman E Borlaug crop research center, Pantnagar. The disease infection was recorded at the time of maturity on whole plot basis according to susceptibility reaction.The ten polymorphic SSR markers used in the present study yielded a total of twenty one polymorphic bands, the number of polymorphic bands per primer ranged from 2 to 4. Markers ASSR-363, ASSR-66 and ASSR-366 were found to be the most informative primers. TheDendrogram consist of a super cluster which is divided in two major gene cluster A and B. In cluster analysis, cluster A had genotype 17 (Paras) which is separated from rest of genotype. Cluster B further subdivided into two subcluster B1 and B2 , Sub cluster B2 further subdivided in to B2A and B2B On the basis of these cluster we can differentiate the different genotypes for their wilt reaction.

Keywords: Pigeonpea, *Fusarium* Wilt, Clusters and Diversity

Abstract – 103

SOIL AND NUTRIENT MANAGEMENT IN RICE-WHEAT CROPPING SYSTEM

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In India, rice-wheat is a dominant cropping system across the Indo-Gangetic plains and in Himalayan foot hills. Approximately, 10.5 million ha area under this system contributes 25% of total food grain in India. About 33% of India's rice and 42% of wheat is grown in this rotation. Nearly 65% of total fertilizer used in the country is applied to rice and wheat crops alone. Continuous and high intensive farming, the nutrient supplying power of most of the soils has been found to be decline particularly when rice based cropping systems are followed. In general there is deterioration in soil health due to faulty agricultural practices in this system such as residue burning, excessive tillage and non use of organics. The deterioration in soil health can be reversed if faulty practices are replaced with conservation practices such as minimum tillage and residue management, crop rotation, use of organics etc. There are reports that direct seeded rice can be replaced by transplanted rice provided weeds are controlled and the same resulted in better soil condition for succeeding crop. The cost of production can be greatly improved by technologies such as zero tillage. Residue management has always a tricky business but most of the earlier reports suggest that incorporation is best strategy however needs very good machineries. This is the reason with the availability of modern machineries like Happy seeded nowadays residues are retained on the soil surface. Nutrient management also needs to be taken care of well. With the change in the tillage nutrient dynamics in the soil also change. Rice crop suffers from iron deficiency in direct seeded rice. Such nutrient should be provided through foliar spray. After about 23 years of research at Pantnagar shows that factor productivity can only be maintained if along with NPK good use of organics is being done. Hence, soil management through reduced tillage operations, residue management and conservation agriculture should be done efficiently however its effects on nutrient dynamics should be studied to mitigate the problems occurring in rice-wheat cropping system. There is also need for continuous research further on these subjects.

Key word : Indo-Gangetic plains, deterioration, zero tillage, residue.

Abstract – 104

IMPACT OF GLOBAL WARMING ON INSECT POLLINATORS

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Global Warming is the increase of earth's average surface temperature due to increasing levels of greenhouse gases. It has been recorded the adverse effects of global warming on animals life, their biodiversity and on agriculture too. Pollinators are a key component of agriculture and global biodiversity. Insects are being major pollinators providing vital ecosystem services to crops and wild plants. There is clear evidence of recent studies that there is decline in both wild and domesticated pollinators, and thereby parallel loss in the plants that rely upon them. The United States Fish & Wildlife Service (USFWS) for the first time added seven bee species to the endangered species list. These bees are native to Hawaii and the seven species are *Hylaeus anthracinus, H. longiceps, H. assimulans, H. facilis, H. hilaris, H. kuakea* and *H. mana.* Many food crops are entomophilous in nature and rely up on insects for pollination. Approximately 73 *per cent* of the worlds cultivated crops are pollinated by bees, 19 *per cent* by flies, 6.5 *per cent* by bats, 5 *per cent* by wasps, 5 *per cent* by beetles, 4 *per cent* by birds, and 4 *per cent* by butterflies and moths (Abrol, 2009). Effect of global warming can be divided into direct and indirect effects. Direct effects includes pollinator responses, such as altered foraging activity for example *Apis florae* foraging is reported to decline at temperatures beyond 32 °C in mango (Reddy *et al.,* 2012). Direct effects also include effect on body size, in case of arctic fritillary butterflies smaller body sized individuals have been recorded due to the rising summer temperature in Greenland. Global warming has also reported to affect the life span of pollinators, i.e., for every degree increase in the average early spring temperature, male bees (*Andrena nigroaenea*) start emerging around nine days earlier (Jonathan, 2015). Other adverse effects like migration- *Apis dorsata* migrates in response to seasons and flowering patterns up to 200 km to escape starvation or predators (Mattila and Otis, 2006) and distribution- Bumble bees have lost nearly 200 miles of the southern end of their wild range in both the U.S. and in Europe (Tim Mc Donell, 2015). Indirect effects consists of plant responses to global warming, which include altered flowering like in case of Lychee (*Litchi chinensis*) where plants exposed to temperatures above 20 °C for 8 or more hours per day failed to flower (Menzel and Simpson, 1995). Others plant responses like nectar and pollen production as in case of *Glycine max* grown under elevated temperatures (38 °C day and 30 °C night) produced 30–50 *per cent* less pollen as compared to normal temperatures, effect of is plant height is species-specific like (*Anemone nemorosa)* increased in height whereas *(Silence noctifera)* at 28˚C day, 24˚C night were several cm shorter which affect pollinator energy and time in locating these floral resources (Qaderi and Reid,2008).Thus this kind of altered plant responses could modify the floral resource availability and reproductive output of pollinating insects. The maintenance of pollinator in the face of global warming is a complex and important conservation goal for the coming decades.

Key word : Global warming, Insect pollinator, Lychee

Abstract – 105

INDEX SELECTION FOR FORAGE AND GRAIN YIELD IN OAT *(Avena sativa* L.*)*

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The present investigation in oat (*Avena sativa* L.) was undertaken at the Institutional Dairy Farm of Gobind Ballabh Pant University of Agriculture and Technology, Pantnagar, Udham singh nagar, Uttarakhand (India) during the Rabi season of the year 2016-17. The experiment was designed with an intention to get the relevant information on the quantum of genetic variability present in the population with respect to green forage yield and grain yield. The direction and magnitude of their contributing characters; the nature and direction of inter-character associations (correlations); the direct and indirect effects of the component characters on green forage yield and grain yield; construction of selection indices to find their efficiency over direct selection for yield *per se* and also to know about the best combination of characters with highest selection efficiency as a mean of simultaneous improvement of these traits. The observations recorded were for plant height (cm), days to 50%

heading, number of tillers per plant, number of leaves per plant, leaf length (cm), leaf width (cm), flag leaf length (cm), flag leaf width (cm), green fodder yield per meter row length (Kg), leaf : stem ratio, dry matter yield per meter row length (Kg), dry matter percentage at stage-I. The observations for Stage – II were plant height (cm), number of fertile tillers, number of leaves, leaf length (cm), leaf width (cm), panicle length (cm), number of spikelets per panicle, days to maturity, biological yield per plant, grain yield per plant, 100 – grain weight.

Key word :- Index selection, Characters, panicle length, magnitude.

Abstract – 106

MITIGATING THE EFFECTS OF CLIMATE CHANGE IN FRUITS AND VEGETABLES

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Climate change has the potential to affect fruits and vegetables, soils, livestock and pests. Directly increase in temperature reduces crop duration, increase crop respiration rate, alteration in photosynthesis process, survival and distribution of pest population, decreasing fertilizer use efficiency and increase evapo-transpiration. Hotter temperatures can reduce yield in fruits and vegetables by lowering photosynthesis, increasing respiration, and causing reproductive failure (split sets, flower drop, reduced seed set, reduced fruit set). As growers face the challenges of climate change, there are a number of tools or strategies that can be used to mitigate the effect of higher temperatures. Managing mulch is one such tool. In tomatoes, high soil temperatures have been shown to reduce potassium uptake and increase fruit quality defects (white tissue and yellow shoulder). Use of white plastic has been shown to reduce theses defects. Day-neutral strawberries had higher summer yields on white plastic. Shading is another strategy. Research showed that shading tomatoes during fruiting can improve fruit quality and reduce culls. Water-based cooling can be employed to reduce heat loading in crops and crop environments. Evaporative cooling has been commonly used in greenhouses to cool air entering houses and reduce temperatures for greenhouse grown vegetables. Some biological root inoculants have also been shown to reduce plant stress. Mycorrhizal fungi can act as root system enhancers, increasing the effective area for absorbing water from the soil. Adaptive changes should be considered for more long-term stress management which includes to breed more fruits and vegetables crops that are more stress tolerant.

Key word : Mitigation, pest, livestock, respiration, mycorrhiza, fungi.

Abstract – 107

A REVIEW ON QUALITY IMPROVEMENT IN POMEGRANATE

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Pomegranate is one one of the favourite table fruit of tropical and subtropical region of the world. Pomegranate seeds get their vibrant hue from polyphenols. These chemicals are powerful antioxidant. Pomegranate juice contain higher levels of antioxidant than most other than fruit juices .The antioxidants in pomegranate juice can help remove radicals and protect cells from damage and reduce inflammation. Today, pomegranate juice being studied for its man health benefits. It may help with cancer prevention, Immune support and fertility. Pomegranate is rich in sugar, vitamin and minerals. Pomegranate is used not only as dessert fruit but it is also used as spices. Therefore it is necessary to increase its quality of pomegranate. Potassium is essential plant nutrient and s required in large amounts of proper growth of plant and have a significant effect on quality and quantity of fruits because of its vital role in photosynthesis, favoring high energy status and appropriate nutrient translocation and water uptake in plants, developing fruit quality by maintaining sugar to acid ratio, Thus it is important nutrient for improving the quality of fruit. Therefore with the application of potassium treatment we can improve the quality of pomegranate fruit. Irrigation management is a powerful tool to manipulate fruit composition. Timing of water stress is an important factor in quality improvement. Bagging is a physical protection technique, not only protects fruits from pest and diseases, but also affect the quality of produce by changing the microenvironment around the fruit during the growth and development. Bagging different fruit during development can reduce the chance of physical damage, improve color at harvest and yield high quality of fruit.

Key words :- Polyphenols, antioxidant, microenvironment

Abstract – 108

ROLE OF ORGANIC MANURES IN IMPROVING FRUITS QUALITY

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Organic manures are derived from animal and plants matter (*eg.* compost and crop residue). It releases nutrients necessary for plant growth, with the benefit of being slower acting and gentler than chemical fertilizers. Organic manures rich in nitrogen and other nutrients which facilitate the growth of plant. In advance agriculture soil health has received due attention because of the fact that availability of plants nutrients depend upon various physical and chemical characteristics of soil. Multi nutritional deficiencies in horticulture crop are very common everywhere in the world and the application has been noted to influence plant growth and productivity in variety of ways. Deficient nutrient not only reduce the productivity of crop but also reduce the use efficiency of applied nutrients. Mineral nutrition play an important role in influencing the quality of fruit and it is fact that the soil health deteriorates due to continuous use of chemical fertilizers. The production of fruits through organic means may help in improving the fruit quality. Nutrient management is one of the most important considerations under organic production system. The increasing cost of chemical fertilizers and their harmful effects on the soil health is also an important consideration for the use of organic nutrients. Organic manures are the major source of nutrients under organic production but they slowly release nutrients to the soil. Healthy appearance is one of the main factor affecting the marketability of fruit. Various disorders due to nutritional deficiency and toxicity of chemical fertilizers reducing quality and quantity of fruits. From the sustainable agriculture point of view, management of horticultural practices is one of the main ways to produce healthy crop.

Key word :- Organic manure, soil health, nutrient, sustainable

Abstract – 109

IMPACT OF CLIMATE CHANGES ON FLORICULTURE

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Climate change affects day by day in the atmosphere where changes in climatic factors. Human activity particularly emission of greenhouse gases *i.e.* Carbon dioxide, Methane and Nitrous oxide in the atmosphere also one of the very strong reason for climate change. It is manifested in terms of occurrence and repetition of events like droughts, melting of glaciers and rising sea levels. The average global temperature has increased by 0.8^0C in the past 100 years and the global mean temperature may increase between 1.4 to 5.8^0C. Climate change affects directly or indirectly on the horticulture activity including crops, soils, livestock and pests. Some scientific evidences suggest a positive effect of increase in atmosphere CO_2 in C_3 photosynthetic pathway promoting their growth and productivity. Increased CO_2 will reduce evapotranspiration rate and thus increase in water-use efficiency. CO_2 enrichment in greenhouse (800-2000 ppm depending on crop) to increase the production of flower crops is popular. It would be possible to spend less energy to generate CO_2 to carbon fertigation. The positive impact will be counteracted by increase in temperature, reduced humidity, reduced water level, increased salt level in water and soil. Rise in temperature will reduce crop duration, increased respiration rate, hasten senescence, fruit ripening, maturity, reduced post-harvest life, poor pollination and seed set. Deterioration of pigments leading to dull shades of ornamental plants, absence of winter chilling will reduce flowering in bulbous ornamental and flowering plants. The overall impact of climate change and global warming will depend on interaction effect of elevated carbon dioxide and temperature rise. A number of strategies are followed up for conservation, multiplication, production, improvement and protection of valuable ornamental species and varieties.

Key word :- Floriculture, climate change, bulbous, fertigation,

Abstract – 110

CONTAINER GARDENING: THE BRIGHTEN WAY TO GROW

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Container gardening is a gardening type that can be applied at any spot on this world, in all climatic zones, in humid and arid regions, in rural and in urban areas, outside and inside the house. It can be used for embellishment of the home with ornamental plants or for food production (vegetable and fruit trees), e.g. in the dry lands where soil and irrigation cause huge problems. Container gardening can be modify in different kinds of containers: bottles, pots, trays, bags etc. and it is strongly believe that massive application of container gardening would offer an impressive number of possibilities to grow food in the most adverse conditions in arid or semi-arid regions, thus helping to combat desertification, hunger and child malnutrition. Recent studies strongly recommend this method to all reforestation projects in developing countries. It is cheaper and more efficient (higher survival rates) than the classical ones. Many developing countries are facing food security problems due to drought and desertification, population growth and shortage of arable lands and it can be overcome by container gardening. Container garden is a remarkably universal solution to alleviate these food problems. Most of the container plants are chosen because they are aesthetically nice, but not necessarily edible. Generally, small crops, which have a quick maturing period, are ideal and compact varieties of normally large plants perform better but vertical "climbers" also adapt quite well to container conditions, but they require more space because of their vining growth. Quick-growing small herbs and leaf lettuces can be planted around larger fruiting vegetables. There is a lots of advantages of container gardening such as maximum utilization of space, convenient, environment friendly , economical and personal growth and development.

Key word : Container gardening, container plants, environment friendly

Abstract – 111

HUMAN HAIRS: BOON FOR HORTICULTURE CROPS

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A number of waste materials and by-products (such as animal manure, municipal solid waste composts, and sewage sludge) are used currently in agricultural crop production and the human hair waste generated by barbershops typically has been disposed as a waste way or composted along with other municipal solid wastes. But now days, some research work proved that non-composted human hair waste with an addition of municipal solid waste compost can be used as nutrient source for crops. It is an exclusive nutrient source for greenhouse container production, although human hair waste based products have been commercially available to crop producers in the last couple of years. By adding hair to compost is as simple as sprinkling it in among the other green ingredients when you add that layer. The hair will break down easier if you spread it out instead of dropping it in large clumps. In order to speed up the decomposition process, it may help to place a tarp (tarpaulin) over top of the compost pile. This will help retain both heat and moisture necessary for these materials to break down and turn the compost a few times a week to mix everything together and keep it aerated. It normally takes about a month for composting hair to break down enough before adding it to your garden soil. Un-composted hair can help improve poor quality soil by slowly releasing nutrients and nitrogen into the soil. The hair can also provide structural support for roots and help break up thick or clay soil. Experimental treatments find out that the 24.26 mm hair waste cube contained 16.5% N, 0.01% phosphorus (P), 0.01% potassium (K), 0.27% calcium (Ca), 0.05% magnesium (Mg) and 0.23% sulfur (S) which is very beneficial for plant growth.

Abstract – 112

INDOOR GARDENING: REDUCING INDOOR AIR POLLUTION

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Indoor air pollution refers to the physical, chemical and biological characteristics of an air under the indoor environment viz. home, building or an institution. People spend 80–90% of their time at indoor places. Indoor air pollution is a concern with the developed countries, where energy efficiency improvements sometimes make houses relatively airtight, reducing ventilation and raising pollutant levels. Indoor air problems can be subtle and do not always produce easily recognized impacts on health. Indoor air quality (IAQ) is essential to living environment and an issue for human health. People inhale 6-10 lit/min of air or 15,000 lit/day. Indoor air has been found to be upto 100 times more polluted than outdoor air. They also stated that 9 indoor air pollutants i.e. airborne Bacterial Count (ABC), Carbon Monoxide(CO), Carbon Dioxide($CO_{2)}$, Formaldehyde(HCHO), Nitrogen Dioxide(NO_2), Ozone(O_3),Radon(R_n), Respirable Suspended Particulates (RSP), and Volatile Organic Compounds (VOC_3) could affect people's health to a certain extent. In research conducted by NASA regarding the air purification capacity *Spathiphyllum wallisii* plant score 7.5 out of 10 (absorb electromagnetic radiations emitted by computers and printers), *Dracaerna deremensis* scored 7.8 (absorb 1.328 micrograms HCHO), *Ficus elastica* scored 7.7 (absorb odors and amount of toxic substances), *Philodendron scandens* removes Formaldehyde, *Chrysanthemum morifolium* absorbs Benzene from cigarette, *Gerbera hybrida* removes Trichlorethylene and Benzene from indoor air, *Dracaena marginata* removes xylene from the stuffy atmosphere, Ferns are known for removing pollutants from the air, palm trees have an important role in regulating the level of air humidity. These are most important indoor plants because it eliminates the chemical toxins from the air. The challenges of the next generation is to abate the environmental pollutions and horticultural concepts like indoor garden, roof top garden, vertical gardens and indoor plants mitigate the indoor pollution.

Abstract – 113

VARIABILITY AND HERITABILITY ANALYSIS FOR YIELD AND GRAIN QUALITY TRAITS IN AROMATIC RICE (*Oryza sativa* L.)

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The investigation conducted at N.E. Borlaug crop research centre of G.B. Pant University of agriculture & technology during *kharif* 2017 with forty four rice genotypes comprising of aromatic types revealed significant differences among the genotypes for yield and grain quality characteristics. High estimates of GCV were observed for leaf area, number of tillers/plant, biological yield/plant, grain yield/plant and 1000 grain weight. The yield components, *viz*., grain yield/plant, biological yield/plant and plant height which exhibited high heritability coupled with high genetic advance as percent mean were under the influence of additive gene action and thereby these traits could be considered as reliable indices for selection. The remaining traits were mostly under the influence of non additive gene action as they recorded low to moderate estimates of genetic advance.

Keywords: Aromatic, quality, heritability, genetic advance and additive gene action.

Abstract – 114

ROLE OF ANTIOXIDANT IN HUMAN LIFE

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Antioxidants are man-made or natural substances that may prevent or delay some types of cell damage.Oxygen is a highly reactive atom that is capable of becoming part of potentially damaging molecules commonly called "free radicals." Free radicals are capable of attacking the healthy cells of the body, causing them to lose their structure and function.Antioxidants are our first line of defense against free radical damage, and are critical for maintaining optimum health and well-being. Pollution, pesticide, cigarette smoke, drugs, illness, stress, and even exercise can increase free radical exposure.Oxidation damage cells can lead to the development of disease, including Alzheimer's, heart disease, and cancer. Antioxidants are found in fruits, vegetables, nuts, beans, grain cereals, and other foods.Scientists believe molecules called free radicals can contribute to the aging process, body uses antioxidants to balance free radicals.It has been estimated that dietary increases in antioxidant vitamins may reduce the risk of heart disease by 20-30%. Aging and different chronic diseases including diabetes, cancer and cardiovascular diseases could be caused by oxidative stress. Many plant-derived substances, collectively termed "phytonutrients," or "phytochemicals," are becoming increasingly known for their antioxidant activity.Medicinal plants are an important source of antioxidants. Natural antioxidants such as Vitamin C, vitamin E, carotenoids, and other low molecular weight compounds such as glutathione and lipoicacid increase the antioxidant capacity of the plasma and reduce the risk of certain diseases. Four synthetic antioxidants are widely used in foods; namely, butylatedhydroxyanisole (BHA), butylatedhydroxytoluene (BHT), propyl gallate (PG), and tert-butylhydroquinone (TBHQ).

Key Word: Antioxidant, Free Radical, Cell Damage and Aging.

Abstract – 115

ASSOCIATION MAPPING APPROACH IN PLANT BREEDING

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Now a day's determining the genetic bases of economically important agricultural traits is the major area of concern for plant breeders. However, most of the agriculturally important variations such as productivity, quality, tolerance to environmental stresses, and some of the forms of disease resistance are controlled by polygenes. These traits are greatly influenced by genetic × environmental (G × E) interactions. Linkage mapping has been a key tool for identifying the genetic basis of quantitative traits in plants. However, use of standard bi-parental mapping populations like F2 or RILs in linkage mapping limits its application, as low number of recombination events result inpoor resolution of maps. In addition, only two alleles per locus can be identified at a time. To circumvent these limitations, linkage disequilibrium (LD) mapping or association mapping (AM) has been used extensively to dissect quantitative variations.LD refers to a historically reduced (non-equilibrium) level of the recombination of specific alleles at different loci controlling particular genetic variations in a population. This LD can be detected statistically and has been widely applied to map quantitative trait loci (QTLs). Association mapping is carried out by using natural populations, diverse germplasm lines or elite breeding material.It involves searching for genotype-phenotype correlations among unrelated individuals. Its high resolution is accounted by the historical recombination accumulated in natural populations. By exploiting broader genetic diversity, AM offers three main advantages over linkage mapping: mapping resolution, allele number and time-saving in establishing a marker-trait association. Although AM presents clear advantages over linkage mapping, they are often applied in conjunction, especially to validate the associations identified by AM.

Keywords: Association mapping, Linkage disequilibrium, Quantitative traits loci (QTLs

Abstract – 116

ANALYSIS OF SOCIOECONOMIC STATUS AND PROBLEMS FACED BY CHERRY CULTIVATORS OF SHIMLA DISTRICT OF HIMACHAL PRADESH

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The current study was conducted to investigate the economics of cherry (*Prunusavium*) cultivation in Shimla district of Himachal Pradesh and twoof the objectives were to examine the socioeconomic status of cherry growers and constraints faced by them. The study used primary data collected through well-structured questioners from 50 respondent growers by using simple random sampling in three purposively selected tehsils i.eKumarsain, Nankhari and Kotkhai of Shimla district during year 2017-18. Socio-economic analysis revealed that 90.10 per cent of the family members were literates with a literacy index of 3.32 among which literacy rate of male (96.58%) found to be higher compared to female (83.66%) in overall category. Average operational land holding size was 1.69 hectares of which 87.71 per cent was under fruit crops. Among different fruit crops, 42.54 per cent were cherry plants,contributing 40 per cent of the income from fruits and dominant varieties of cherry were Dero Nero, Stella, Merchant and Van. The problems faced by the growers were being evaluated by using chi square test andmajor problems faced by growers were invasion of diseases, insects, birds, lack of storage facility,shortage of labour, malpractices during marketing by middleman and the climatic conditions among whichproblemslike bird attack and diseases were found more pronounced in the study area.

Abstract – 117

PRODUCT PROFILE AND MARKETING CHANNELS USED BY UTTARAKHAND COOPERATIVE DAIRY FEDERATION IN DEHRADUN DISTRICT OF UTTARAKHAND

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India is the largest milk producing country in the world, milk production is more than 127 million tons in a year. Out of entire production, 55% consumed as fluid milk and rest 45% are sent for industrial processing. For the present study, Dehradun district of Uttarakhand was selected purposely for its importance in milk production and processing due to presence of UCSF. Uttarakhand Co-operative Dairy Federation has significant economical and social contribution in the Uttarakhand state. With formation and proliferation of milk societies in the villages of remote areas, UCSF is regularly supplying good quality of milk and milk products under"*Aanchal*" brand name to the consumers. It is observed that all the respondents process their available milk for butter, ghee, cheese, paneer, dahi. In addition with these major products, the respondents were also manufacturing ice-cream, khoa, flavoured milk, lassi etc. Paneer, Dahi, Butter were the major dairy products preferred and consumed by the people in the study area.

Key Words: Marketing channel, Milk Co-operative, Product Profile.

Abstract – 118

SCREENING OF MUNGBEAN GERMPLASM FOR YIELD AND YELLOW MOSAIC VIRUS RESISTANCE

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The present study was conducted to screen 75 mungbean gremplasm for yield and yellow vein mosaic resistance in rabi 2017-2018. The major limitations in achieving high yield are lack of genetic variability and susceptibility to diseases and pests. Yellow mosaic virus is one of the most destructive pathogen of mungbean which is transmitted by white fly (*Bemisia tabaci*). Infected plants usually mature late and bear pods having small and shrivelled seeds that could result in 90% yield loss. The lines with higher yield are BMGP-1, Bhutan LK-2 and ML-1451 and MH-421 showed resistance against yellow mosaic virus.With increase in disease severity the yield of crop reduces. The lines with higher yield and resistant or moderately resistant can be used in further crossing programmes.

Keywords: *Vigna radiata* , germplasm , yellow mosaic virus, white fly.

Abstract – 119

INFLUENCE OF POST-HARVEST APPLICATION OF PLANT EXTRACTS AND STORAGE IN ROOM TEMPERATURE ON POST-HARVEST PHYSIOLOGY OF APPLE FRUITS CV. FANNY

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Ethnobotanists, microbiologists, and natural-products chemists are combing the Earth for phytochemicals and "leads" which could be a useful alternative to synthetic fungicides in the post-harvest handling of fruits and vegetables. While 25 to 50% of current medicines are derived from plants, none are used as antimicrobials. Traditional growers have long used plants to prevent or cure infectious conditions; Western medicine is trying to duplicate their successes. Plants are rich in a wide variety of secondary metabolites, such as tannins, terpenoids, alkaloids, and flavonoids, which have been found in vitro to have antimicrobial properties. The aim of this study was to access the efficacy of extracts obtained from two plants (neem and turmeric) on the extension of shelf life of apple fruits fanny. The application of different treatment like T_1 (turmeric powder @ 15%), T_2 (turmeric powder @ 25%), T_3 (neem leaves extract @ 15%), T_4 (neem leaves extract @ 25%) and T_5 treatment (control). After harvesting of fruits were treated with different botanical extracts treatments and stored in room temperature from 0 days to 120 days and physico-chemical analysis was done at an interval of 30 days *viz*., initial day, 30 days of storage, 60 days of storage, 90 days of storage and 120 days of storage. Fruit firmness was found maximum (4.71 lb/inch^2) in T_9 treatment (neem leaves extract @ 15%). After 120 days of storage maximum total sugar (11.76%) were observed in T_1 (turmeric leaves extract @ 15%) and maximum reducing sugar (9.90) was found in T_5 treatment (control). Among the treatment overall acceptability scores was found in T_4 treatment (neem leaves extract @ 15%). It was also observed that T_3 (neem leaves extract @ 15%) treatment was at par with the treatments having lowest physiological loss in weight, rotting percent and highest total sugars. Thus, the post harvest dipping of fruits in neem leaves extract @ 15% was more effective in increasing the storage behaviour of the apple fruits cv. Fanny.

Abstract – 120

INFLUENCE OF WEATHER PARAMETERS AND EFFECT DIFFERENT SHADE INTENSITIES ON GROWTH OF VEGETABLES SEEDLINGS

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An experiment was conducted at the Department of Horticulture, college of agriculture, Dapoli Maharashtra. To study the growth behavior of vegetable seedlings under "U" shaped tunnel having different shade intensities during *rabi-summer* season under Konkan agro-climatic condition. The treatments comprised of different shade net intensities. Altogether, seven treatments were applied in a randomized block design with three replications. The chilli and brinjal crop were grown in rabi-summer season under different shade intensities. The influence of environmental variables atmospheric temperature, soil t0emperature and atmospheric humidity were studied. The lowest atmospheric temperature was noticed in the treatment T_6 (25.88 °C) i.e. ("U" shaped tunnel covered with coarse and loosely woven jute bag). The lowest soil temperature was noticed in the treatment T_6 (21.05 °C). Whereas, the highest relative humidity was in the treatment T_3 (62.20) i.e. ("U" shaped tunnel covered with shade net 75 per cent). "U" shaped tunnel with covered coarse and loosely woven jute bag was found more suitable for better seedling growth of chilli and brinjal than those with the other different shading intensities "U" shaped tunnel and open filed condition.

Key words :- Vegetable seedlings, shade intensities, 'U' shaped tunnel, weather parameters

Abstract – 121

CLIMATE CHANGE: INDIAN SCENARIO

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The global average temperature and the rainfall pattern are changing day by day. The change in climate has affected the agriculture sector drastically. Agriculture sector mainly depends on rainfall and temperature. There are mainly two major crop growing season in India. The *kharif* season mainly depends on south west monsoon and accounts for about 50% of food grain production and 65% of oil seed production. The agricultural impacts of climate change in India are uncertain. The total average impactmaybepositiveornegativedependingontheclimatescenarios(temperature rising in 2°C, 3°C, 4°C, increase in CO_2 and interaction of increase in temperature and CO_2).Global warming poses a major threat to Indian food security. The increased CO_2 concentration may increase primary productivity but it may lead to either to increased or decreased net ecosystem productivity. The most scenarios show that the overall climate change will have a positive impact or will not affect Indian agriculture significantly till 2050. By 2080 due to significant increase in global temperature, food production will be affected significantly. Present General Circulation Model (GCM)in predicting the impact of climate change on rainfall is still not promising. We need to urgently develop our own integrated assessment simulation models in which cropping systems; water use and socioeconomic parameters need to be brought togetherforassessingtheimpactofenvironmentalchange in diverse regions of the country.

Key Words: Global Warming, Global Temperature, Climate

Abstract – 122

ROLE OF FERTILIZERS IN CLIMATE SMART AGRICULTURE

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In the era of sustainable development all organizations endorses with climate smart agriculture which as per definition is "Agriculture that sustainably increases productivity, enhances resilience, reduces/removes greenhouse gas emissions where possible, and enhances achievement of national food security and development goals". The correct and balanced use of plant nutrients is a core component of Climate-Smart Agriculture. It is estimated that fertilizers represent 2.5% of global greenhouse gas emissions, 1.5% of which deriving from their application. When mineral fertilizers and manures are added to soil, microbial conversion causes some loss of nitrous oxide (N_2O), a greenhouse gas with a global warming potential roughly 300 times greater than that of carbon dioxide (CO_2).The best fertilizer management practices include site- and crop-specific production techniques and practices developed through agronomic research, verified and continuously adapted in the fields to maximize economic, social and environmental benefits. There are various ways in which these emissions can be reduced like carbon sequestration, water management, improved nutrient use efficiency etc.

Keywords: Climate smart agriculture, Fertilizers, Global warming

Abstract – 123

A BRIEF REVIEW ON STORAGE TECHNIQUES IN FRUITS CROPS

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In India, there is a vast scope for growing fruit throughout the year in one or other part of the country because the climatic condition are highly suitable form growing various types of fruits. Fruits are available in surplus only in certain season and availability in different regions. In peak season due to improper handling practices, marketing, storage problem around 20-25 % fruit are spoilt in various stages. Fruit have very short life due to their high moisture content and are liable to spoil. Moreover, they are living entities and carry our transpiration; respiration and ripening even after harvest. Metabolism in fresh horticulture produce continues even after harvest and the deterioration rate increase due to ripening, senescence and unfavourable environmental factors. Hence, preserving the fruits in their fresh from demands that the chemical, bio chemical and physiological changes are restricted to a minimum by close control of space temperature and humidity . To reduce post harvest losses and shelf life of fresh produce, different storage techniques such as low temperature storage, modified atmosphere storage, controlled atmosphere storage; irradiation etc techniques are effective and popular strategies for shelf life extension of fresh commodities. The shelf life of sapota fruits can be increased up to 49 days by packaging in 25 µ LDPE bags at gas concentration 5% O_2 + 10% CO_2 and stored at 6°C with maximum sensory score. The storage of bananas after ethylene treatment at 2% O_2 extended the storage life up to 25 days beyond those of the control but there was some discoloration when they were transferred to normal air. Commercial ripening of bananas is initiated with exogenous ethylene treatment and these bananas can survive maximum of one week. In this short period these bananas cannot reach the ultimate consumers so these become over ripe at the outlets and heavy losses occur. Controlled atmosphere storage produced firmer bananas which could be beneficial in avoiding mechanical damage during transportation and also extend shelf life. Bananas stored at 4 and 6% O2 with 4 and 6% CO2 extended their storage life by 12 to 16 days beyond that of the control with good eating quality. Fruit is highly perishable but most important commodity for human diet due to their high nutritional value. They are the cheapest and other source of protective food supplied in fresh or processed or preserved form throughout the year for human consumption. The production of fruits is confined to relatively short growing seasons and thus storage becomes essential for provision of fresh produce out of the harvest season. In tropical countries production is often extended but storage may still be necessary or desirable for extended supply to the consumer. As consumer purchasing power increases, the reasons for storage may cease to be ones of traditional necessity but of satisfying consumer demand. Consumer demand is likely to include improved quality as well as improved availability and pressure is increasing, and will continue to do so, for improvements in storage techniques.

Keywords: Commodity, Respiration, Shelf life, Storage problem

Abstract – 124

BUSINESS PERFORMANCE OF SHGS IN JEERAPHOOL RICE : A CASE STUDY OF BALRAMPUR DISTRICT IN CHHATTISGARH

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The rice is one of the important cereal crops of the world and forms the staple food for more than 50 per cent of population. India sub continent is very rich in aromatic rice diversity. A major character of aromatic rice is its aroma and which increases its value in international market. The demand of traditional aromatic rice has increased over the past two decades and India is a major exporter of aromatic rice in international market. The self help groups (SHGs) have been the social innovations of the poor particularly in the underdeveloped regions. In India the SHGs are basically formed for specific production activities and they promote saving among members of the group and use the resources to meet the credit needs of the group members. In village Changro

of Shankargarh block of Balrampur district the possibility of increasing the scented rice production was discussed with local administration in consultation with agriculture scientists. The scented rice variety Jeeraphool, Vishnubhog, Kapoorbhog are popular in this area. Looking to this fact the ICAR, New Delhi approved a 15 member women farmers. With this 15 female farmers a self-help group was formed named Surya and which is managing the variety Jeeraphool production and marketing for earning a good profit. The district administration has also provided some help in this regard.

Keywords: Aromatic rice - Jeeraphool, production and impact of Self-help group

Abstract – 125

SEASONAL INCIDENCE AND EFFECT OF ABIOTIC FACTORS ON POPULATION DYNAMICS OF WHITEFLY ON BRINJAL CROP"

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Brinjal or eggplant (*Solanum melongena* Linnaeus) belongs to the Solanaceae family is one of the major vegetable not only in India. Brinjal, presumed to be of Indian origin with China as secondary center of origin. Information on the population dynamics of major insect pests of brinjal in relation to abiotic factors is essential in present scenario of climatic change which help in prediction of infestation of pest problem as well as application of economical management strategies. A comprehensive understanding on population dynamics of major insect pests of Brinjal in relation to abiotic factors helps in adaptation of an effective pest management programme and crop improvement strategy. Effect of abiotic factors on seasonal incidence and population dynamics of whitefly in brinjal was studied in 2017 at Vegetable Research Centre, GBPUA&T Pantnagar, Uttarakhand. Brinjal seedlings were transplanted in the field on the month July by following Randomized block design with three replication. Evaluation showed occurrence of insect pest initiated 25-30 days after transplanting. The population increased with the advancement of crop and achieving its peak during November to December. During the study whitefly (*B. tabaci* Gen was recorded as major pest infesting the brinjal crop. The first appearance of whitefly (*B. tabaci* Gen.) was recorded during 1st week of August *i.e.* 31st standard week. Highest population (10.91 whitely per leaf) was noticed in 45th standard week with maximum and minimum humidity was 93.9 and 51.6%, respectively.

Abstract – 126

CHANGES IN PHYSICO CHEMICAL PROPERTIES OF SOIL UNDER OPEN FARMING SYSTEM AND POPLAR BASED AGROFORESTRY SYSTEM

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The present investigation was carried out at Agroforestry Research Centre of G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand, India, during March to October, 2017 to study the physico chemical property of soil before and after the growth of taro as sole crop and under poplar based agroforestry system. Taro plant can fit well into tree crop and agroforestry systems and some types are particularly well adapted to unfavourable land and soil conditions such as poor drainage. As such taro is grown under intensive cultivation as a starch crop. So, proper cultivation and utilization plays a remarkable support to maintain the existence of the plant species in the nature. Taro in an agroforestry system will not only increase the supply of vegetable crops but also raise the green cover. The food productivity and environmental quality is dependent on the physico chemical properties of soil, so it is very important to know the effect of taro plant on soil pH, electrical conductivity, organic carbon, available soil nitrogen, available soil phosphorus and available soil potassium. Results of the present study revealed that the physico chemical property of soil varied significantly in different taro germplasm under poplar based agroforestry system as compared to open farming system. Before the planting of taro, the Soil pH was observed maximum for germplasm PA-73 (7.23) and PA-16 (7.15), Soil EC was observed maximum for germplasm PA-56 (0.40 dSm^{-1}) and PA-60 (0.36 dSm^{-1}) and Soil organic carbon (OC) was

observed maximum for germplasm PA-49 (1.17 %) and PA-73 (1.06 %) under poplar based agroforestry system and open system respectively, whereas after harvesting of taro, the maximum soil pH was observed with germplasm PA-16 for both the condition, which was 7.20 and 7.14, maximum soil EC was observed with germplasm PA-56 (0.39 dSm^{-1}) and germplasm PA-60 (0.35 dSm^{-1}) and maximum soil OC was observed under poplar based agroforestry system as compared to open system respectively.

Keywords: Agroforestry, Organic carbon, Poplar, Taro plant, Total nitrogen

Abstract – 127

Intercropping –An important tool against climate change in pulses

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Climate change is primarily driven by rise in temperature and carbon dioxide. The rise in temperature is threatening the global food security, impacting productivity of pulses adversely in South East Asian countries, which contribute more than 50% of the world's total pulses production. India is the largest producers, consumer and importer of pulses in the world. Pulses are highly vulnerable to climate change as these crops are grown under rainfed conditions. The drought and high temperature both have been the recurrent events during the present scenario of climate change. Rainfed pulses suffer due to severe water crisis because of delayed monsoon and uneven distribution of rainfall or complete failure of rains. The productivity of pulses in Gujarat and Andhra Pradesh, though falling under arid and semi-arid regions, is often high owing to moderate temperature during pod filling, as these areas are closer to the coastal belt. The C_3 crops, especially pulses, have the narrow-temperature tolerance limit for optimum physiological function are mostly in the range of 30-35^{0}C. Even *Vigna* groups of pulses (greengram and blackgram) grown during summer season are often exposed to high temperature beyond 40–42°C, resulting in drastic reduction in their grain yields. Crop rotation, intercropping are strategies that adapt crops to biotic stresses. With climate change, the pest and disease is likely to change. Intercropping is another key strategy for climate change adaptation. Intercropping reduces the impacts of both biotic and abiotic stresses whose intensity is likely to increase with climate change. Intercropping plays a pivotal role for increasing land use efficiency, weed suppression, yields and yield stability, enhanced use of water and nutrients and ecological services and greater economic profitability against climate variability.

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EFFECT OF CLIMATE CHANGE ON WATER RESOURCES

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Climate change is expected to increase the frequency and intensity of current extreme weather events, greater monsoon variability and also causes new disaster i.e. sea level rise and new vulnerabilities with differential spatial and socio-economic impacts on communities. It is also projected that rainfall pattern of India would change in the western and central areas could have more than 15 more dry days each year and northern and eastern area 5-10 days more of rainfall annually. Thus the dry area becomes more drier and wet areas wetter. This unprecedented increase is expected to have severe impact on the hydrological cycle, water resource for drinking water, forest and ecosystems, losses of coastal wetlands and mangroves, food security, health and other related areas. The impact would be particularly disastrous for developing countries. The hydrological cycle is being modified quantitatively or qualitatively in most agro-climatic regions and river basins of India by human activities such as land use planning, water uses, cropping pattern, irrigation and drainage. Many of the areas are transformed from safe area to critical and over exploited area with the fall in water table. So, sustainable management of surface and ground water and the supporting natural environment have gained considerable importance in recent years. An assessment of the availability of water resource in the context of future national requirements taking particular account of the multiplying demands for water and expected impacts of climate change and variability is critical for resource planning and sustainable development as a basis for economic and

social development. This study was focused on availability of surface and ground water resources and the potential for water related developments, keeping in view the possible impacts of climate change to meet the demand in India. It is required to develop an integrated strategy for addressing the issue of water, community adaptability and disaster risk reduction.

Abstract – 129

CLIMATE CHANGE – A REAL THREATS TO OKRA PRODUCTION

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Okra is one of the important vegetable crop belongs to malvaceae family, rich in fiber, minerals specially iodine, protein and vitamins. India is the largest global producer and earns 13% of the foreign exchange through its export. Changes in different climatic parameters on a global scale is not only affecting the food grain production but overall vegetable production. However, okra is one of the hardy vegetable crop which can tolerate more and adapt rapidly in changing environments but there are some negative impacts on quality and quantity of its production. Okra seedling growth is retarded in low temperature while in high temperature flower drop and other floral abnormalities occur in severe form. Similarly, in water stress condition shoot and fruit dry weight, plant height and leaf biomass is highly reduced and therefore, growing of early or late flowering cultivars can tolerate this stress condition through their escape mechanism. Ca and K ions and antioxidant enzymes like Glutathione Reductase (GR) and Ascorbate Peroxidase (APX) also plays key role and provide strong resistance against drought condition. Reduced germination percentage and increase in mean germination time is observed in saline soils which results in affecting vegetative growth and thus decrease the yield of the crop. However, pests and disease infestations in okra are also influenced by various environmental factors. Bhindi Yellow Vein Mosaic is a major viral disease that mainly occurs in low temperature and high humid condition as it is highly favourable to the whitefly population which is a vector of this disease. Likewise, raise in temperature favours multiplication of jassids but population of aphids expand with increases in relative humidity. Therefore, to mitigate this problems researchers have to develop some eco-friendly technology in near future for maintaining sustainable production in adverse climatic conditions.

Abstract – 130

MICROPROPAGATION OF SUGARCANE *(Saccharum offcinarum)* VARIETY CoLk 94184

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Tissue culture techniques are now becoming important tools of crop improvement and rapid multiplication of selected clones. There has been considerable interest in Applying these techniques is breeding, propagation, disease elimination, rejuvenation of older varieties, development of clones suitable for abiotic and biotic stress, conservation of genetic resources etc. Now micro propagation is drawing special attention for multiplication of new varieties on large scale in comparatively shorter period of time in several crops including sugarcane. Despite several advantage of applying micro propagation technique in sugarcane such as quick multiplication of newly released varieties; rejuvenation of old deteriorated varieties; production of disease free seed; elimination of viruses; high cane productivity and sugar yield etc.Experiments were conducted to check the survival percentage of sugarcane explants under different concentration mercuric chloride ($HgCl_2$). The growth of explants was seen against different concentration of growth hormone like BAP through micro propagation in basal MS media. The shootlets of sugarcane were inoculated in media and growth was observed. It was found that more concentration of BAP in media led to more development of shoots. Micro propagation of sugarcane (*Saccharum* spp.) was studied using shoot tip culture process. Sugarcane shoot tip culture was considered a

better method for micropropagation, since it produced plants phenol typically similar to the mother plant and gave a much more rapid multiplication rate when compared to the other procedure.

Keywords: Micro propagation, Concentration and Explants

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INCREASE THE CROP YIELD OF CITRUS VARIETIES IN SUMMER SEASON BY USING PLANT TISSUE CULTURE

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In summer season to fulfil the daily energy requirement of our body citrus fruits are suggested as these fruits comes with huge amount of vitamins, minerals, inorganic nutrients etc.These fruits are called citrus as the name suggest they are rich in high amount of citric acid in its pulpy core. Such types of citrus fruits are- lemon (Citrus limon), Orange (Citrus sinnensis), Pomelo. Of these lemon is majorly cultivated and used in all over the world because not only for its vitamin content but also for its broad medicinal purposes. But the cultivation of lemon in dry summer season is difficult as the seed dormancy does not break easily but it best grows in rainy season. So the need is not completely fulfilled in summer season, that why to prevent the pre harvest losses we can increase the crop yield of citrus fruits by using Plant Tissue Culture technique that imply the cultivation of citrus varieties in laboratory under aseptic conditions. The idea is to grow the seeds of a major citrus variety such as lemon in M.S media in three different variants. It means to culture seeds in three different types of M.S media differing in their vitamins concentration. One type of media contain Standard concentration of vitamins, next type of media contain 5X vitamins, and third type of media contain 9X vitamin. Then it is allowed to grow under aseptic conditions and after 2-3 days of cultivation we can observe different growth rates in the three types of media used. This was happened because the increased amount of vitamins in media supports very fast breakdown of seed dormancy in comparison with standard ones. So by this experiment it is clear that if we prepare a manure containing high amount of vitamins concentration and mix with soil so that it can increase the high temperature tolerance of citrus varieties in dry summer season.

Keywords: Citrus Fruits, Plant tissue culture, M.S media, Seed dormancy, Aseptic condition, Vitamins.

Abstract – 132

SEED QUALITY ENHANCEMENT THROUGH PRIMING TECHNIQUE

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Seed quality is the major key factor governing stand establishment of any crop and having a huge importance and bears utmost priority in case of high value, low volume crops like vegetables in particular and for high volume low value crops in general for enhanced productivity and production as well. On the other hand seed enhancement may be defined as post-harvest treatments that improve germination and seedling growth or facilitate the delivery of seeds and other inputs/materials required at the time of sowing smoothly. Various techniques have been employed to assure seed quality enhancement like seed pelleting, coating, coloring, priming in different crops and most have been found to have immense commercial application. Among these the priming of seed is most promising one. Seed priming first allows the seed to imbibe moisture, using various protocols of osmo-halo and osmo-hydro-priming, followed by redrying the seeds to undertake routine handling smoothly in most efficient manner. This process controls hydration of seeds to a level that allows pre germination activities aggressively in a regulated manner. Seed priming has been used to improve germination, reduce seedling emergence time, improve stand establishment and yield. The beneficial effects of priming have been demonstrated for many field crops. It is the best solution of germination related problems especially when

crops are grown under unfavorable conditions. Many priming techniques have been evolved which are being utilized in many crops now days. It can enhance rates and percentage of germination and seedling emergence which ensure proper stand establishment under a wide range of environmental conditions. A lot of work has been done on seed priming and results of these studies indicate well the importance of priming to get a good crop stand in many crops. Therefore, there is need to develop novel formulation and priming agents that can improve and enhance seed quality.

Keywords : Priming, Osmopriming, Seed quality

Abstract – 133

POLICY SUPPORT FOR STRENGTHENING SEED PRODUCTION.
NEED SEPARATE PERISHABLE GOODS TRANSPORT RAIL SYSTEM FOR THE HIMALAYAN REGION?

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Off-season vegetable cultivation possesses great potential in most of the areas in both temperate and non-temperate belts of Western Himalayan Region. This region has easy access to a growing and vast consumer markets in Delhi. Climatic conditions suitable to produce crops in the summer season, when these crops are not grown in the plains. The price advantage makes it worthwhile to incur high production cost and transport off-season vegetables to distant consumer markets. The fruits and vegetables cover around 16 per cent of Himalayan cropland. The present trends were a rapid expansion of horticultural crops in the hilly area. According to MoFPI to CIPHET of ICAR in 2015, the post-harvest loss wasrange from 5% to 16%. Globally, the highest food loss and waste are reported mainly in fruits and vegetables (up to 45%). The agricultural perishable commodities, faces a perpetual shortage of time, once the produce is harvested. However, on the demand side, the volumetric consumption is well ascertained from various surveys. According to the Planning Commission, 2015 total fruits and vegetables transported 71.85 mt out of which only 1.89mt transported through rail system. All major city centres connected through modern rail terminals and freight handling yards. These cities are easily identified as the destination of agri-produce freight. Upgrade logistics to facilitate to handle perishable vegetablesand also facility adjoining railway sidings for loading and unloading. For perishable produce, where delivery can be managed within 24 hours, enclosed carriage on VPNs can also be used. For specialised commodities, requiring climate controlcarriage, refrigerated containers are required. A north to south perennial flow of apple and potato is already developed. Similarly, there is south to north perennial movement required. According to NTDPC (Planning Commission - 2014) had also stated that transport in India had been project-centric done in single-mode silos. The recommendation is to have a system based approach, cutting across modes of transport and geographies. The report also mentioned relative transport remoteness by region, in specific North East Region (NER).Railways system would have a wholesale yard or receiving facility and railways wagons (covered type) could also be used for transport. Special refrigerated containersused for perishable commodities. Initially, a weekly schedule train for perishable fruits and vegetables. The initial freight volume is expected to be piecemeal or less than rake load. As volumes are scaled up, necessary development and infrastructure development done. Publicity can be given to a two-year window of rail-based service offering to promote users. Which ultimately increase demand for improved and hybrid seeds of vegetables and fruits.

Keywords: Himalayan region, off time cultivation, railway, transport system

Abstract – 134

CONSERVATION OF BIODIVERSITY, CROP IMPROVEMENT, AND PLANT VARIETY PROTECTION. DUS CHARACTERIZATION OF HIMALAYAN RICE (*ORYZA SATIVA* L.) GERMPLASMUSING BY USING MORPHOLOGICAL DESCRIPTORS AND QUALITY PARAMETERS

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According to intellectual property rights, the NDUS test of a candidate germplasm is essential for protecting it under PPV & FR Act, 2001. AsasignatorytotheTRIPs Agreementof1994, India wasobligedto enactits own legislation system. Keeping this in mind, 30 paddy germplasm collected from different blocks of Himachal Pradesh ware studied to access the diversity. An experiment was conducted at Department of Seed Science and Technology. Palampur (31.1048°N; 77.1734°E), HP during season of 2016 and 2017. Morphological characterizations of 30 germplasm of paddy were characterized by employing 56 DUS descriptors of morpho-physiological nature prescribed as PPV&FR authority. Among these 8 characters were monomorphic, 11 were dimorphic and 23 were polymorphic. Distinct profiles were observed in Jhinidhan for absence of pubescence, Sukara khalijhini for keel anthocyanin colouration, Chohartu for colour of stigma.In total, 23 land races (76.6%) showed green color leaf sheath were as leaf anthocyanin absent in 22(73.3%), 10 (30%) had leaf sheath anthocyanin colour strong surface pubescence of penultimate leaf blade, 6 (20%) showed strong anthocyanin colouration on sheath, only one (HPR-2682) has very strong leaf blade pubescence. 3 (10%) had anthocyanin color for collar, 2 (6.6%) showed purple ligule colour, Chohartu has yellow stigma colour, 21 (70%) had semi-erect curvature of panicle main axis, 4 (13.36%) showed awness with yellow white color, 5 (16.6%) had semi-erect attitude of branches in panicle, Sukara showed erect branching and 24 (80%) had its semi erect spreading, 19 (63.3%) showed medium decorated grain length, 13 (43.3%) had medium grain length and all showed very early too early for maturity. Highest diversity observed for grain colour, length of main axis, weight of fully developed grains, grain width, and decorticated grain shape.No off types were observed for any of the parameters and similar expression for two years and thus considered to be uniform and stable.Besides, germplasm were grouped into four major clusters by the UPGMA clustering method based on Dice coefficient. Cluster I was the largest group with fourteen genotypes. The dendrogram revealed that the genotypes Sailadhan and RP-2421 ware very closed. It was concluded that grouping on the basis of DUS descriptors of grouping characteristics was not sufficient and other molecular descriptors may be used for distinguishing the varieties and for establishing the distinctiveness of a variety.Sukara and Kasturi showed unique feature of valuable, which can sustainable utilization in future breeding programs regarding intellectual property rights.

Keywords: Intellectual property rights, plant variety protection, Himalayan, paddy, traditional varieties

Abstract – 135

CONSERVATION OF BIODIVERSITY, CROP IMPROVEMENT, AND PLANT VARIETY PROTECTION. RESPONSES TO SEED DORMANCY-BREAKING TREATMENTS IN HIMALAYAN RICE (*ORYZA* L.) GERMPLASM

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Freshly harvested rice seeds that do not sprout under favorable conditions,due to the presence dormancy. Wild and traditional rice cultivars have higher degrees of dormancy than modern ones.Seed dormancy is an important aspect that limits effective and efficient conservation, evaluation, distribution and utilisation of rice germplasm. The present study was conducted at Department of Seed Science and Technology, CSK HPKV University, Palampur, HP (31.1048°N; 77.1734°E) during 2016-17. Seed dormancy breaking, germination tests of 30 germplasms collected from different zones of foot hills of Himalayan region were conducted under different treatments. Harvested manually and dried at 13% RH and 15°C. Seeds were subjected to dry heat treatment and

to treatments with: Heat for 48 and 72hrs, Soaking in water for 48hrs, 0.005 and 0.010 M KNO_3, 25 and 50ppm gibberellic acid (GA_3), 1M H_2O_2 and 0.1 and 0.2 M HNO_3. Initial assessment for germination confirmed high levels of dormancy among all the germplasms testedno one shows having >50% germination. The results implied that the maximum length of roots under the treatments of priming with GA_3 and KNO_3were gained 24.07cm, 20.59cm respectively. The most length of seedling under the treatments of priming with KNO_3 gained in HPR-2711(34.96cm). The most roots to shoot length (R/S) for prim Gibberllic acid was gained percent to (5.24%). The most ratios of rootless weight and stem (R/S) under the treatments of priming with KNO_3 gained with densities of 1 respectively were (8.64%, 0.062%). Maximum seedling weight was observed forgibberllic acid (0.0365gm) whereas minimum for water treatment (0.011gm).The highest index vigor1 under Prime by KNO_3 Concentration of 1% (1865). While the highest and lowest index vigor 2 corresponds to the 50ppm GA_3 and H_2O priming for 48 at concentrations of 1 and 4% were obtained (26.77 and 7.071) in rice seed. Highest EC observed for H_2O (0.352) and $KNO_3$100ppm shows highest resultfor α-amylase (12.13). Different priming and priming duration on germination and seedling growth of rice has been effective.

Key words: Rice, Seed dormancy, Treatments, GA_3, HNO_3, KNO_3,Himachal Pradesh.

Abstract – 136

EFFECT OF UREA ON HEMOGLOBIN STRUCTURE OF HEN

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In the present study the effect of different concentrations of Urea was analysed on the structure of henhemoglobin by the help of UV spectrophotometry, Circular Dichromism (CD) and Native page analysis.The secondary structure gets distorted but to a small extent as evident from the CD analysis, although, urea does not dissociate the hemoglobin at 5M and 7M i.e. the *α* and *βchains* still remain together, as evident from native PAGE analysis. Urea have little effect on characteristic UV spectral peaks. Some of the characteristics peak of hemoglobin are only disturbed slightly.

Keywords: Hemoglobin, Urea, UV Spectrophotometer, Circular Dichromism (CD), Native Page.

Abstract – 137

CLASSIFIER COMPARISON MACHINE LEARNING-MNLOGIT WITH ISO-CLUSTERING FOR AGRICULTURE, FOREST & OTHER LANDUSE FOR SAARC NATION

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Rapid dataassessment for land-use classificationis very important for resource planning and management. Time-series data were more useful instead of single data for landuse assessment. Rapid landuse classification using time-series data is a challenge, so classifiers performance is checked. Machine learning Multinomial Logistic regression (Mnlogit) classifiers works on independent data to estimate dependent classes. it trains it-self to calculates statistical estimated classes. Other unsupervised Iterative SelfOrganizing(ISO) is a clustering technique using Dendrogram,to classify cluster into landuse classes. MODIS MOD13Q1 product NDVI, 250m spatial resolution, monthly time series dataareusedin between 2004 to2006 and 2016 for four year. Study region South Asian Association for Regional Cooperation(SAARC) nation is considered.It covers area of 5006711 Sq. Km andfall into varying agri-climatic regions. Time-seriesmonthly data anomalies and noise are filtered using Satvizky-Golayalgorithm, then data redundancy and multi-collinearity are check using Variance Inflation Factor. Time-series data are identified as redundant, so multi-collinearity are removed using Principal Component analysis and data components arePCs(PC1, PC2, PC3) independent images, which are usedfor classification. Random points are created all over SAARC region and its randomness checked using Average Nearest Neighbor(ANN) method. Using R software package mlogit, 75% of random referenced points used for calculation of Mnlogit intercept, coefficient and then model based probability odd-ratio images. Using model and criteria

odd-ratio images converted into agriculture, forest and other (AFOLU) landuse classes. ISO classification calculates mean value of clusters and every pixel value is compared with cluster value one by one and assigns to a cluster. Using dendogram each cluster is classified into a landuse class. Using 25% of random referenced point used for accuracy assessment of Mnlogit and ISO classifiers output. We compared the Machine Learning based classifier Mnlogit with ISO classifier-based algorithm for classificationassessment of agriculture, forest and other landusefor SAARC countries with more that 80% and 55% accuracy respectively.Machine learning based Mnlogit based classification increased reliability and global uniformity at Global level.

Keywords: *AFOLU, Time-Series analysis, Multi-nominal logistic regression, Iterative Self-Organizing, SAARC nation.*

Abstract – 138

BIO-PRIMING: A MODERN SEED QUALITY ENHANCEMENT TECHNIQUE.

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High quality seed is the key to successful agriculture. Modern agriculture with its favouritism for technology and precision demands that each and every seed should readily germinate and produce a vigorous seedling ensuring high yield. Uniformity of growth and synchrony in development are highly desirable characters for mechanized cultural operations. As such, only of high quality i.e., genetically pure, morphologically, pathologically and physiologically sound seed is capable of increasing the productivity; the seed should also have better storability to produce good crop during the next season. Excessive and continuous use of chemical fertilizers coupled with pesticides and fungicides have damaged the soil health which causes deleterious effects on crop cultivation and productivity. Now-a-days, the chemical fertilizers are replaced by environment friendly bio- fertilizers. At present, the carrier based fertilizers are replaced by liquid formulations. Germination is the first step in plant growth, which is one of the critical stages in the life cycle of plants and it is a key process in germination. Germination ability of seeds in favourable conditions, the more chance of establishment of the plant and will lead to higher density, which is resulting in increased performance. The rapid and uniform field emergences are two essential pre- requisites to increase yield, quality and ultimately profits in crops.

Key words: Seed quality, bio prime and tequinics.

Abstract – 139

DIFFERENT STRATEGIES FOR DOUBLING THE FARMER'S INCOME

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India is an agriculture based country. Though in absolute terms agricultural GDP is growing but the share of agriculture in the GDP has been declining and a sizable population is still dependent on agriculture for their livelihood. The most important reason for the emergence of agrarian distress in the country during 1990s is the low level of absolute income as well as large and deteriorating disparity between income of a farmer and non-agricultural worker, which turned even more serious in latest years. Agriculture development in India has been viewed by and large in the context of increasing the output rather than welfare of the farmers. In this background, the goal set to double farmers' income by 2022-23 by shifting the focus from agricultural output and food security to income securitywhich can play crucial role to promote farmers welfare, reduce agrarian distress and bring parity between income of farmers and those working in non-agricultural professions activities (non-farm income includes earnings from non-agricultural economic activities like manufacturing, handicrafts, repairs, construction, mining and quarrying, transport, trade, communication, community and personal services in the rural areas etc.). According to the reports published from *NitiAayog*2017, doubling real income of farmers till 2022-23 over the base year of 2015-16, requires annual growth of 10.41% in farmers' income.In order to double the income of farmers 'including farm and non-farm activities in a span of six years, a compound annual growth rate of 12.25% from the base year 2016 is required. Therefore, strong measures are actually needed to

harness all possible sources of growth in farmers' income within as well as outside agriculture sector. As described by the central government, the major sources of growth operating within agriculture sector mayare improvement in productivity, resource use efficiency or saving in cost of production, increase in cropping intensity, diversification towards high value crops etc. In the due course, many useful strategies were proposed like Irrigation ('Per Drop More Crop'); Quality seeds (Improving seed replacement rate);Soil-test based nutrient management (Distribution of soil-health cards); Post-harvest crop losses (Large investments in warehousing and cold chains); Value addition; Creation of a national agricultural market, removing distortions and e-platform etc.; New crop insurance scheme (*PradhanMantriFasalBimaYojana*)- Minimum Premium and Maximum Security; and Promotion of ancillary activities (poultry, sericulture, beekeeping and fisheries) etc. Though the doubling farmers' income by 2022 looks quite challenging but it is needed and is attainable

Key words: Double farmers' income and crop cultivation

Abstract – 140

GLOBAL SEED INDUSTRY: PRESENT STATUS AND FUTURE ASPECTS

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Seed is very critical input for long term sustained growth of agriculture. A robust seed system is the first and foremost step towards food security. Of the world and acts as driver of growth in agriculture. Sees play significant role in sustainability of the agro- food system, as they are at the very beginning of the food chain, and thus constitute its base and foundation. The seed industry has witnessed a substantial change in past century, with farmers relying on purchasing seeds from market with better traits rather than relying on seeds from previous season's harvest. Developments in seed technology have increased the momentum of the industry's growth and the introduction og genetically modified crops has further boosted the seed market. Global seed market by revenue was $62.1 billion in 2017 & projected to reach $82.94 billion in 2019. North America is biggest market for seeds with share of 35% are expected to retain the top position in the world till 2019, followed closely by Asia Pacific (32.7%). Europe also shares of 23.5%. (IMARC GROUP, 2017). Development of seed industry is divided into two phases: Early Industry Structure (1920- 1970), Modern Industry Structure (1970- Present), (Howards, 2009). Globally, but also in many individual counties, different kinds of seeds can be distinguished among those used by farmers: Conventional seeds, GM seeds, Farmers Seeds. Global seed market can be divided into several categories by market, crop, and seed trait. Apart from this the expansion of seed industry has occurred in parallel with growth of agriculture productivity. Seed industry has an important role for providing quality seeds at reasonable price at proper time to farmers, further which enhance the agricultural growth and world economy. Seed industry is no more confined to just production and marketing of seed. It has a well acquired technologic strength to cater to the varietal needs of tomorrow.

Key words: Seed industry, global seed market and present status.

Abstract – 141

SEED PRODUCTION IN ORGANIC FARMING SYSTEM

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Organic seeds are seeds that have come from plants grown strictly without the use of synthetic fertilizers and pesticides. The term "organic seed" means seed produced under an organic system, ideally one that is certified. For organic seed production, soil fertility and pest management is achieved through various source like cropping patterns, organic manure, bio fertilizers, cultural practices and bio pesticides, including plant derived products. An increase in amount of chemical products used on seed crops may occur due to the length of time the crops remain in the field. As a result, plant disease and insect get more time to attack the crop during seed production. India is bestowed with lot of potential to produce all varieties of organic products due to its various agro-climatic

conditions. India's rank in terms of world's organic agriculture land was 9th and in terms of production was 1st. It is important that the fertility of the soil is improved when producing organically since chemical fertilizers cannot be used. Useof soil amendments such as puchgavya, sanjivak and jeevamrita. It is highly essential to control pests and diseases at early stages in order to avoid heavy loss. Seed treatment with botanicals priming and pelleting is used to improve germination rates. Seed health treatment of hot water bath, plant extract oil and bleach disinfection is useful for storage. The organic seed should be stored and handled separately to maintain their identity. Strong Organic plant breeding programmes is essential for development of verities in various crops which must suit local condition.

Key words: organic farming, seed production.

Abstract – 142

ALLELOPATHIC EFFECT OF *PARTHENIUM HYSTEROPHORUS* ON WHEAT SEED GERMINATION

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Allelopathic effect of aqueous leaf extract of *Parthenium hysterophorus* were studied on seed germination of Wheat. The experiment was conducted at Department of Agriculture, Quantum University during 2018.Leave extract of *Parthenium hysterophorus* were prepared at 2%,4%,6% and 8% of concentration. Wheat seed were dipped for 24, 48 and 72 hrs in different concentration and placed in germinator at 25 C and RH 75% for one weak. The germination percentage in 24 hrs soaking in 2% concentration of leaf extract was 100%,at 4% concentration was 80% and 6 % and 8% was 50%.In 48 hrs of soaking in 2%/ concentration of leaf extract germination percent was 80%,at 4% was 60% and in 6% was 45% and at 8% it was zero. In 72 hrs soaking there was no germination. The extract has shown significant inhibitory effect in seed germination at 72 hrs of soaking. Seed germination in 24 and 48 hrs was not completely inhibited but the germination percentage was low.

Keywords: Allelopathy; *Parthenium hysterophorus*;Germination.

Abstract – 143

INTEGRATED FARMING SYSTEM AS A VIABLE APPROACH IN DOUBLING FARMER'S INCOME

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Marginal and small farmers constitute more than 84 percent of the 115 million operational holdings in India which are cultivating only 29 percent of the arable land. Farming systems under small farm holders can only be made profitable if farmers adopt a conservative approach at all stages of farming. Integrated Farming systems can be proved as viable approach represents an appropriate combination of farm enterprises, *viz*. crop production, horticulture, livestock, fishery, forestry, poultry and goatry *etc*. in specific farming situation to address the problems of sustainable economic growth of Indian farming communities. The farmers can realize the doubling of their income within a contemplated period of five years by adding livestock in the farming system and reap the consequent social and ecological benefits (Ponnusamy and Devi (2017). The conclusion is that 70% of the farmers in India have annual per caput income less than 15,000. Only 10% of them earn more than 30,000. Land size and income are identified important correlate. Since more than three-fourths of the low income farmers (<`15,000) are marginal farmers who cultivate landholdings (Kumar and Chahal 2018). Nearly 72.2% population of India is living in 6.38 lakh villages, mostly dependent upon agriculture and livestock for their livelihood. Crops productivity is largely restricted by uncertain and erratic rainfall, scarcity of water for irrigation and deterioration of soil-health. Out of the 138 million Indian rural households, 33.01 million (24%) are maintaining goats. Households cultivating less than 2.0 ha of land (marginal and small) are the custodian of more than 76% of the total goats in the country. Goat has been playing multiple role in livelihood of the rural people by providing income, employment, nutrition, supporting crop production and risk aversion in case of

crop failure. Landless men and women are increasingly relying on goat keeping for their socio-economic up liftment (Singh *et,al*. 2018).

Key words: integrated, income and ecological.

Abstract – 144

CARBON SEQUESTRATION: A STRATEGY TO MITIGATE CLIMATE CHANGE

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Human activities, especially the burning of fossil fuels such as coal, oil, and land use change, have caused a substantial increase in the concentration of carbon dioxide in the atmosphere. This increase in atmospheric CO_2 from about 280 to more than 380 parts per million (ppm) over the last 250 years is causing measurable global warming. Soil is major source of atmospheric CO_2. Since the industrial revolution, global emissions of carbon due to fossil fuel combustion and due to land use change and soil cultivation. Emissions due to land use change include those by deforestation, biomass burning, conversion of natural to agricultural ecosystems, drainage of wetlands and soil cultivation. The depletion of soil C is accentuated by soil degradation and exacerbated by land misuse and soil mismanagement. Thus, adoption of a restorative land use and recommended management practices (RMPs) on agricultural soils can reduce the rate of enrichment of atmospheric CO_2 while having positive impacts on food security, agro-industries, water quality and the environment. A considerable part of the depleted SOC pool can be restored through conversion of marginal lands into restorative land uses, adoption of conservation tillage with cover crops and crop residue mulch, nutrient cycling including the use of compost and manure, and other systems of sustainable management of soil and water resources. These are the technically and economically feasible strategies to mitigate the consequences of increased atmospheric CO_2.

Key words: Carbon, climate change and atmospheric.

Abstract – 145

INFLUENCE OF INTEGRATED NUTRIENT MANAGEMENT ON GROWTH, YIELD AND QUALITY OF BABY CORN (*ZEA MAYS* L.) UNDER UTTARAKHAND CONDITION

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An experiment entitled with"Influence of integrated nutrient management on growth, yield and quality of baby corn (*Zea mays* L.) under Uttarakhand condition'' has been conducted at the Students' Research FarmUttaranchal (p.g) College of Bio-Medical Sciences & hospital, Dehradun during the *Kharif* season of 2016. The experiment was carried out in randomized complete block design (RCBD) having 7 treatments with four replications. The treatments was T_1 –Control, T_2 -100 per cent of recommended inorganic N, T_3 - 5 tonnes of FYM ha^{-1} + 100 kg inorganic N $ha^{-1,}$ T_4- 10 tonnes of FYM ha^{-1} + 75 kg inorganic N ha^{-1} ,T_5-15 tonnes of FYM ha^{-1} + 50 kg inorganic N ha^{-1} ,T_6-20 tonnes of FYM ha^{-1} + 25 kg inorganic N ha^{-1} ,and T_7-25 tonnes of FYM ha^{-1} . From the analysis of variation table a significant difference were showed by all the treatments. It was revealed that the growth characters were significantly better with the application of treatment T_3 (5 tonnes of FYM + 100 kg of inorganic N ha^{-1}).Moreover, among the various nutrient management treatments the treatment T_3 (5 tonnes of FYM + 100 kg inorganic N ha^{-1}) produced significantly better yield and yield contributing characters than all other treatments.The findings of the present experiment may lead to the conclusion thatthe integration of 5 tonnes of FYM with 100 kg inorganic N ha^{-1} came out to be the best.

Key words: Baby corn, INM and Yield.

Abstract – 146

SEED PACKAGING AND STORAGE

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Seed quality is the most important input which ensures better germination as well as better yield. Seed quality is highest at the time of physiological maturity, which gradually decreases with the advent of time. Qualities of seeds are affected by several biotic and abiotic factors during storage period. Although seed quality is regulated by genetic make-up, but commonly the quality of seeds is deteriorated during storage period. Seed storage condition plays an important role in seed production system. Good storage condition can reduce deterioration of seed. Seed moisture content, relative humidity and temperature during storage are responsible for the main effect on seed quality.Several factors affect the longevity of seeds storage which includes variety of seed, storage conditions, initial seed quality, moisture content, insects, pests, bacteria and fungi. The rate of seed deterioration could be slowed down either by storing the seeds under ambient conditions or by imposing suitable seed treatments. Damage of seed during storage is inevitable. Types of container also regulate temperature, relative humidity and seed moisture contents which appear to be the principle factors in deterioration of seed quality.The seed moisture level and moisture availability are the vital factors for inducing microbial growth. Most of the pathogenic storage microorganism such as *Aspergillus* spp, *Penicillum* spp. and *Rhizopus* spp. requires plenty of moisture for rapid growth and causes discoloration of seed and germination failure and yield loss. If seeds are packed in moisture proof containers and the relative humidity of the air around the seed remains low, then the seed equilibrium moisture remains low and the seed maintains its viability for a longer. Thus, it appears that seed being stored in low relative humidity at lower moisture content in air tight containers could retain high viability for a long period of time.

Key words: Seed packaging, storage and quality.

Abstract – 147

WATER POLLUTION: STATUS, SOURCES AND MANAGEMENT

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Water covers about 70% of the Earth's surface whereas 0.002% of the water is available for human consumption. Water is the most vital element among the natural resources, and is critical for the survival of all living organisms. Today there are many cities worldwide facing an acute shortage of water. The quality of water is affected by human activities and is declining due to the rise of urbanization, population growth, industrial production, climate change and other factors. Water pollution is addition of some substances (organic, inorganic, biological or radiological) or factor (heat) which degrades the quality of water so that it either becomes health hazard for man, animals or plants, or unfit for use. Water pollution is a serious problem in India as almost 70 per cent of its surface water resources and a growing percentage of its groundwater reserves are contaminated by biological, toxic, organic, and inorganic pollutants. 1.8 billion People use a source of drinking water contaminated with faeces, which puts them at risk of contracting cholera, dysentery and typhoid. The discharge of untreated sewage is most important source of pollution of surface and ground water in India. The Ganges basin is the most heavily populated river basin in the world, with over 400 million people and a population density of about 1,000 inhabitants per square mile. The Ganga was ranked among the five most polluted rivers of the world in 2007. In many developing countries the bulk of domestic and industrial wastewater is discharged without any treatment or after primary treatment only. Natural purification of water by dilution, sedimentation and filtration is helpful in reducing pollution. Wastewater management includes pretreatment, primary, secondary and tertiary treatments which provide higher degrees of reduction.

Key words: Water, sources and pollution.

Abstract – 148

GLOBAL ATMOSPHERIC CHANGES: STATUS AND EFFECTS

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Global changes refers to planetary-scale changes in the earth systems which consist of land, oceans, atmosphere, polar region, the planet's natural cycles and deep earth processes. During the last 200 years anthropogenic activities like industrial activities, burning of fossil fuel and biomass, alteration of land surface and transportation practices have altered the atmosphere significantly. Major effects of these activities include increased acidity in the atmosphere, production of pollutant, elevated level of greenhouse gases and threat to ozone layer in the stratosphere. From a geological perspective the contemporary rise of atmospheric carbon dioxide concentration is an abrupt change. The excessive increase in CO_2 and other GHGs results in enhanced greenhouse effect and ultimately global warming. IPCC have recently predicted that average global temperature could increase between 1.4-5.8°C by the year 2100. This elevated level of temperature and GHGs results change in pattern and frequency of weather phenomenon, change in sea level which is a major concern for coastal managers and society. Atmospheric levels of ozone-depleting substances contribute to stratospheric ozone depletion. Although, atmospheric abundance of ozone depleting substances continue to decreases, but nitrogen oxides in the stratosphere predicted to become future ozone depleting substance. Acid deposition of acid gas and acidic salts causes acidification of lakes, stream and decaying of building materials. Thus anthropogenic activities are interlinked with earth system and generating long term trends which if continued, may lead to large and irreversible effects. Hence, it is necessary to adopt preventive measures like reducing emission of GHGs and switching to alternate energy sources to combat global atmospheric changes.

Key words: Atmospheric, global impact.

Abstract – 149

EFFECT OF DIFFERENT HERBICIDE COMBINATION ON CROP GROWTH AND YIELD OF TRANSPLANTED RICE IN WESTERN UTTAR PRADESH

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A field experiment was conducted with the aim to know effects of different weed management on growth and yield of transplanted rice in western Uttar Pradeshduring *Kharif* 2016 at Crop Research Centre of Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, U. P. (India).The experimental site was sandy loam in texture, low in organic carbon and available N, medium in available P and K and slighty alkaline in reaction. The experiment was laid out in randomized complete block design with three replications comprising twelve weed management treatments. The results indicated that the highest plant height, number of tillers (m^{-2}), dry matter accumulation, leaf area index, protein content and grain yield (46.20 q ha^{-1}) were recorded with the application of Pyrazosulfuron fb Bispyribac Sodium (150 g a.i ha^{-1} PE fb 25g a.i ha^{-1} POE) followed by Pyrazosulfuron fb Azimsulfuron (150 g a.i ha^{-1} PE fb 30 g a.i ha^{-1} POE) treatments. Grain and biological yield of rice was registered 37.66 and 34.93 per cent higher under Pyrazosulfuron fb Bispyribac Sodium (150 g a.i ha^{-1}PE fb 25g a.i ha^{-1} POE) treatment in comparison to weedy check treatment, respectively. This shows that Pyrazosulfuron fb Bispyribac Sodium (150 g a.i ha^{-1}PE fb 25g a.i ha^{-1} POE) can be applied in transplanted rice for effective weed control, higher growth and productivity.

Key words: Grain yield, herbicide, transplanted rice, and weed management.

Abstract – 150

SEQUENTIAL STATUS OF INDIAN FORESTS TO MITIGATE CLIMATE CHANGE

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Forests are necessary to determine the greenhouse gases level especially storage of carbon dioxide in the atmosphere. The United Nations Framework Convention on Climate Change refers to forests as both source and sink of greenhouse gases, and accredits their essential role in the mitigation of climate change. India ranks tenth in the world in terms of forest area and eighth in terms of annual forest gain. As per India State of Forest Report, the percentage of forest cover to the total geographical area was 19.49, 19.43, 20.60 and 21.34 in 1987, 1995, 2005 and 2015, respectively, whereas the current status (2017) accounts for 7, 08,273 km^2 (21.54 %) . There was an increase of 6,600 km^2 in forest cover as compared to 2015, which was 0.21% increase during the period from 2015 to 2017. The present estimation also reveals that twelve States and three Union Territories (Mizoram, Lakshadweep, Andaman & Nicobar Islands, Arunachal Pradesh, Nagaland, Meghalaya and Manipur, Tripura, Goa, Sikkim, Kerala, Uttarakhand, Dadra & Nagar Haveli, Chhattisgarh and Assam) have above 33 per cent of the geographical area under forest cover. Though, India has shown an increasing trend in the forest cover as compare to the worldwide trend of decreasing forest cover during the last decade but there is long way to achieve the required goal and maintain consistency of 33 % forest cover.

Key words: Forest cover, Climate change, Mitigation, India.

Abstract – 151

DECREASE IN PADDY PRODUCTION DUE TO SHIFTING OF RAINFALL PATTERN IN RUPANDEHI DISTRICT OF NEPAL

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Rupandehi district is the western plain region in Nepal covering an area of 1360 sqkm and extending up to hills in north and Maharajgunj of Uttar Pradesh in South. Out of total area cultivable land of district is 85,122 hectare and major cultivated crops are paddy, wheat, maize, oilseeds, pulses and vegetables. Among all the crops the district is well known for the production of paddy. But in recent few years, the production is decreasing by 1-2% yearly and the major reason found behind this scene was shifting of rainfall pattern in the district. The peak rainfall period in the district shifted from June/July to mid august/September. This resulted the drying of seedlings in the nursery and dying of plants where it has been already transplanted. According to the government reports only 80-85% of the cultivation has been satisfactory till the end of peak period of transplantation. As well the cases have also been reported where the matured crops were damaged during harvesting period due to shifted rainfall period. Due to the shifting of rainfall period, the rainfed paddy is at main risk due to drought over a long period. In other hand, the insect pests get favorable condition and hence the loss due to pest infestation has also been increased as they are also the vectors of various diseases. This entire phenomenon resulted in the significant loss of production.

Key words: Paddy, Rainfall, Production, Rupandehi District.

Abstract – 152

CONSEQUENCES OF CLIMATIC CHANGES ON NTFPS, IN EASTERN REGIONS OF MADHYA PRADESH

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Madhya Pradesh is endowed with rich forest wealth.There are many NTFPs like, Tendu leaves (*Diospyros melenoxylon*), sal seed (*Shorea robusta*), chironzi (*Buchania lanzan*), flowers of mahua (*Madhuca indica*). In which only tendu leaves, sal seeds and kullu gum are nationalized forest products. Non-nationalized NTFPs can be collected and traded freely (MFP federation). Maximum region being precipitation irregular rainfalls in the last 15 year have caused up to 60% decreased in crop yields, directly impacting the food security of the region. While output of most NTFPs has reduced extremely due to unendurable extraction, production of mahua has not suffered as much. Community based institiutions have the potential to support the ecosystem- based livelihoods of forest products communities.

Keywords: Climatic change, NTFPs, Tendu leaves, Sal seed, Mahua, MP

Abstract – 153

IMPORTANCE OF MANGROVE IN OUR ECOSYSTEM

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Mangrove has a great contribution in our ecosystem. Mangroves are salt loving plants and are endemic to both tropical and subtropical environment. They protect our ecosystem from damaging storms, winds, waves and floods. On the other way, it is also helpful in protecting the coastal line areas and also working as providing the habitats for aquatic animals like fishes, crabs, other animals. Mangrove is also serves as valuable nursery for invertebrates and fish. They also support a number of threatened and endangered species like American alligator, green sea turtle, Loggerhead sea turtle, etc. It is also utilized as Renewable resource in many part of the world; people utilize them as building houses, boats, furniture because wood of mangrove is water resistance and durable. Black Mangrove wood is used for the production of charcoal. Mangrove exist several types of important things like extraction of dyes from its bark. Its leaves have been used to make tea, medicine and also a substitute for tobacco for smoking. Mangrove is also useful as live feed stock for pet animals. Species *Acanthus ilicifolius* is used for the treatment of rheumatic disorder in this way several species is used as preparing beverages and also in preparing honey. Mangrove helps in reducing global warming because these are rich source of carbon mainly in tropic region. They are helpful in maintaining the biomass accumulation. They provide thick and sediment matter to its surroundings and also increasers the strength of the soil. So it is very necessary to conserve the mangrove forest because this comes under natural protecting system.

Keywords: Mangrove, Ecosystem, Endangered Species, Global Warming.

Abstract – 154

ALLELOPATHIC EFFECTS OF *MELIA AZEDARACH AND GREWIA OPTIVA* LEAF EXTRACTS ON GERMINATION AND EARLY GROWTH OF BARNYARD MILLET

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A laboratory experiment was conducted to evaluate the effect of *Melia azedarach and Grewia optiva* leaf extracts on germination and subsequent seedling growth of barnyard millet. Seven treatments comprised of distilled water 0(control), 50, 75,100%, concentration of leaf extract were employed. The results obtained shows that as the concentration of extract increases the growth and further development of seedling affected adversely. 100 % *Melia azedarach* shows considerable degradation in all the parameters under study and 50% aqueous extract of *Grewia optiva* had the least effect on all the parameter under study *viz.* root, shoot and seedling length, fresh and dry weight of seedling and vigour index I and II.

Abstract – 155

ESTIMATION OF HETEROSIS IN GARDEN PEA FOR YIELD AND YIELD CONTRIBUTING TRAITS UNDER MID-HILL CONDITIONS OF HIMACHAL PRADESH

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The present investigations was carried out at the Research Farm, Department of Vegetable Science, Dr YS Parmar University of Horticulture and Forestry, Nauni, Solan (HP) during 2015 and 2016 to estimate heterosis in 15 F_1 crosses of garden pea derived from 6 × 6 diallel analysis excluding reciprocals. F_1's were observed for heterobeltiosis. The crosses Arkel × PM-2 (32.81%), Arkel × VRP-6 (22.54%) and Matar Ageta-6 × VRP-6 (19.63%) exhibited maximum significant positive heterosis for pod yield over better parent where as the cross Matar Ageta-6 × PM-2 exhibited maximum significant negative heterobeltiosis for node bearing first flower (-7.26%), days to 50 per cent flowering (-7.69) and days to marketable maturity (-5.55%) thus indicating earliness. These crosses can be exploited to isolate desirable segregants for trait specific breeding.

Keywords: Garden pea, Heterobeltiosis, Segregants, Traits and Yield.

Abstract – 156

CHANGES IN THE PHYSIOC-CHEMICAL PROPERTIES OF SOIL IN DIFFERENT DEODAR FORESTS OF GARHWAL HIMALAYA

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The study was carried out in five different deodar forest of Uttarakhand in Western Himalaya, India. The aim of the study was to evaluate the changes in physico-chemical properties of soils. Bhatt in 2000 analysis the physico-chemical properties of same studied sites. Physical and chemical properties of the soil as moisture percentage, organic carbon percentage, available phosphorus, available potassium were analyzed from collected Composite soil samples for three different depths viz., (i) (0–10 cm), (ii) (11–20 cm), and (iii) (21–30 cm) in all the selected forest types. Highest soil organic carbon % was obtained under Devidhar (0.68%) forest and lowest under Dewarkhal (0.24%) forest. Study reveals that soils were slightly acidic to buffer in nature on all the 5 sites and the pH values of these soils ranged from 5.07 to 5.87. Maximum Potassium was recorded in Dewarkhal (406kg/ha) and minimum was recorded in Devidhar (63.05kg/ha). Phosphorus was highest recorded in

Dewarkhal (64.21 kg/ha) and lowest recorded in Jhandidhar (7.76kg/ha). The highest average moisture content % was recorded in Dhanoulti (41.99%) and lowest was recorded in Devidhar (14.72%). The values of physical and chemical properties of the soil in all the forest types were higher than the values previously recorded for the similar forests of the Western Himalaya. The possible reasons being luxuriant vegetation and undisturbed nature of these forest types, which is evident from higher values of diversity and other phytosociological parameters.

Key words: Physico-chemical, deodar forest and garhwal Himalaya.

Abstract – 157

MARKER TRAIT ASSOCIATION FOR WOOD CHARACTERS ASSOCIATED WITH STEM HARDNESS IN A BACKCROSS POPULATION OF *JATROPHA CURCAS*

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Jatropha curcas L. belongs to the family-Euphorbiaceae. It is a native of tropical America which was brought to India by the Portuguese during sixteenth century. The plant has now found recognition as a potential biodiesel crop worldwide due to its socio-economic and environmental benefits. Beside the oil, the wood biomass of Jatropha can be used for energy generation through gasification or pyrolysis. Jatropha varieties with low wood moisture content are likely to have more energy content per unit fresh weight. Further, such varieties would be able to withstand better the weight of fruits. It is therefore necessary to examine the variation in different anatomical traits of wood and study their correlation in an interspecific backcross population. The major traits analysed were wood moisture content, one-minute sap flow, fibre length, fibre diameter and radial dimensions of various tissue zones in stem section. Significant variability for the observed traits was present in the BC_1 plants. There was significant positive heterosis over the mid-parent values for pith index (~67%) and fibre length (~14%) but negative heterosis for vascular bundle index (34%), fibre diameter (26%) and one-minute sap flow (36%). There was no significant heterosis observed for moisture content and calorific value on fresh weight basis. Transgression was observed in 25, 37.5 and 62.5% of the BC_1 plants for pith index, vascular bundle index and cortex index, respectively. Further, transgression was observed in 12.5% of the BC_1 plants for moisture content and 16.6% of the BC_1 plants for calorific value on fresh weight basis. No significant transgression was observed for fibre length, fibre diameter and one-minute sap flow. Moreover, QTLs on LG8 were also identified for moisture content and gross-calorific value using genotype data obtained from various markers like SSR, AFLP and GBS-SNPs.

Key words: *Jatropha curcas L,* marker and genotype.

Abstract – 158

CULTIVATION AND NUTRITIONAL ANALYSIS OF *PLEUROTUSPULMONARIS* IN ADVERSE CLIMATIC CONDITIONS WITH OPTIMISED SUBSTRATE AND SUPPLEMENT

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According to International Code of Nomenclature 16,000 species of mushrooms has been reported till date and environmentally considering this group of fungi absorb oxygen and release carbondioxide. Mushrooms are well known for their contribution in bioremediation through biosorption process and also in the biosynthesis using agricultural crops wastes eventually in making remarkable involvement in sustaining stable environmental conditions.*Pleurotuspulmonarius* var. stechangii (=P. sajor-caju) mycelial growth and fruiting requires the temperature of 23-28 ºC and 18–24 ºC respectively in tropical and subtropical areas for the promising yield. The current studies reported feasible growth of *Pleurotus* spp. duringinevitableadverse climatic fluctuations (unsuitable July- august months for growth of *Pleurotuspulmonaris*) where the mycelial growth and fruiting

temperature shifted to 33-37 ºC and 25–30 ºC. Perhaps, with the use of optimised organic substrate such as temple's flower with leaves waste and supplements as gram flour with calcium carbonate treated wheat straw the satisfactory yield of 8-10 Kg in four flushes. The significant moisture content in dry weight was 86.4%, 78% Ash content, 32-35 gmprotein, 6-6.9 gmcarbohydrate and 0.38- 0.42 gmlipid content and reduced time period from mycelia production to fruiting body of 23- 29 days has been observed. This data implicates the importance of optimisation of substrates and supplements in adverse conditions for the achievement of promising yield and nutritional quality.

Keywords- *Pleurotuspulmonaris*, bioremediation, biosynthesis, climatic change.

Abstract – 159

OPTIMIZATION OF WHEAT STRAW, GREEN OR BLACK WASTE TEA BAGS BASED SUBSTRATE WITHLACTOSE SUPPLEMENT FOR CULTIVATION OF *PLEUROTUSSAJOR-CAJU* IN ADVERSE TEMPERATURE BASED CLIMATIC CONDITIONS

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The previous studies highlight the cultivation of Pleurotuspulmonaris in favourable climatic conditions from 23-28 ºC for mycelial growth and 18–24 ºC for fruiting. The present studies determine the effect of biodegradable waste such as black tea or green tea bags with wheat straw as substrate and 3% lactose as supplement in combating the fluctuation of temperature due to climate change in the production of *Pleurotussajor- caju.*The mycelium running took place in 8-10 days but the appearance of pin head followed by maturity took almost 22-24 days at 28^0c-37^0c. The four flushes yield gives the maximum yield around 9 kg- 11.5 kg . The nutritional analysis of oyster mushroom shows 0.22-0.28 gm fat and 8.5-9.8 gm carbohydrate and 28-30 gmprotein. Our data allude to the prominence of substrates and supplements in adversative conditions for the attainment of virtuous quality and quantity of mushroom in short cycle.

Keywords - *Pleurotussajor- caju*, biodegradable waste, yield, climatic change.

Abstract – 160

EFFECT OF WOODEN LIGNOCELLULOSE BASED SUBSTRATE WITH OAT MEAL AND TWEEN 80 SUPPLEMENTS FOR CULTIVATION OF *OYSTER MUSHROOM*IN CONTENDINGANTAGONISTICTEMPERATURE BASED CLIMATIC CONDITIONS

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Till date 16,000 species of mushrooms are recognized for their substantial involvement in bioremediation and biosynthesis in supportingunwavering environmental conditions. *Pleurotuspulmonarius* var. stechangii (=P. sajor-caju) requires 21-35 ºC for general mycelialcolonizationbut optimized conditions for mycelium running and fruiting requires the temperature of 23-28 ºC and 18–24 ºC respectively.The present studies determine the effect of biodegradable waste such as wooden waste from carpenter, broken broom pieces, groundnut shells with wheat straw as substrate and oat meal with tween 80 as supplement in encountering temperature fluctuation due to climate change. The mycelium running took place in 5-7 days followed by appearance of pin head 14th -18th day and fruitingin 19th-22nd day at 28^0C-37^0C. The four flushes yield gives the maximum yield around 10 - 13kg. The nutritional analysis of oyster mushroom shows 0.20-0.26gm. fat and 7.5-7.8 gm. carbohydrate and 32-34 gm. protein. Our data emphasesupon the importance of optimisation of substrates and supplements in adverse conditions in attaining effective yield in short span.

Keywords- *Oyster mushroom*, bioremediation, climatic fluctuation, nutritional analysis.

Abstract – 161

CULTIVATION AND NUTRITIONAL ANALYSIS OF *PLEUROTUSPULMONARIUS* VAR. STECHANGII IN ADVERSE CLIMATIC CONDITIONS WITH LEMON GRASS TEA LEAVES, JACKFRUIT LEAVES AND 2% PEPTONE.

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According to International Code of Nomenclature 16,000 species of mushrooms has been reported till date and environmentally considering this group of fungi absorb oxygen and release carbondioxide. Mushrooms are well known for their contribution in bioremediation through biosorption process and also in the biosynthesis using agricultural crops wastes eventually in making remarkable involvement in sustaining stable environmental conditions. *Pleurotuspulmonarius* var. stechangii (=P. sajor-caju) mycelial growth and fruiting requires the temperature of 23-28 ºC and 18–24 ºC respectively in tropical and subtropical areas for the promising yield. The current studies reported feasible growth of *Pleurotus* spp. during inevitable adverse climatic fluctuations (unsuitable July- august months for growth of *Pleurotuspulmonaris*) where the mycelial growth and fruiting temperature shifted to 33-37 ºC and 25–30 ºC. Perhaps, with the use of optimised organic substrate such as Lemon grass tea leaves and 2% peptone with calcium carbonate treated wheat straw the satisfactory yield of 6-9 Kg in four flushes. The significant moisture content in dry weight was 87.3%, 74% Ash content, 26-28gm protein, 5-5.9 gm carbohydrate and 0.44- 0.46gm lipid content and reduced time period from mycelia production to fruiting body of 21- 23 days has been observed. This data implicates the importance of optimisation of substrates and supplements in adverse conditions for the achievement of promising yield and nutritional quality.

Keywords- *Pleurotuspulmonarius* var. stechangii, temperature fluctuation, climatic change.And nutritional analysis.

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OPTIMIZATION OF WHEAT STRAW, GREEN OR BLACK WASTE TEA BAGS BASED SUBSTRATE WITH NUTRIENT AGAR SUPPLEMENT FOR CULTIVATION OF *PLEUROTUSSAJOR-CAJU* IN ADVERSE TEMPERATURE BASED CLIMATIC CONDITIONS.

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The previous studies highlight the cultivation of Pleurotus*sajor-caju*in favourable climatic conditions from 23-28 ºC for mycelial growth and 18–24 ºC forfruiting. The present studies determine the effect of biodegradable waste such as *egg trays, cardboard waste of departmental store* with wheat straw as substrate and nutrient agar as supplement in combating the fluctuation of temperature due to climate change in the production of *Pleurotussajor- caju.* The mycelium running took place in 6-7 days but the appearance of pin head followed by maturity took almost 25-30 days at 28^0c-37^0c. The four flushes yield gives the maximum yield around 12kg-14kg . The nutritional analysis of oyster mushroom shows 0.12-0.18 gm. fat and 7.5-7.8 gm. carbohydrate and 34-36gm. protein. Our data allude to the prominence of substrates and supplements in adversative conditions for the attainment of virtuous quality and quantity of mushroom in short cycle.

Keywords- *Pleurotussajor- caju*, egg trays, cardboard box, climatic change

Abstract – 163

GEOCHEMISTRY OF THE BUNDELKHAND GRANITES AND ITS INFLUENCE ON SOILS IN TROPICAL TO SUBTROPICAL CLIMATES OF CENTRAL INDIA

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Central Indian craton is dominated by the precambrian rocks especially granitoids (~65-75%), followed by the older gneisses and enclaves of ancient supracrustal rocks (~20-30%). Bundelkhandcraton is spread over an area of 26,000 sq. km, extending north up to the Himalaya, and bounded by Son-Narmada fault against the Satpura mobile belt in the south and Great Boundary Fault against the Aravallicraton in the west. In the north, few of its part concealed under the Indo-Gangetic Alluvium plain, considering which the total area may go up to 35,000 sq. km. The craton is characterized by voluminous granitoids, which typically originates from the melting of mafic lower crust (igneous rocks). We report the influence of granite mineralogy in soil profile that are widespread in Bundelkhandcraton. The mineralogical, petrological and geochemical characters of granitoids and its soil analyses can be useful in predicting weathering intensity of soils that derived from these voluminous granitic rocks of Bundelkhandcraton. Results showed that the granites are mostly metaluminous, calc-alkaline and has a moderately fractionated rare earth elements (REE), low Yb and insignificant to negative Eu anomaly and is probably generated by the melting of felsic crust. Measured La/Yb_N and light REE/heavy REE ratios showed that weathering processes had a significant impact on REE fractionation in soil profiles. The LREE/HREE fractionation was high along the northern Indo-Gangetic Alluviums, which is more humid as compared to the other parts of the craton. The soil profile formed due to the weathering of these granites shows enrichment for LREE over the HREE. Significant to no Eu anomaly were observed. These REE fractionation can give better idea about the weathering intensity of soils that derived from Bundelkhand granites. Major oxides data were also studied to estimate the weathering rates of granites in tropical environments.

Keywords*:* Bundelkhand granites, rare earth elements, Soil weathering, granitic rocks, trace element chemistry.

Abstract – 164

PGPRS FUNCTION IN COMBATING CLIMATIC VARIATIONS FOR SUSTAINABLE AGRICULTURE

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Plant growth promoting rhizobia(PGPR) belongs to the various families of Phyllobacteriaceae, Rhizobiaceae and Bradyrhizobiaceae. The nutrition and inhabitation of PGPR is sustained by the niche known as Rhizosphere. PGPRs inculcate numerous benefits specifically for mechanisms including defence mechanism againstpests and diseases through activation of defence pathways and development of wide range spectrum resistance to overcome extreme abiotic or combinatorial stress conditions such as over dosage of pesticides, fertilizers, salinity, drought, temperature, heavy metal contamination and pH on a variety of commercially important agricultural crops. PGPRs microbes offer enhanced plant growth and yield with nutrient enrichment of soil using their remarkable property of nitrogen fixation, siderphore production, phosphate solubilisation influencing soil fertility and cellulase, protease, lipase enzyme production to enhance plant defencemechanism. Our review summarizes the importance of efficacy of screening, selection andcommercialization to agricultural production sustainability.

Keywords- *PGPR, Agricultural sustainability, abiotic stress*

Abstract – 165

BIOTECHNOLOGICALCONTRIBUTIONS TOWARDS CLIMATIC CHANGE CONSEQUENCES FOR DEVELOPING COUNTRIES

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Climatic change has an enormous effect on economy whicheventuallydepends upon the agricultural practices of any densely populated developing country. Human activities has produced global warming, disturbed the agricultural ecology for crop production challenging food security through salinity, adverse temperature, arid and saline soil condition and affectedwater precipitation leading to enhanced water use demand, dry land and hunger problems. Here we summarize the contribution of conservative and contemporary approaches of biotechnology involved in negative regulation of climatic fluctuations and their consequences by utilization of energy-efficient farming, plant tissue culture techniques and formulation of bio fertilizers, carbon sequestration with breeding for adaptive varieties, development of genetically advanced stress toleranttransgenic crops contributing in improved food security.

Key words: Conservative and contemporary biotechnology, global warming, formulation of bio fertilizers, carbon sequestration, food security.

Abstract – 166

MICROBES ROLE IN PROTECTION OF ENVIRONMENT FOR SUSTAINABLE AGRICULTURE AGAINST CLIMATIC FLUCTUATIONS

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Microbes play significant role as symbiontsin crops contributing indirectly for sustainable agriculture through nutrient recycling and in turn plants release their waste as food for microbes. These microbial formulations can be used as chemical fertilizers which substitute these agrichemicals eventually regulating over dosage of chemicals and increasing productivity of crops. Our paper summarizes the contribution of microbes in different forms maintenance of environment and sustainable agriculture.

Keywords- Microbes, chemical fertilizers, sustainable agriculture.

Abstract – 167

CLIMATE ENGINEERING AND AGRICULTURE

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The food production is severely influenced by variations in climate. The variations include temperature and precipitation which are observed at global level in different regions. Climate Engineering and Geo- Engineering is a technique utilized to regulate sunlight vis deflection with aerosols scattering into atmosphere. This review highlights the importance of various approaches using chemical engineering for the study of effects of climate change of crop yield.

K**eywords**: Climatic engineering, precipitation, aerosols, crop yield.

Abstract – 168

INFLUENCE OF CLIMATIC CHANGE ON LIVESTOCK

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Livestock production depends on various factors such as availability of water, feed crop and forage's quality and the demand of livestock products is enhancing progressively with increasing population. Livestock have severe impact of climate change and these factors may contribute in influencing food security issues. Our review discusses about the impact of different factors of climate change on livestock and livestock products.

Keywords: Climatic change, livestock, aerosols, feed crop.

Abstract – 169

NANOTECHNOLOGY CONTRIBUTION IN SUSTAINABLE DEVELOPMENT OF AGRICULTURE

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Agrochemicals are in extensive use for the modern agriculture practices which help in production & efficient productions but they have a negative effect of over dosage of fertilizers and pesticides leading to deterioration of environmental health. In these studies, function of nanotechnology in sustainable agriculture is discussed.

Keywords- Nanotechnology, sustainable agriculture, agrochemicals.

Abstract – 170

CLIMATE CHANGE AND ITS IMPACT ON AGRICULTURE

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Climate change severely affects precipitation intensity and frequency both, rainfall, hydrological cycles, and heat waves. These all factors influence temperature on earth. Hydrological cycle and rain precipitation and may be solely or in compound from effects agriculture production of crops. The effect is likely to consider as negative in broader sense. Our review suggests strategies of adaptation by agriculture against these climate variations.

Keywords- Climatechange, precipitation, hydrological cycles

Abstract – 171

GLOBAL WARMING: IMPACT ON AGRICULTURE IN INDIA

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Global warming has been responsible for increasing the earth temperature from last 100years. CFCs, greenhouse gases (GHG) are major contributors of this global warming. The temperature is expected to increase by 35degree above the standard industrial value. These all may result in threatened environmental issues damaging agriculture, affecting protective ozone defence layer and so on. This article summarizes the effect of global warming in Indian agriculture system.

Keywords: Global warming, GHGs, crop yield.

Abstract – 172

ORGANIC FARMING SYSTEM AS A SOURCE OF SUSTAINABLE AGRICULTURE IN CLIMATIC CHANGE REGULATION

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The chemical technology based food production completely depends on climatic variations but it also produces global greenhouse gases. These emissions enhance carbon dioxide production and the global warming. The current review suggests the practice of organic agriculture as a source of sustainable development of agriculture to regulate climatic changes.

Keywords: Organic farming, GHGs, global warming.

Abstract – 173

AGRIBUSINESS INFLUENCE ON CLIMATE CHANGE

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Agribusiness leading companies produces food and at the same time they are responsible for production of CO_2, greenhouse gases, methane and nitrous oxide. Current studies reflect the increase of 2degree Celsius temperature which eventually might be responsible for livelihood of poor farmers, yield of food and extraction of million species. Our studies discuss the factors of agribusiness that have impact on climate change.

Keywords: Agribusiness, yield of food, Climate change

Abstract – 174

ENVIRONMENTAL MANAGEMENT AND SUSTAINABLE AGRICULTURE IN INDIA

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Environmental management requires equilibrium among economic development with the replenishment of resources required for that development. The depletion of natural resources cannot be compensated in short span, thus the cast of this development can be managed through "management strategies" among the short- term interests and long- term benefits with economic development and also protection of environment at same time. This current chapter discusses the causes and challenges to overcome issues in environmental management and its development.

Keywords: Environmental management, sustainable agriculture, management strategies.

Abstract – 175

CLIMATIC CHANGE AND ITS IMPLICATION ON UTTARAKHAND

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India is a a tropical country where the Uttarakhand state is located in Himalayan region.Uttarakhand is very sensitive to climatic fluctuations but with increasing population the climatic disasters are the major issues effecting its economy. Rainfall and temperature fluctuations are major reasons for affecting the human population and economic growth of state .Here, we summarize the cause and effect of these factors on Uttarakhand's population, crop production and different resources.

Keywords: Climatic change, rainfall, temperature, Uttarakhand.

Abstract – 176

CLIMATIC VARIATIONS EFFECT ON SOIL

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Soil is a natural body and it is influenced by several factors such as microbial interactions and climatic changes .Climatic variations severely affect process of soil formations and influences properly of nutrient available, water holding capacity, soil erosion, carbon input to enhance evaporation, temperature and precipitation. The current review focuses on the different ways climatic variations affect soil.

Keywords: Climatic variations, effect on soil.

Abstract – 177

CLIMATIC VARIATIONS: FOREST SYSTEM, PRODUCTS & PEOPLE

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Forest ecosystem services provide social, environmental &economic advantages including livelihood through forest goods products and services. But climatic variations adversely influenced not only economic aspects but also caused the environmental threats. Our studies highlight the causes and possible adaptation strategies to combat these issues.

Keywords: Forest ecosystem, Climatic variations, effect on soil.

Abstract – 178

RESPONSE OF MUSHROOMS TO CLIMATIC CHANGE

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Mushrooms serves as a source of economic growth and regulate environmental implications in developing countries. They also sort out the wastage issues under "white agriculture revolution". In this review the importance of mushrooms in agricultural & environmental aspects has been studied.

Key words: *Mushrooms, climatic change, white agriculture revolution*

Abstract – 179

CLIMATIC CHANGE EFFECT ON BEES AND ITS IMPACT ON ENVIORNEMENT

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Bees play an important role as pollinators on the agriculture field and their 2500 species contribute in 73% of total pollination in the agriculture field. One third of our food derives from bee pollinated crops but in present scenario the bees are declining due to changing climate. The global warming has shrunken the area for the bee hives and it has direct influencedflowering pattern and affectedtheir development as well. Bees are highly susceptible species to disease and currently new disease has been reported to impact bee's population because of the shrunken. Our review focus upon different strategies and measure which may contribute in making environment safe for bees through limiting deforestation, limiting use of pesticides, preserving indigenous spp. and eventually through raising awareness to protect bees which would help in protection of environment.

Key words: *Bees, climatic change, global warming*

Abstract – 180

EFFECTS OF PARENT MATERIAL ON INHERENT SOIL FERTILITY IN OLDER BASTARCRATON OF CENTRAL INDIA: STUDY BASED ON CONTRASTING GRANITES

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We report the mineralogy and geochemistry of I- and S- type granites from the Bastarcraton of Central India and their effects on soil fertility using the major and trace element data. The main objective is to understand the relationship between granite signatures and soil characteristics in order to increase the nutrient use efficiencies for increased productivity of food, fodder and energy crops. The Bastarcraton is one of the oldest cratonic nucleus of the Archean record which are underlain by igneous and metamorphic rock types (basement granite-gneisses), including I- and S-type granites. The two different types of granites differ in their mineralogy and chemistry and have a profound effect on soil fertility. The I-type granites contain larger concentrations of mafic and accessory minerals such as plagioclase feldspar, amphiboles and apatite which are rich in K, Ca, Mg, and P. Concentration of these elements account for the majority of nutrients derived from the soil profiles. In contrast, the S-type granites have higher concentrations of silica and Al saturation. The parent material plays a decisive role in determining the soil characteristics of the studied area. It also governed the rate of carbon accumulation in soils. The varying mineralogical and chemical contrasting characters of the granites have wider implications in larger parts of older cratons such as in Central India to effectively improve the crop productivity.

Keywords: Granite, Soil fertility, parent material, I-type granite, S-type granite, Bastarcraton.

Abstract – 181

EFFECT OF CLIMATE CHANGE ON BIO-DIVERSITY

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Biodiversity has a significant role in regulation of climatic fluctuations which leads to remarkable and genetically alternations. These changes have been observed to produce structural and genetically changes in plants, insects, animals and humans. Our review describes the impact of climate change on the biodiversity, significance of biodiversity and its conservation

Keywords: Biodiversity, Genetically

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IMPACT OF CLIMATE CHANGE ON WATER RESOURCES

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Climate change is one of the global issue that would affect the Sustainable development of many regions. The objective of this presentation is the impact of climate change on water resources. Climate change affects certain components of the hydrological cycle, especially precipitation and runoff. A change in climate can alter the availability of the water resources. The effects of minor levels of climate change are already being felt, with impacts across many economic sectors. These changes will result in increased Floods and drought, which will have significant impacts on the availability of fresh water. These impacts on fresh water will be further compounded by rising sea levels, and melting glaciers. In general warmer climate will accelerate the hydrologic cycle, altering rainfall, magnitude and timing of run-off.

Keywords: Climate, Water, Effect.

Abstract – 183

ANALYSIS OF PGPR ACTIVITIES OF HEAVY METAL TOLERANT BACTERIA AND THEIR EFFECT ON GROWTH OF *SESAME INDICUM*

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Sesame indicum commonly known as sesame is an important oil crop. The plant is known to possess several biochemical, medicinal properties alongwith exceptional nutritive value due to presence of proteins, antioxidants and other nutrients. In the present study heavy metal tolerant bacteria were isolated from effluent treated soil. Out of total 17 bacteria isolated three bacterial strains (HMT1, HMT2, HMT3) were found to possess PGPR activities including indole acetic acid production, HCN production, phosphate solubilisation and siderophore activity. Among the three bacteria HMT2 was also found to specifically enhance shoot development in Seasame plants. Compared to control plants all the plants cultivated in presence of the three bacteria exhibited enhanced growth.

Key Words: *Sesame indicum*, PGPR and bacteria

Abstract – 184

IMPACT OF DROUGHT STRESS AND PH ONTO SELECTED VARIETIES OF *TRITICUM AESTIVUM*

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Triticum aestivum is one of the most important cereal crop cultivated across the globe. Several abiotic factors pose a challenge for growth and productivity of crops. Temperature, humidity, alkalinity acidity of soil, availability of nutrients are among main factors which govern the overall survival and growth of plants when exposed to abiotic stress every plant species exhibit adaptation to survived the concerned stress. Among various abiotic stresses exposure to pH is considered to be major threat to growth of plants. pH stress is known to directly affect germination rate, root length and shoot length, chlorophyll content, fresh and dry weight of roots, shoots and leaves. In the present study three different varieties of wheat were taken namely HD2307, HD2329 and C306. When grown under pH 3 variety HD2307 exhibited maximum shoot length followed by HD2329 depicting average shoot length and onto this pH C306 was found to possess minimum shoot length. When the pH was increased to 6, wheat variety HD2329 was found to possess average shoot growth whereas C306 exhibited maximum shoot length. Results obtained in the present study clearly depicts remarkable effect of variation in pH onto growth of Wheat varieties. All the three varieties were found to possess higher POX and SOD when cultivated under water stress conditions. On contrary, CAT activity was found to decrease under water stress conditions.

Key Words: *Triticum aestivum*, pH and Varieties.

Abstract – 185

NATURAL RESOURCES MANAGEMENTAND THEIR CONSERVATION

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Although, India is endowed with rich and vast diversity of natural resources, particularly soil, water, weather, multipurpose treesand agro bio-diversity. The extremes stress on these resources leading production fatigue, poor resource-use efficiency and countriesrich and bountiful biological endowment is showing sigh of stress. The major issue which directly or indirectly affecting the agricultural production systems ustainability are identified as follows : shrinking land resources, water scarcity, low input us eefficiency, soilorganic matter depletion, loss of biodiversity, salinity and alkalinity, multiple nutrient deficiency, negative nutrient balance and low fertilizers useefficiency,water logging, industrialization and intensification agriculture and global climate change. Therefore, it is important to preserve these agriculturally valuable resources, so that they continue to be useful under prevalent biotic and abiotic pressures. An integration of modern tools and techniques like conservation agriculture (Bed planting, Paddy transplanter and laser land levelers), Fertigation, Organic farming, crop-diversification strategies, precision farming, site-specific nutrient management, bio-intensive farming (Raised beds, Broad bed and furrow, furrow irrigated raised bed, intensive planting, intercropping, composting, companion planting and whole energy system) and farming system research approach haves how npromis etoenhanceresource-useefficiencyon the one hand and to conserve evaluable resources on the other. The ICT-based options like GIS, Remote Sensing and Nutrient Experts has powerful tools for managing resources in spatial, temporal and location specific mode. The natural resource in the country needs its appropriate and scientific use.

Keywords: Resources use efficiency, Soil and Water Resources, Conservation Agriculture, Precision Farming & Bio-intensive Farming

C

Abstract – 186

CHALLENGES AND PROSPECTUS OF PRESENT STATUS OF IPM PROGRAMMES IN INDIA

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Insect pests are well recognized as one of the major limiting factors in enhancing and sustaining agricultural productin in India. Recent improvements from research brought considerable change in the cropping systems and allowed farmers to grow several crops throughout the year, which were very seasonal in the past. This also brought significant shift in the insect population dynamics and change in the status of several insect pests. Recent data revealed that 93% of the farmers in India had adopted chemical control, 51% farmers get the ir plant protection advice from dealers, while 22% from extension official s and majority of the farmers (73%) in itiatethe plant protection based on the first appearance of the pest, irrespective of the ir population, crop stage, and the ir damage relationships. The cost of plant protection on various crops ranged from 7 to 40% of the total crop production cost. Though integrated pest management (IPM) has been advocated for the past two decades, only 3.2% of the farmers adopted IPM practices in various crops. IPMresearch in the past decade brought out changes in the farmer's attitude in pest management, which results 100% reduction in pesticide use in different crops. The recent farmer participatory approach working in a consortium mode proved very effective in the exchange of technology. Though the results are encouraging, there is a need to further strengthen the IPM adoption in Indian agriculture through increased investments in both basic as well as applied research in plant protection to overcome the prevailing three evil "Rs" (Resistance, Resurgence, and Residues). To be more effective, readdressing the policies for encouraging eco-friendly options and strengthening extensi on, involving farmers should be considered as high priority.

Key Words: IPM, Technology and Rs.

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CLIMATE CHANGE AND OPPORTUNITY COST

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Climate change is an important factor addressing the economy. At what cost does the change in the agriculture sustain its role in agriculture economics. The cost of climate policy depends on the no-policy alternative through which the "opportunity cost" of climate action on agriculture cannot be compared. The one of the most important factor "human" decisions for survival/starvation rose out debate on the cost benefit that the climate change presents at previous & current period of food security. Resources are also impacted and their use is also being explored in context of food security and environment. Mitigating global climate change and compensation to developing countries by conserving resources and best utilization management of resources should include the study of opportunity cost of forgone world development.

Keywords: Opportunity cost, Economics, climate policy, starvation

Abstract – 188

PREPARATION OF GIS BASED SOIL FERTILITY MAPS AND IDENTIFICATION OF SOIL RELATED CROP PRODUCTION CONSTRAINTS OF A TOPOSEQUENCE LOCATED IN THE MID-CENTRAL TABLE LAND AGRO CLIMATIC ZONE OF ODISHA

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A detailed plot wise surface (0-15cm) soil sample collection and soil profile study was conducted in RRTTS and KVK farm, Dhenkanal located in the Mid–Central Table Land Agro Climatic Zone of Odisha. The study area lies along atoposequence with three distinct land types comprising of upland, medium land and low land. Pedon 1, 2 and 3 located in upland, medium land and low land respectively are classified as *TypicUstorthents; UdicHaplustalfs*and*AericOchraqualfs*respectively. The X- ray diffraction and mineralogical study of the parent rock revealed the parent rock to be '*Khondallite*' and abundance of feldspars. The results show that available nitrogen, phosphorus and sulphur content increased towards the lower topographic. There was an increasing trend of available potassium observed from higher to lower topographic position. Available iron, manganese, copper, zinc and boron content was also found to be increasing towards the lower topographic position. Positive correlation between available Fe, Mn, Cu, Zn with soil organic carbon content and that of negative correlation with soil pH has been found. Clay percentage in the medium land and low land were found to be higher than that of upland. The soil reaction was found to be acidic in the entire farm varying between pH of 4.1 to 5.9. Electrical conductivity for all the surface soils were found to be less than1 dSm^{-1} and hence are safe for all types of crop production. Organic carbon status for the surface soil was found to vary between medium to high range. Available N, Bray's P of the study area were found to be low to medium in range and that of available K status was observed to be in medium to high range. Available S status was found to be of low range. Available Fe, Mn, Cu, Zn and B status was found to be sufficient. Soil acidity was found to be the major crop production constraint of the study area. So, application of liming materials along with application of soil test based fertilizers and manures will help in optimising crop productivity as well as sustaining soil health.

Key Words: Soil, map and GIS.

Abstract – 189

EFFECT OF CLIMATE CHANGE ON SOIL PROPERTIES

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Soils form through the multifarious interaction of a number of forces, including climate, relief, parent material, organisms, all acting over time. It takes thousands of years for a soil to form and most soils are still developing following changes in some of these soil forming factors, particularly climate and vegetation, over the past few decades. Climate is one of the most important factors affecting the formation of soil with important implications for their development, use and management perspective with reference to soil structure, stability, top soil water holding capacity, nutrient availability and erosion. Further Indirect effects corresponds to changes in growth rates or water-use efficiencies, through sea-level rise, through climate-induced decrease or increase in vegetative cover or anthropogenic intervention. Assuming constant inputs of carbon to soils from vegetation, different estimate predict that expected changes in temperature, precipitation and evaporation will cause significant change in organic matter turnover and CO_2 dynamics. In conclusion, increased productivity would generally lead to greater inputs of carbon to soil, thus increasing organics. The main potential changes in soil-forming factors (forcing variables) directly resulting from global change would be in organic matter supply from biomass, soil temperature regime and soil hydrology, the latter because of shifts in rainfall zones as well as changes in potential evapotranspiration. The biggest single change in soils expected as a result of these postulated forcing changes would be a gradual improvement in fertility and physical conditions of soils in humid and subhumid

climates. The changes in temperature but particularly in rainfall to be expected as a result of global warming are subject to major uncertainties for several reasons. Also, the interaction with changes in location and intensity of major ocean currents and resultant possible modifications in sea surface temperatures is still most uncertain, as well as the interaction with possible major changes in cloudiness and land cover and the resulting changes in albedo and actual evapotranspiration.

Keywords: Adaptation, vulnerability, Climate Change

Abstract – 190

MOST SIGNIFICANT GENOMICREGIONS IN CONTROLLING NITROGEN USE EFFICIENCY IN RICE, AS REVEALED BY QTL META-ANALYSIS AND PROFILING OF META-QTL DIVERSITY IN INDIAN RICE GERMPLASM

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Nitrogen (N) is considered one of most important element for rice growth and it is fundamental for the plant physiological and metabolic processes. The N use efficiency (NUE) of rice is very low which is about 30-35%.Improving the N use efficiency (NUE) will save significant quantity of fertilizers and prevent environmental problems due to high mobility of N in soil.For the improvement of N use efficiency in rice several QTLs have been identified which generally have minor effect. Most of these are identified in different genetic backgrounds. Therefore, in order to identify most significant genomic regions (meta-QTLs) which govern N use trait in rice, this study was undertaken. We have assembled 453 QTLs reported from 16 studied published between 2001 to2016 for the meta-analysis. Sixteen meta-QTLs (mQTLs) related to traits such as N use efficiency and grain yield per plant under N deficit conditions have been identified distributed over six chromosomes 1, 3, 4, 8, 9 and 11. In order to validate and study the diversity of the mQTLs in local rice germplasm, 65 genotypes were field evaluated under three N level N0, N50 and N100 for agronomic and N use related traits. The mQTLs linked marker were used to genotype the same germplasm set used for field evaluation. The marker RM 202 which was linked to *mQTL11.2* was validated to be associated with two N use parameters such as grains number per panicle under N0 condition and N assimilation efficiency under N50 condition. The positive allele for this marker with 179 bp size was found distributed in genotypes such as, Acharmati, ADT 38, ADT 42, ASD 16, Chandrahasini, CR Dhan 310, Jaiphoola, Kamlesh, Nagina 22, Nidhi and Pusa 44.These N efficient genotypes can be further used as donors for NUE trait in breeding program.

Key Words: Rice, N and QTL.

Abstract – 191

MOLECULAR MAPPING OF LEAF AND STEM RUST RESISTANCE GENES IN WHEAT RYE RECOMBINANT 'SELECTION 212'

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The frequent evolution of new pathotypes in wheat rust neutralizes the available resistances in currently grown cultivars. To cope with rapidly evolving rust pathogens, there were continuous efforts to search for new resistance genes. In this effort a rust resistant homoeologous recombinant 'Selection 212' of wheat (*Triticum aestivum*) and rye (*Secale cereale*) was developed at the Division of Genetics, ICAR-IARI, New Delhi. It was assessed against array of leaf and stem pathotypes and identified to carry linked recessive leaf and stem rust resistance gene named *LrSel212* and *SrSel212,* respectively located on chromosome 2B.Present inheritance

studies on F_1 and F_2 seedlings of cross Selection 212/Agra Local with pathotype 77-5 of leaf rust and pathotype 40A of stem rust confirmed the operation of linked recessive genes *LrSel212 and SrSel212* for leaf and stem rust resistance, respectively in Selection 212. Bulk Segregant Analysis (BSA) with Recessive Class Analysis mapped the *LrSel212* on chromosome 2BS, between the flanking SSR markers *Xwmc474* and *Xgpw1148* with a distance of 5.6 cM distal to marker *Xwmc474* and 18.1 cM proximal to *Xgpw1148* and stem rust resistance gene *SrSel212* at a distance of 10.8 cM proximal to *Xwmc474.*Differential rust reaction of different pathotypes on Selection 212 and known leaf and stem rust resistance genes *Lr13, Lr16, Lr23,Lr35, Lr73, Sr19, Sr20, Sr23, Sr36* on chromosome 2BS, ruled out the possibility of these genes being same as *LrSel212/SrSel212.* This investigation suggested linked genes *LrSel212/SrSel212* present in ''Selection 212'' probably a new source of resistance.

Key Words: Molecular mapping, rust and genes.

Abstract – 192

SYSTEM OF RICE INTENSIFICATION: A WATER MANAGEMENT STRATEGY

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Competition for limited water resources and low rice yields in developing countries has renewed the interest in finding better ways to grow more rice with less water. As the largest agricultural water consumer, the rice sector is coming under increasing pressure to economize on water use. Rice is the staple food for nearly half the world's population and the most widely grown of all crops under irrigation. Increasing global population and greater domestic and industrial demand for water have created the need to grow more food with less water. Finding ways to reduce the demand of rice producers for fresh water is thus a major concern for farmers. On an average, rice requires twice the quantity of water per unit of production as any other cereal crop. Since major rice-producing countries like India, China, and Indonesia no longer enjoy an abundant water supply, experimentation has begun using less water in rice. Some of the water management practices that have been investigated for decreasing water consumption in rice are rotational irrigation (alternate-wet dry irrigation), mid-season drainage, delayed flooding, saturated soil culture, and IWMI's (International Water Management Institute) water saving irrigation (WSI). A promising strategy in Madagascar called System of Rice Intensification (SRI) has been found to increase grain yield while applying less water. SRI consists of a set of principles including aerating the soil during the vegetative development period and transplanting rice at a much earlier age (8-12 day old) and at a lower density (25 hills per m^{-2} or fewer) than conventionally practiced. In SRI, the soil is aerated during intermittent drying of the field throughout the vegetative growth phase. Only a little water (2-3 cm) is kept on the field during the reproductive and milk ripening stages. This set of cultivation and irrigation practices, collectively called SRI, has been widely reported to double and even quadruple the average (2.03 t/ha) rice yields in Madagascar (Uphoff 1999). Total water productivity and irrigation water productivity was significantly higher under SRI practices (5.95 and 3.67 kg/ ha-mm) compared to practices of conventional transplanting (3.36 and 2.44), meaning that using SRI method, water saving of about 34% could be achieved and significantly less water was required to produce one kg of rice (Shahane*et al.,* 2015).

Keywords: Rotational irrigation, Water productivity, Water use efficiency, System of rice intensification

Abstract – 193

CLIMATE SMART AGRICULTURE: NEED OF HOUR

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Multiple climate changes have occurred over the past several decades across the world, including increasing temperatures, changes in water availability and precipitation, and increasing instances of floods. These changing climatic conditions, especially over the last twenty years, have presented multiple risks to the country's agricultural sector, affecting the productivity and quality of crops. Marked changes in rainfall dynamics, with more frequent and intense precipitation events, and more frequent and pronounced drought events that disrupt farming and other economic activities, have presented new challenges for farmers. Farmers are now forced to respond to these adverse changes that affect the way they are familiar to farming and threaten to destabilize the economic viability of many farming communities. These changes, along with increasing climate variability, have influenced soil fertility, crop selection, and harvesting times. The emerging challenges have prompted a need for change in agricultural practices and technologies on the islands. Innovators in the community of farmers in world have realized that to tackle these issues, both mitigation and adaptation measures need to be implemented, and have thus committed to working towards creating more resilient agricultural systems.

Key Words: Climate, Smart, Agriculture, Floods, rainfall, soil fertility.

Abstract – 194

FACTORS AFFECTING *IN VITRO*CALLUS INDUCTION IN FENUGREEK (*TRIGONELLAFOENUM-GRAECUM* L.)

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The study investigates the effect of genotypes and culture media on callus induction of fenugreek (*Trigonellafoenum-graecum*L.).Shoot apex explants of different genotypes were inoculated on MS medium containing varying concentrations of cytokinins and auxins either singly or in combinations. The cultures were incubated at 25 ± 2^0C with a light intensity of 3000 – 3500 lux. Among all the genotypes maximum callus induction was observed in RMt-305 in shoot apex explant on MS medium at responsive level (0.5 mg/l BAP + 0.5 mg/l 2,4-D). MS medium induced maximum callus in shoot apex explantsincomparison to other media supplemented with 0.5 mg/l BAP + 0.5 mg/l 2,4-D.

Keywords:-Fenugreek, MS media, *in vitro*, shoot apex

Abstract – 195

CLIMATE CHANGE: PLANTS, PEOPLE AND PLANET

Altaf Ahmad Wani and Raheeba Tun Nisa.

The long-term good health of populations depends on the continued stability and functioning of the biosphere's ecology and physical system, often referred to as life supporting system. Climate change is a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean variability of its properties, and that persists for an extended period, typically 'decades or longer' (IPCC report, 2007) Human alteration of earth is substantial and growing and also, modern climate change is dominated by human

influences, which are now enough to exceed the bounds of natural variability (Karl and Trenberth, 2003). Each year, mankind injects approximately six billion tons of carbon into atmosphere from the burning of fossil fuel as well and substantial amount from deforestation (Id *et al*.,1992). Since the beginning of industrial revolution, atmospheric concentration of carbon dioxide has risen by more than 25% from 280 ppm to more than 350ppm. Scientists estimate that if the current patterns of emissions continued unchecked, the increased concentrations of carbon dioxide, together with parallel increases in other trace gases such as methane and nitrous oxide, will cause an average global warming in the range of 0.2^0C to 0.5^0C per decade or 2^0C to 5^0C by the end of next century (IPCC, 1992). This rapid increase in the temperature could have more detrimental impact on coastal areas, agriculture, forests and human health. Vast expansion of human activities such as industrialization and growing population has led to substantial increase in the emission and ultimately to higher atmospheric concentration of green house gases. This increased emission has alter the equilibrium between the emissions of green house gases from natural sources on one hand and removal of these gases by sinks on other hand. Climate change is a global issue and an integrated approach with collaboration of scientists from various disciplines as well as countries is required to tackle this global problem.

Key words: climate change, deforestation, green house emission, global warming, industrialization, agriculture, human health, global issue.

Abstract – 196

Climate Change and Global warming: Planning and Management.

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Rising fossil fuel burning and land use changes have emitted, and are continuing to emit increasing quantities of greenhouse gases into the Earth's atmosphere. These greenhouse gases include carbon dioxide (CO_2), methane (CH_4) and nitrogen dioxide (N_2O), and a rise in these gases has caused a rise in the amount of heat from the sun withheld in the Earth's atmosphere, heat that would normally be radiated back into space. This increase in heat has lead to the greenhouse effect, resulting in climate change. The main characteristics of climate change are- increase in average global temperature (global warming); changes in cloud cover ; precipitation particularly over land; melting of ice caps and glaciers and reduced snow cover; and increase in ocean temperatures and ocean acidity; an increase in the incidence and severity of wildfires that threatens habitats, homes, and lives. The U.S. Environmental Protection Agency, NASA, and the National Oceanic and Atmospheric Administration concur that climate change is indeed occurring and is almost certainly due to human activity. The earth's average temperature has gone up 1.4°F over the past century and is expected to rise as much as 11.5°F over the next. That might not seem like a lot, but the average temperature during the last Ice Age was about 4º F lower than it is today. Climate change becoming the major concern today has created panic worldwide. Climate change risk management approaches generally fall into four broad categories: 1) mitigation 2) adaptation 3) geoengineering or climate engineering 4) knowledge-based expansion.

Keywords: Greenhouse gases, mitigation, adaptation, geoengineering, knowledge-based expansion

Abstract – 197

MANAGEMENT OF DAMPING OFF OF CUCURBITS INCITED BY *PYTHIUM APHANIDERMATUM*

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For the effective management of *Pythium aphanidermatum* inciting damping off of cucurbits various isolates of Trichoderma spp. a few bacterial species, actinomycetes, neem formulations and various fungicides can be used. Trichoderma species are proven most effective as they inhibit the fungal acticity through volatile as well as non-volatile mycoparisitism.Bacterial species are also found to be effective in inhibitingthe growth of P. aphanidermatum. Neem formulations are found considerably effective in both in vitro and in vivo conditions. Cowpea green manuring is found superior over other soil amendments followed by sunhemp for reducingmortality of cucurbits. The population density ofTrichoderma species is maximum in cowpea resulting in maximum in resulting in maximum reduction of pathogen population

Key Words: management, isolates, inciting, formulations and mycoparisitism.

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MANAGEMENT OF SEED ASSOCIATED PATHOGENS IN MAJOR PULSE CROP

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Pulses the important sources of vegetable protein, are cultivated in 23.21 m ha with 14.26 mt production (2005-06) in India. In order to boots pulses production availability of quality seed is the most important input. for this minimum seed standard have been fixed. A number of pathogen causing disease are also associated with seed externally, internally, extraembryonal, intraembryonal, as contaminants and inhert material or associated with inhert matter pathogens are transmitted from seed to plant systematically, locally, or both.

Key Words: Pulse, seed and fungal pathogens.

Abstract – 199

IMPACT ON AGRICULTURE AND ROLE OF IPCC IN CLIMATE CHANGE MITIGATION

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Climate change is the most important global environmental challenge facing huminity with implications for natural ecosystem, agriculture and health. The most serious climate change risk to the Indian economy and people is the increased intensity, frequency and geographical coverage of drought. Higher temperatures, increased evapotranspiration and decreased winter precipitation and may bring about more droughts. The possibility of winter droughts will increase in certain areas. Climate change is expected to increase the severity of flooding in many river basins, especially those of the Godavari and Mahanadi along the eastern cost. The third most important risk is that of cyclonic stromes and coastal inundation. A sea surface temperature rise of 2-4^{0}C, as anticipated in the Indian ocean over the century, is expected to induce a 10-20 % increase in cyclone intensity. The intergovernmental panel on climate change (IPCC), an international body of over 3000 experts, indicates that rice and wheat production of India will drop significantly because of climate change. A 1.5^{0}C and two mm increase in precipitation could result in decline rice yield by 3-15%. According to IPCC's Third Assessment Report (TAR), "The importance of climate change impact on grain ad forage quality emerges from new research".

In the Fourth Assessment Report (AR4), published in 2007, the IPCC projects that, without future action to reduce GHG emission, the global average surface temperature is likely to rise by a further 1.8-4^{0}C this century, and by up to 6.4^{0}C in the worst case scenario.

Keywords: IPCC, climate change and GHG.

Abstract – 200

ECOLOGY AND MANAGEMENT OF CHARCOAL ROT (*MACROPHOMINA PHASEOLINA*) ON COWPEA

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Cowpea (*Vigna unguiculata* (L.) Walp) is a valuable source of protein for human and animal nutrition. It is mainly grown to produce dry grains, but about 25% is consumed on-farm or marketed as green pods. The grain and fresh peas have a high protein content (about 25% on a dry weight basis) and an amino acid. In soils with high moisture content, microsclerotia were inactivated completely within 24 h at 50°C or higher. A strong decline also occurred at 40°C, but at 30 and 35°C an effect of temperature was not evident. Charcoal rot development expressed by AUDPC was more severe during the dry than during the wet season, which likely was due to the high temperatures (33°C) and low relative humidity (50%), which both predispose hosts to infection by *M. phaseolina*. In our study, solarization during 30 days reached on average 49°C as maximum temperature, about 10°C higher than the non-solarized treatments, and led to a significant reduction in inoculum of *M. phaseolina*. Our study demonstrated that under conditions where solarization alone does not provide sufficient control, the combination with organic amendments improves yields and reduces infection by *M. phaseolina*. High-N containing amendments may be most effective, such as the paunch used in this study. Solarization as well as application and incorporation of millet residues or paunch content in moistened soil can double cowpea production in poor naturally infested soil.

Key Words: Charcoal rot ,Cowpea*, M. Phaseolina* and solarisation.

Abstract – 201

MICROBIAL DYNAMICS IN ALLUVIUM SOIL AS INFLUENCED BY BIO-ORGANICS AND MINERAL FERTILIZER

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The present investigation was carried out at the Vegetable Research Farm, Institute of Agricultural Sciences, Banaras Hindu University, Varanasi, Uttar Pradesh (India) during Rabi of the year 2009 and 2010 on alluvial soil to assessed the effect of *Pseudomonas fluorescens* and humic acid in combination with three different levels of mineral fertilizer fertilizers on microbial dynemics in alluvium soil. All inoculated treatments in both years of experiment gave significantly greater microbial population and enzymetic activities compared to control at harvest of cabbage crop. The highest microbial population and enzymetic activities were caused by 100% fertilization with *Pseudomonas fluorescens* + humic acid which showed its significant superiority over rest of the treatments except with 75% RDF + *Pseudomonas fluorescens* + humic acid, 100 % RDF + *Pseudomonas fluorescens* and 100 % RDF + humic acid in both experiments. The lowest microbial population and enzymetic activity were found with 100 % RDF as control which was statistically at par with 50 % RDF + *Pseudomonas fluorescens* and 50 % RDF + humic acid in both year of experiments. Separately inoculation of *Pseudomonas fluorescens* and humic acid with fertilizer, humic acid gave higher microbial population, dehydrogenase and urease enzymetic activity and alkaline phosphatase activity with *P. fluorescens* inoculation in cabbage rhizospheric soil during both years of experiment at harvest.

Key words: Microbial Population, Enzymetic activity, *Pseudomonas fluorescens,* Humic acid and Mineral fertilizer

Abstract – 202

EVALUATION OF BIOCHEMICAL BASIS OF RESISTANCE IN BER AGAINST POWDERY MILDEW

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Indian jujube or ber (*Ziziphusmauritiana*Lamk.) is one of the most common fruit of Rajasthan as well as India. Powdery mildew of ber incited by *Oidiumerysiphoides*f. sp. *ziziphi,* Yan and Wang is the most important disease that causes maximum reduction in yield and quality of ber fruits. An increase in total phenols and decline in total soluble solids and ascorbic acid content were observed in fruits of infected plants at peanut and immature stages with *Oidiumerysiphoides* f. sp. *ziziphi*compared to the healthy ones. Biochemical changes in total soluble solids, ascorbic acid and total phenol content were played a very important role in imparting resistance against this disease. Similar trend in these biochemicals were also observed at tender and maturing stages of leaves.

Key words: Ber, *Ziziphusmauritiana*, powdery mildew, total soluble solids, total phenol, ascorbic acid.

Abstract – 203

THE EFFECT OF SALINITY ON PLANT AVAILABLE WATER

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Salinity has a dual effect on plant growth via an osmotic effect on plant water uptake, and specific ion toxicities. By decreasing the osmotic potential of the soil solution, plant access to soil water is decreased, because of the decrease in total soil water potential. As the soil dries, the concentration of salt in the soil solution increases, further decreasing the osmotic potential. In order to maintain water uptake from a saline soil, plants must osmotically adjust. This is done either by taking up salts and compartmentalizing them within plant tissue, or synthesizing organic solutes. While increased uptake of salts may contribute to osmotic adjustment, Na+ and Cl- toxicity may result. A range of symptoms have been described, with chlorosis on the tips of older leaves, developing to necrosis, followed by death of leaves, common across many species.Accumulation of excess Na+ ion may cause metabolic disturbances in processes where low Na+ ion and K+ ion. High concentrations of Cl- in leaf tissue may disrupt photosynthetic function through the inhibition of nitrate reductase activity.

Key Words: osmotic effect, ion toxicitie, Na+ and Cl- toxicity.

Abstract – 204

NEMATODE CONTROL RELATED TO FUSARIUM WILT IN SOYBEAN AND ROOT ROT AND ZINC DEFICIENCY IN CORN

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The amount of yield response directly related to nematode control could not be determined because of the apparent interaction of nematodes on the expression of Fusarium wilt of soybean. Nematode and disease problems of irrigated, corn and double-cropped soybean, zinc deficiency of corn were investigated. Aldicarb, ethylene dibromide, phenamiphos were equally effective for controlling nematodes and increasing yields of corn planted minimum-till and soybean planted in a moldboard plow prepared seedbed. The residual effects on yields of nematicides applied to the preceeding crop occurred during 3 years for soybean and 1 year for corn. Fusarium wilt symptoms of soybean that developed during 2 years of the study were less severe in all nematicide-treated plots than in control plots. Typical zinc deficiency symptoms on 30-day-old corn plants were observed during 1 year of the study in certain plots. Only occasional plants had symptoms on plots treated with phenamiphos and aldicarb and symptoms were not evident on plants grown on plots treated with ethylene dibromide. Our study

strongly indicates that the expression of Fusarium wilt of soybean and zinc deficiency in corn are influenced by nematodes and that nematicides will reduce their severity.

Key Words: Nematode, soybean, fusarium wilt zinc and corn.

Abstract – 205

CLIMATE CHANGE IMPACTS ON PLANT PATHOGENS AND PLANT DISEASES.

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The effects of climate change on plant pathogens and the diseases they cause have been examined in some pathosystems. Predicted climatic changes are expected to affect pathogen development and survival rates and modify host susceptibility, resulting in changes in the impact of diseases on crops. The effects of these climatic changes will differ by pathosystem and geographical region. These changes may affect not only the optimal conditions for infection but also host specificity and mechanisms of plant infection. We describe research on the effects of changes in temperature, CO2 and ozone concentrations, precipitation, and drought on the biology of pathogens and their ability to infect plants and survive in natural and agricultural environments. Changing abiotic conditions will also affect the microclimate surrounding plants and the susceptibility of plants to infection. These changing conditions are expected to affect microbial communities in the soil and canopy pathosystems, possibly altering the currently observed beneficial effects of these communities. Because both pathogens and host plants will be affected by the changing climate, dramatic changes in the magnitude of disease expression in a given pathosystem, the geographical distribution of particular plant diseases, the economic importance of particular diseases in a given location, and the set of diseases that challenge each crop are expected. These changes will affect the measures farmers use to effectively manage disease, as well as the feasibility of particular cropping systems in particular regions.

Keywords: biotic stress, crop loss, disease management, global warming, pathosystems, plant-pathogen interaction.

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IMPACT OF CLIMATE CHANGE ON AGRICULTURE AND ADDRESSING CLIMATE CHANGE

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Climate change is one of the most important global environmental challenges, with implications for food production, water supply, health, energy, etc. The excess exploitation of nature is creating this problem and changing the weather pattern. The major consequences of climate change are greenhouse effect, global warming, ozone depletion and epidemics which directly or indirectly affect the biological resources and life sustaining system of the nature. Climate change has about 4-9 per cent impact on agriculture each year. Climate change presumably causes about 1.5 per cent loss in GDP. In agriculture, rising temperature affects flowering and leads to pests and disease buildup. Flood and excess rain over a short duration of time cause extensive damage to crops. Our most of the crops affected by climate change either positively or negatively. Such as, wheat is likely to be negatively impacted in Rabi season due to terminal heat stress with 1°C rise in temperature results in loss of 4 metric tonnes (MT) of wheat. Similarly, legumes are going to be benefitted because of elevated level of atmospheric CO2. Extreme weather events have caught attention of agrarian experts and scientists alike and they are now focusing on natural farming to arrest the impacts of climate change. Climate change affects all the three aspects of food security: availability, access and absorption. Climate change hits poor the most. They don't have income to buy the food, so their access to it is affected. By 2030, rice and wheat are likely to see about 6-10 per cent decrease in yields. The most effective way to address climate change is to adopt agriculture resilient, climate-smart agriculture that increases yield and income, carbon sequestering,

renewable energy, forest conservation, reforestation, water conservation, etc. The UNFCCC and the Kyoto Protocol provisions are also address the climate change challenge.

Key Words: Climate change, natural farming and impacts.

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PLANT GROWTH IMPROVEMENT BY USING PSEUDOMONAS FLUORESCE SAT FARMERS LEVEL

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Biofertilizers are eco-friendly, cost effective and improves the soil fertility and plant growth. Pseudomonas is a gram negative, rod shaped, plant Growth Promoting Rhizobacteria (PGPR) which plays a major role in plant growth promotion by releasing phyto hormones such as auxins and gibberellins, inducing systemic resistance, biological control of pathogens and solubilize the phosphorus. Pseudomonas can be easily multiplied in farmer's level. Soyabean powder (10g), salt (5g), Jaggery (8g) and yeast (5g) and mixed in 1 litre of water in air tight glass bottles. After sterilization 20ml of mother culture is transferred to the bottle and kept in shade. Bacterial growth can be observed in 4-5 days when the colour of the bottle turns fluorescent green, which is ready for field use.

Keywords: Pseudomonasfluorescens, organic farming, low cost technology

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STUDY AND FORECAST OF PREVAILING CHANGE IN CLIMATE

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Climate change has become the most prudent topic worldwide since last decade. The significant change in climate over past few years will not only affect the climatic cycle of the earth but also it will have an impact on various flora and fauna and geographical features. The need of the moment is to list out major causes, its impact and various other mitigation measures to deal with this problem. Global warming is directly proportional to climate change. Though we have several sets of rules and regulation in almost every country to stop or control the emission of green house gases but is it really proving helpful. The magnitude of the problem is greater than the solution that has been put in front of the world. According to the assessment reports of IPCC it has been stated that "Taken as a whole, the range of published evidence indicates that the net damage costs of climate change are likely to be significant and to increase over time". According to the Third and Fourth National Climate Assessment report, facts like climate change is projected to be continue over this century and beyond, lengthening of growing season, change in precipitation pattern, stronger hurricanes and drought have been stated.

Keywords: Climate change, Global warming, Season, Geographic features

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