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6th International Conference

On

Current Issues in Agricultural, Biological & Applied Sciences for Sustainable Development (CIABASSD-2022)

Venue: Kalimpong Science Centre, Deolo, Kalimpong, W.B.

11-13 June, 2022

SOUVENIR

Organized by

Department & Directorate of Extension Education,
Uttar Banga Krishi Vishwavidyalaya, Pundibari, West Bengal, India

ICAR- National Agricultural Higher Education Project (NAHEP)-IG

Kalimpong Science Centre
Deolo, Kalimpong, W.B.

Agro Environmental Development Society (AEDS)
Majhra Ghat, Rampur, U.P, India
(www.aedsi.org)

The Himalayan Scientific Society for Fundamental and Applied Research, Kalimpong

Editors

Prabhat Kumar Pal, B.B. Gurung, Chhatarpal Singh
Sajeed Ali, Md. Nadeem Akhtar

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Dr. Swarup Kumar Chakrabarti
Vice-Chancellor, UBKV
Chief Patron, CIABASSD-2022

Message

It is immense pleasure that Agro Environmental Development Society (AEDS) is going to organize 6th International Conference on "**Current Issues In Agricultural, Biological & Applied Sciences for Sustainable Development"** (CIABASSD-2022) at Kalimpong Science Centre, Deolo, Kalimpong, WB, India in association with Department & Directorate of Extension Education, UBKV, ICAR-NAHEP, Himalayan Scientific Society for Fundamental and Applied Research (HIMSFAR), **during June 11-13, 2022**. Organizing seminar and symposia is an important activity which helps in harnessing the research and communication skills of scientists, researchers and students. Such scientific gatherings are the important part of academic pursuit which opens the new vistas for the scientists. The topic of the conference is very relevant because multi disciplinary interactions are more useful to take a hostile view of a problem. After the industrial revolution in Europe, Environment has been the main causality, thus forcing all the countries to build a consensus to combat the same. All climate models predict that there will be more extreme weather conditions with more draughts, heavy rainfall, and storms with changing climatic conditions in future. In the last two decades, we are observing the adverse effects of climate change on agriculture forcing us to reorient our research strategies. I am happy that environment, agriculture and other applied sciences will be discussed in a cohesive manner in this conference. The present conference will certainly enrich knowledge of our researchers and students through deliberations and discussions of experts especially coming from the different parts of the country and abroad.

I convey my best wishes for the successful completion of this international conference and I wish theorganizing committee and whole team of AEDS society all the best and hope the event concludes with its grand success.

Dr. Swarup Kumar Chakrabarti

Uttar Banga Krishi Vishwavidyalaya (UBKV)
Pundibari, West Bengal, India
(www.ubkv.ac.in)
Prof. Prabhat Kumar Pal
Director of Extension Education, UBKV
Organizing Chairmen, CIABASSD-2022

Message

It is a matter of great privilege for me to organizing the 6th International conference on **"Current Issues In Agricultural, Biological & Applied Sciences for Sustainable Development"** (CIABASSD-2022) at Kalimpong Science Centre, Deolo, Kalimpong, WB, India in association with Department & Directorate of Extension Education, UBKV, Agro Environmental Development Society (AEDS), ICAR-NAHEP, Himalayan Scientific Society for Fundamental and Applied Research (HIMSFAR), **during June 11-13, 2022.** On behalf of Society and Organizing Committee I warmly welcome all the guests, participants, delegates, researchers, Scientists and other stake holders in this conference. I am also thankful to all the honored guests and eminent scientists from India and abroad for sharing their valuable time and ideas to our International Conference. Our main motive for organizing this Conference is to bring together interdisciplinary ideas from the field of Agriculture, Environment and Applied Sciences for Sustainable Development.

I am grateful to the Chief Patron Hon'ble Vice Chancellor, UBKV, Cooch Behar, WB for their constant encouragement and valuable suggestions for organizing this conference.

I am also grateful to the members of the regional Coordination Committee, members of organizing committee and various other committees who worked day and night for this conference became a great success.

Once again, I wish all of you for a wonderful stay in this beautiful lap of nature for another three days.

Prof. Prabhat Kumar Pal

Kalimpong Science Centre (KSC) Deolo
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(www.kalimpongsciencecentre.org)
Dr. BB Gurung,
Head & Curator, KSC
Organizing Chairmen, CIABASSD-2022

Message

It is a matter of great pleasure that Agro Environmental Development Society (AEDS) is going to organize 6th International Conference on **"Current Issues In Agricultural, Biological & Applied Sciences for Sustainable Development"** (CIABASSD-2022) at Kalimpong Science Centre, Deolo, Kalimpong, WB, India in association with Department & Directorate of Extension Education, UBKV, ICAR-NAHEP, Himalayan Scientific Society for Fundamental and Applied Research (HIMSFAR) **during June 11-13, 2022.** The quest for knowledge has been from beginning of time but inherent knowledge provide the valuable inputs which disseminated to the different beneficiary. It is hoped that the international conference will provide the platform to collect and disseminate the latest knowledge in recent emerging areas of agriculture. Through this platform researcher, stakeholders and entrepreneurs will able to discuss and share the new findings which may applicable practically. It is also expected that they will understand the current scenario of the market and able to face challenges raising at the different level of business. New start-ups have great potential to succeed either in term of contributing in GDPand generating the employment. Agri-entrepreneurs are able to grab the opportunities due to conductive environment provided by the Government through various schemes.

I congratulate the organizing committee and other associates for kind support during the conference to make this event a grand success.

Dr. B B Gurung

एग्रो एनवायर्नमेंट्ल डेवलपमेंट सोसाइटी (ए.ई.डी.एस.)
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Message

As organizing secretary, I warmly welcome to all the dignitaries, delegates and participants in the 6th International Conference on **"Current Issues In Agricultural, Biological & Applied Sciences for Sustainable Development"** (CIABASSD-2022" The conference is going to be organized by Agro Environmental Development Society (AEDS), Kalimpong Science Centre, Deolo, Kalimpong, Department & Directorate of Extension Education, UBKV, ICAR-NAHEP, Himalayan Scientific Society for Fundamental and Applied Research (HIMSFAR) **during June 11-13, 2022**. As we all know that at the present time the whole world is facing terrible pandemic of COVID-19 even after this AEDS is continuously working and organizing training course/international conference to keep the students, researchers and scientists encourage during this situation. The main focus of the society and conference is how to overcome the problems that are arising for the development of sustainable agriculture and how to strengthen agricultural production with the low expenditure. I am very much thankful to our Chief Patron Dr. Swarup Kumar Chakrabarti, Hon'ble Vice-Chancellor, Uttar Banga Krishi Vishwavidyalaya, Pundibari, West Bengal, India and Prof. Prabhat Kumar Pal, Director of Extension Education, UBKV, West Bengal, India and all the committee members of this conference for their valuable support and guidance during this event.

I once again express my heartfelt gratitude to all esteemed Delegates and Participants for taking part and enhancing the dignity of this conference and sharing their views on different aspects of agriculture, animal husbandry and allied fields for the grand success of this conference.

Dr. Chhatarpal Singh

Agro Environmental Development Society (AEDS)
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Message

This is a matter of great honor that Agro Environmental Development Society (AEDS) is going to organize 6th International Conference on **"Current Issues In Agricultural, Biological & Applied Sciences for Sustainable Development"** (CIABASSD-2022) at Kalimpong Science Centre, Deolo, Kalimpong, WB, India in association with Department & Directorate of Extension Education, UBKV, ICAR-NAHEP, Himalayan Scientific Society for Fundamental and Applied Research (HIMSFAR), Pondicherry Institute of Agricultural Sciences, Puducherry **during June 11-13, 2022**. On this auspicious occasion, I warmly welcome to all the stake holders from India and abroad. The organization of such a mega event will provide us an opportunity to assemble the learned delegates coming from different parts of our country and abroad like Egypt, Nigeria, Nepal, Bangladesh and Canada.

Organizing such mega event is impossible without team work. In this event we are indebted to the Chief Patron Hon'ble Vice-Chancellor, Dr. Swapan Kumar Chakrabarti, Director Extension Education, UBKV, Dr. Prabhat Kumar Pal and other university authorities for their kind support and cooperation. I sincere thanks to all the members of various committees for their invaluable support and suggestions to make this conference a grand success.

I am again delighted to welcome you all on this occasion for enjoyable stay and pray almighty to bless us for making this conference a great success.

Md. Nadeem Akhtar

Uttar Banga Krishi Vishwavidyalaya (UBKV)
Pundibari, West Bengal, India
Regional Research Station, Kalimpong
(www.ubkv.ac.in)
Prof. Sajeed Ali, Professor, RRS-UBKV
Joint Organizing Secretary, CIABASSD-2022

Message

I warm welcome to all the committee members, speakers, participants and other stakeholders of three days 6th International Conference on **"Current Issues in Agricultural, Biological & Applied Sciences for Sustainable Development"** (CIABASSD-2022) at Kalimpong Science Centre, Deolo, Kalimpong, WB, India. The conference is going to be organized by Kalimpong Science Centre, Department & Directorate of Extension Education, UBKV, Agro Environmental Development Society (AEDS), ICAR-NAHEP, Himalayan Scientific Society for Fundamental and Applied Research (HIMSFAR) **during June 11-13, 2022.**

Throughout the conference, many ideas and issues related to sustainable development will be deliberated in the field of agriculture, horticulture, animal husbandry and allied sectors and it will be very productive to all the participants specially in the perspective of inclusive and sustainable development and I am very grateful to all those who are going to join this conference in huge numbers.We are seeing that in spite of different research and technology, the production of agriculture is falling. Since, we need to understand that whatever technology & research is coming how to be sustainable in the agriculture and allied fields. Therefore, this conference will provide the innovative and sustainable ideas in the field of agriculture and allied sectors to all the stake holders and young researchers.

I wish the organizing committee and whole team of AEDS society all the best and hope the event concludes with its grand success.

Prof. Sajeed Ali

CONTENTS

Gray blight-a major threat for the tea industry

Abhay K. Pandeyand Azariah Babu

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Abstract

The tea crop, taxonomically known as Camellia sinensis (L.) O. Kuntze, is an important non-alcoholic beverage worldwide that is extensively grown in Asia, South America, and Africa. Worldwide, India is the second largest tea producer after China. Various biotic and abiotic factors are directly related to tea productivity. Among the biotic factors the most destructive one is the gray blight disease caused by a necrotrophic fungus Pestalotiopsis-like species.Gray blightis a widespread disease affecting tea cropin many tea-growing countries, including India, resulting in huge losses in tea production. This disease is also spreading in the other countries like Korea, China, Kenya, Japan, and Sri Lanka. In India, this disease is extensively spreading in tea gardens of Southern and Northeast India. In Southern India, this disease has caused 17% crop loss and in Japana 10 to 20% yield loss. Chinese researchers have also found that gray blight has slowed crop production and caused significant quality declines in major tea-growing regions. Further, management of gray blight in tea crop relies on use of synthetic fungicides, with instantly spray after plucking using machine being essential for satisfactory mitigation.Although, application of protectant and eradicant fungicides have shown promising results for controlling gray blight but overuse of chemical pesticides causes phytotoxicity, residual effects and fungicides resistance, thus use of microbial biocontrol agents are gaining more impetus. Besides, in such area for the management of gray blight fungicide resistance management strategies as recommended by Fungicide Resistance Action Committee should be implemented.There is a great deal of importance to these findings for areas where gray blight disease is unknown.

Emerging fungal disease threats to Natural and Planted forest in Nepal

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Abstract

The study was conducted during July 2020 to June 2021 in the four physiographic regions of Nepal (Tarai, Siwalik, Middle Mountains and High Mountains). During survey, total 69 different kinds of fungal diseases specimens associated with 35 host plant species in 187 plots were collected from all four physiographic regions of Nepal. A total 68 pathogens were isolated and identified.The damage caused by these fungal pathogens have been more severe, long term, widespread, and it is difficult to mitigate than caused by any other biological disturbance agent. It is reported that these pathogens introduced into native forests and have threatened the extinction of native tree species and critically degraded many diverse ecosystems. During survey, 11 Invasive pathogens associated with different kind of disease in forest plants were recorded from different physiographic regions of Nepal. Among them, Neonectrianeomacrospora(Needle cast) reported on Abies spectabilis, Aureobasidiumapocryptum

(Leaf anthracnose) onAcer laevigatum, Golovinomycescichoracearum(Powdery mildew) on Alnusnepalensis, Phytophthora alni subsp. alni (Oomycota) (Bleeding canker) on Alnus nepalensis, Dothistromaseptosporum(Needle blight) on Pinus roxburghii,Ganoderma sp. (Butt rot) Quercus semecarpifolia, Calonectriaindusiata(Leaf spot) on Rhododendron arboretum;Calonectriareteaudii (leaf blight) on Eucalyptus camaldulensis, Nectriasp. (stem canker) on Shorearobusta, Oliveatectonae(leaf rust)on Tectona grandis and Rhytismaacerinum (tar spot) on Toona ciliata. These pathogens are being first time reported in Nepal which may have probable invasiveness.

Key Words: *Fungal diseases, Invasive pathogens, Native trees.Physiographic regions*

Nano Wound Dressing to facilitate Debridement and Healing of Burn Wound

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Abstract

Burn injury is the fourth common trauma with devastating effect causing death of 180 000 every year. It is caused by heat, radiation, electricity or contact with chemicals.In India, 1 000 000 people suffer from burn injury/ year. Wound healing occurs in overlapping multiple stages. Currently available wound dressings act on any one phase of healing without positive influence on other phases. Removal of necrotic tissue is essential for the smooth transition between different phases of healing. Wound debridement removes dead tissues and prepares the wound for healing and epithilialization. Mechanical debridement is non selective. Selective enzymatic debridement is very slow and surgical debridement needs a trained and expert surgeon and operating conditions. Highly selective autolytic wound debridement is suitable for non infectious wounds. The present work aims to fabricate a nano wound dressing to control infection and induce autolytic wound debridement in burn wound. The size of silver and zinc nanoparticles was 45nm and 36 nm respectively. Third degree burn wound was created in wistar rats as per Institutional Animal Ethical Committee guidelines. 86% of infection was reduced by nano wound dressing compared to 66% reduction in positive control nano dressing. Wound was healed in 28 days compared to 37 days in positive control nano dressing.

Keywords:*Antimicrobial Resistance, burn wound,infectionand inflammation*

Creation of Rice Repository and Effective Application of Farmer' Varieties for Rice Improvement

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Abstract

Gene pool is the basis of all plant improvement programmes. The collected farmers' varieties (FVs) of

rice possessed high probability of the useful genes for efficient application in the breeding programmes to develop high yielding varieties with grain quality, nutritional quality, accepted phenotype, productivity and resistance to biotic and abiotic stresses. Those FVs needs to be conserved ex situ or in situ. In the rice repository of Uttar Banga Krishi Viswavidyalaya, Pundibari has about 200 FVs collected from West Bengal, Assam and Manipur. Every Kharif season, they are being cultivated and seeds are collected to conserve since 2008. High variability has been observed among those varieties. Some special characteristics also have been identified during characterization and ex situ conservation of those landraces, such as, long and white sterile lemma, double and triple kernelled spikelets. Important landraces were used as donor in rice improvement. A number of desirable mutants, recombinant inbred lines and somaclones have been developed which are in different yield trials. Some pure lines also have been isolated from the collected FVs. There are further scope to utilize those FVs in rice improvement.

Keywords: *Farmers' Varieties, Mutation, Recombinants, Rice biodiversity, Somaclonal variation, Special characters, Rice improvement*

Estimation of key population parameters of Penaeus indicus (Crustacea:Penaeidae) in the Andharmanik River, southern Bangladesh: implications for sustainable management

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Abstract

This study was conducted to estimate the key population parameters to understand both thecurrent status and the yield of Penaeus indicus in the Andharmanik River, southernBangladesh, using monthly samples collected during July 2019 to June 2020. We found thatthe size at first sexual maturity of P. indicus is 15.5 mm CL. The spawning season was August- December with a peak in September. Recruitment occurred at ~8.4 mm CL for an extendedperiod of the year with two pulses: one in November (minor recruitment pulse) and another inFebruary (major recruitment pulse). The von Bertalanffy growth equation gave the followingresults: CL? = 31.9 mm and K = 1.14 year-1. The overall growth performance index was 3.37and the longevity was 2.6 years. The estimated total, natural, and fishing mortalities were 3.53,2.15, and 1.38 year-1, respectively. Therefore, the exploitation rate was 0.39 and the maximumsustainable yield was 0.42, indicating that the stock is almost optimally exploited. Hence ourwork should help improve decisions to (i) conserve the stock, (ii) maximize economic returnsfrom the stock, and (iii) continue ensuring that the stock is exploited in an ecologicallysustainable way.

Diversity of horticultural crops of North East India and their exploitation potential.

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Abstract

The North-East India the richest reservoir of plant diversity in India and is one of the 'biodiversity hotspots' of the world supporting about 50 % of India's biodiversity. Northeastern region occupy 7.7 % of total geographical area of country and harbours 50 % of Indian flora (8,000 species) of which about 4 % is endemic (2,526 species). The distinct tribes in the region have rich indigenous knowledge system on the use of components of biodiversity for their daily sustenance like food, fodder, shelter and healthcare. The region has several unique features such as fertile land, abundant water resources, evergreen dense forests of about 66%, high rainfall, and agriculture-friendly climate. Its unique phyto-geographical positions, topography and high degree of precipitation are some of the important factors which are mainly responsible for its enormous biological diversity. As a result, an array of diverse plants are grown across the region ranging from tropical to alpine. A large number of diversity in fruits belonging to the genera Artocarpus, Annona, Averrhoa, Garcinia, Musa, Passiflora, Phyllanthus, etc. are reported from the region. Besides diverse vegetables particularly wild leafy vegetables, rare genotypes of cucurbits, solanaceous vegetables, chilli, ginger, turmeric, etc. are there with some unique quality because of their locational advantage. The region has a great ethno-cultural diversity with major and sub-tribes, which explains the wealth of traditional ecological knowledge among farmers. People of region have their ownculture, tradition and medicinal system of treatment and knowledge acquired through close observation of nature. Its ethnic people living in the remote forest areas still depend to a greater extent on the forest ecosystems for their livelihood They collect different medicinal plants and use them in traditional ways to cure their health related forms. The minor and wild fruits are mostly used to cure various gastrointestinal disorders, respiratory problems, cardiovascular compliance, muscular illness, bone diseases, gynaecological problem, cancers, snake bite, allergy and malaria etc. by local people of the region. This indigenous system of treatment based on such fruits is still an important part in social life and culture of the tribal people. However, this traditional knowledge of the local people has been transferred from generation to generation without proper technological interventions.

This paper will discuss the potentialities of underutilized plants of North-East India.

A potential herbal antibiotic "Dinoxin B Withanolide" from Datura inoxia

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For more than 70?years, human society routinely used antibacterial agents for the management of infection caused by pathogenic microbes. Although these antibacterial agents have saved many lives and an essential part of modern medicine, they have been responsible for evolutionary stress on the microbes and the emergency of drug-resistant mutants among the microbes. This decreased efficacy and withdrawal of the antibacterial agent from widespread usage.Drug resistance causes immense human suffering and now it is one of the greatest challenges of the twenty-first century. Species like the methicillin-resistant Staphylococcus aureus and vancomycin-resistant enterococci have emerged due to the irrational or overuse of antimicrobial agents. To a greater extend, drug resistance can be controlled by a proper understanding of the mechanism of action of each drug. During the last two decades, the development of drug resistance, as well as the appearance of undesirable side effects of certain antibiotics, has led to the search for a new antimicrobial agent.Synthetic antibiotics may lead to side effects by killing several good bacteria of our body and may quickly counter bacterial resistance. This emerging problem has led to understanding the multi-layered mechanisms of antibiotics action and resistance for exploring alternative therapies so that we could minimize the development and spread of resistant pathogens. Staphylococcus aureus is a gram-positive, round-shaped bacterial strain frequently found on our skin microflora and within the upper respiratory tract. The strain is not always pathogenic, but it may sometimes be the root cause of skin infections, respiratory disease & food poisoning. Some Staphylococcus bacteria such as MRSA (methicillin-resistant Staphylococcus aureus) are resistant to certain antibiotics including beta-lactam antibiotics, making infections harder to treat. MRSA causes many infections including nosocomial infections & emerged as a challenging pathogen in the community setting as well.Infections caused by MRSA can be very serious & are the most frequently occurring of all bacterial infections.

The emergence of antibiotic resistance in clinically relevant bacterial populations is an increasing problem worldwide. Keeping this in mind, we worked on different plants (Mathur,2013) and find Datura inoxiaa very potent plant with antibacterial characteristics.We at the research laboratory of Amity Institute of Biotechnology, Amity University Lucknow campus, worked and find that its ethanolic extracts are effective against microbes and their active compounds can be promising agents for developing novel antibacterial agents. Encouraged by our result, we have also isolated, identified, and characterize a potential antibacterial compound Dinoxin B withanolide from Datura inoxia against Staphylococcus aureus (Tandon et. al. 2016). Compound identification will be done by the characteristic mass spectrum developed by LC-MS and data available in the literature. The fraction will be observed as a mixture of six major phytoconstituents, identified as Dinoxin B withanolide and their aglycone (fig 1, Tandon et. al. 2016) with molecular formula C34H49O11 and exact mass calculated as 633.3269.

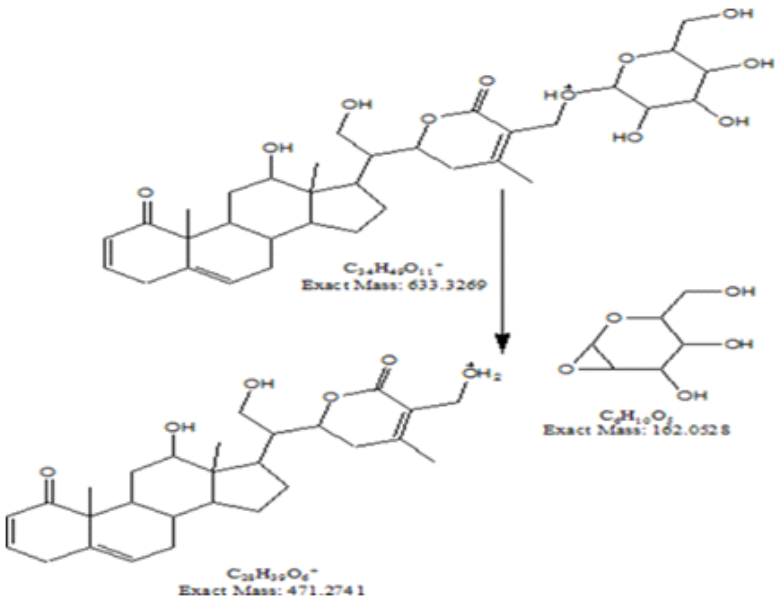

Figure 1: Structural and molecular formula of withanolideDinoxin B, identified as antibacterial compound from ethanolic fraction of Datura inoxia leaf. Identification done by characteristic mass spectrum developed by LC-MS and data available. The fraction will be observed as a mixture of six major phytoconstituents, identified as Dinoxin B withanolide and their aglycone (Tandon et al. 2016).

This compound could be present with its genins, which is shown in fig 1 with a molecular mass of C28H30O6- with mass 471.2741 and C6H10O5with mass 162.0528 There are very few detailed mechanistic studies done on natural antibacterial compounds. Significant results from our previous experiments (Tandon et. al 2016) have encouraged us to study the detailed mechanism of action of Dinoxin B withanolide against staphylococcus aureus, to strengthen its potential as herbal medicine. We have also worked for structure-activity relationship (SAR) of the compound to make it more valuable for pharmaceutical industries.

Natural compounds have much more complex chemistry than synthetic compounds, because of this complex structure bacteria cannot quickly counter their effects and cannot develop immunity to them. So, instead of developing synthetic antibacterial therapy, we should research for natural antibiotics. It would not only take us closer to nature, but several new healthier ways of living a disease-free life will be discovered. Medicinal plants used as sources for therapeutic agents represent a rapidly expanding area of health science. There areno or very few serious studiesincluding mechanistic studies for the development of herbal antibiotics on natural antibacterial compounds. We have done detailed mechanistic studies for mode of action ofDinoxin B withanolide. The development of novel drugs through the extraction of biologically active compounds from plants is the need of today's research program. Compounds identified may be able to act against the MDR and XDR strains of the bacterial species.

Water management strategies of rice under changing climate scenario

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Abstract

Water scarcity is increasing in the age of climate change, with levels anticipated to limit sustainable development and slow progress against poverty for years to come. Population and developmental pressures are creating competing demands for water for basic human needs, agriculture and power. Globally,water demand is projected to increase by 55% till 2050. Much of the demand is driven by agriculture, which accounts for 70% of global freshwater use, and food production will need to grow by 69% by 2035 to feed the growing population. Rice (Oryza sativa L.) is one of the majorly consumed food crops in Asia. Major share of available freshwater is used to irrigate rice.On an average, 2500 liters of water is used, ranging from 800 liters to more than 5000 liters to produce 1 kg of coarse rice.Rice is not exclusively a wetland plant, but its growth in inundated conditions has been practiced for a long time. The reasons for growing rice in inundated conditions are mostly agronomic, and it would be possible to grow rice in less water environments like other crops. The demand for rice is increasing with growing population, while water resources are getting scarce. Hence, the rice-growing practices requiring less water input are needed to be adapted. A well-levelled field is one of the conditions for successful crop husbandry. Laser leveling is a modern form of land leveling method during which the soil surface is smoothed (± 2 cm) from its average elevation using laser-powered tractor-powered scrapers. Alternate wetting and drying (AWD) is a water-saving technology that lowland (paddy) rice farmers can apply to reduce their water use in irrigated fields. In AWD, irrigation water is applied to flood the field a certain number of days after the disappearance of ponded water. Hence, the field is alternately flooded and non-flooded. Aerobic rice is a production system in which especially developed "aerobic rice" varieties are grown in well-drained, non-puddled, and non-saturated soils. With a good management, the system aims for yields of at least 4-6 tons per hectare. Alternate wetting and drying (AWD) and aerobic rice provide a respective 38 and 40 % reduction in water input to rice over the conventional flooding. Another water management strategy, System of Rice Intensification (SRI)is a climate-smart, agroecological methodology for increasing the productivity of rice and more recently other crops by changing the management of plants, soil, water and nutrients.Another method of rice cultivation which is attracting the attention of farmers is Direct Seeded Rice or DSR which under Indian conditions received popularity during covid 19 pandemic and arose as a preferred method of cultivation owing to its less labour input. Moreover, Agricultural scientists and farmers too are viewing it as the rice cultivation technology for the future. Ground Cover Rice Production System (GCRPS) is an innovative production technique developed to use less water and to improve tolerance to low temperature. This technique is also environmental friendly as it helps reduce rate of herbicidal application. Changing climate scenarios is expected to cause a 13-23 % rise in irrigation water requirement for rice cultivation. It is necessary to comprehend the aspects that reduce rice yield and impair its optimal

performance under low water input systems. This will aid in the judicious utilization of existing water resources for sustainable rice cultivation.

Keywords: *SRI, Rice, AWD, GCRPS, DSR.*

Piper nigrum possesses in vitrocytotoxic potential against colon cancer cells

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Abstract

Spices have been used for thousands of years and are known for their flavour, taste and colour in food. Indian spices not only add aroma and taste to the food, but are known to possess bactericidal, bacteriostatic, fungistatic and antifertility with other medicinal properties. Many Indian spices like turmeric, coriander, cumin, etc. have been proved to cure the diseases ranging from common cold and cough to cancerous tumors. Some antioxidants from spices, such as curcumin (turmeric), eugenol (clove) control cellular oxidative stress and have the ability to block the production of reactive oxygen species. Therefore, spices could be used to prevent and treat cancers, because oxidative stress, inflammatory stress and immune response have been associated with the genesis, growth and metastasis of cancer. The use of spices as mediators is gaining popularity, vastly due to their safe toxicity profiles and their potential as chemo sensitizers. Thus, in recent times, major attention is being devoted to discover additional novel strategies to combat cancer through natural dietary components.In the present research work, Piper nigrumwas screened for in vitro anticancer efficacy against seven human cancer cell lines originated from various tissues. The methanolic extractof the black pepper was prepared and used as test material. The anticancer activity was determined by the cytotoxic potential of the test material at 100 µg/ml viaSRB assay. Cells were allowed to grow for 24 h on 96 - well flat bottom tissue culture plates. Cells were further allowed to grow in the presence of test material for 48 h. Cell growth was terminated by addition of 50% (w/v) trichloro acetic acid. Cells were stained with SRB dye. Excess dye was removed by washing with 1% (v/v) acetic acid and bound dye was dissolved in Tris buffer and OD was taken at 540 nm. The results demonstrated that Piper nigrumshowed in vitro cytotoxicity (86%) against one human cancer cell linefrom colon i.e., HCT-116.Further studies are required for the isolation of active ingredient from thisseed spice that will serveas drug for the management of cancer.

Key words: *Piper nigrum,SRB assay, Cytotoxicity, Cancer cells, Black pepper*

Modelling volatile Agricultural Price Series Using Bayesian Time Series Models

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Abstract

Incorporation of exogenous variable(s) in a model improves the modelling as well as forecasting performance of it, one such very useful class of model is ARIMAX. But, in some practical scenarios while dealing with agricultural commodity prices, this model does not suffice. ARIMA or ARIMAX being a linear class of models fails to capture the volatile phenomenon present in the series. Thus, several researchers dealing with inherent noisy agricultural data series have reported the superiority of Generalized Auto Regressive Conditional Heteroscedasticity (GARCH) and its family of models over these linear class of models. From early 2000's the integration of ARIMAX as mean model with GARCH as the volatility model has been proposed and used as ARIMAX-GARCH specification for various volatile time series data. ARIMAX-GARCH model mostly has been used in financial series with very little application in agriculture field. The estimation of GARCH model under Bayesian framework has been carried out by few researchers. Moreover, due to distinct nature of agricultural series from financial series, the methods cannot be directly applied as such. Thus, during application of these models estimated under stringent statistical assumptions sometimes fails to produce estimates with acceptable standard errors. Hence, in such situations one needs to sort for alternative ways of estimating the model parameters which can provide flexibility from assumptions, yet provide reliable estimates. One, such way out is Bayesian paradigm. In this paper we have applied this approach and estimated the different combinations of ARIMAX-GARCH models (i.e., ARIMAX, Bayesian ARIMAX, ARIMAX-GARCH and ARIMAX-GARCH Bayesian). The models has been applied tomonthly time series data of onion price (Rs/quintal) from Jan, 2005 to July, 2019 (https://agmarknet.gov.in) of 3 major markets of Maharashtra along with arrival quantity (tonnes) from Jan, 2005 to July, 2019 (https://agmarknet.gov.in). We could document superior results of the models under Bayesian framework.

Keywords: *ARIMAX, Volatile, ARIMAX-GARCH, Bayesian, Agricultural prices, Time series.*

Identifying the Birds Diversity Hot Spots in Catchment of Arpa River, Bilaspur, Chhattisgarh

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Abstract

Arpa River is the life line of Bilaspur district, in Central India. It is a major tributary of river Seonath and originates from the Maikalhill ranges in the northen part of district. It flows in the stretch of 147 km from Khondri village at Pendra tehsil in Bilaspur district where Malaniya nala (originate from Surhighat village of Pendra tehsil) and Sonekachar nala (originate from KamraPathra forest village, Keochi)

merges with each other and gives the birth to Arpa river. It meets in river Seonath (a major tributary of river Mahanadi) near Matiyari village of Bilha tehsil in Bilaspur district.The total catchment area of the Arpa river watershed is 2022 sq. km. The catchment area of Arpa is well known of itshabitat diversity that includes series of heights and cliffs, forest area, shrubby and bushy plains, flatalluvial areas, seasonal marshes and water bodies. Such a rich topographical diversity has created the richness in floral diversityand subsequently faunal diversity. Nevertheless, no study was conducted on Arpa catchment areaparticularly on the bird's diversity and its associated hot spots analysis. The present study was aimed to identifying the bird diversity hotspotsalong Arpa river catchment area.The entire study area was visited during 2019-2022 where thirty sampling sites were surveyed regularly indifferent seasons targeting the birds diversity and their habitats.A Total of one hundred andforty-nine bird species belonging to 22 orders and 53 families were recorded during the current study. Geostatistical Modelling in ArcGIS was used to determineimportant hotspot for birds in Arpa rivercatchment area.Highlighting the birds hotspots in this region would assist inaddressing the management effort property by demonstrating the importance of the area as apriority for conservation on the national level, and addressing set of recommendations as a toolfor treating the threats that threaten the biodiversity in general and birds in particular in thiskey biodiversity area in Central India.

Key words: *Arpa River, riverine habitats, bird diversity, hotspot, management*

Front Line Demonstrations of leaf spot disease management by chemical method in turmeric crop

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Abstract

Front Line Demonstrations of leaf spot disease management by chemical method in turmeric crop were conducted by Krishi Vigyan Kendra, Korea during the year 2020-21 with 18 farmers. In order to demonstrate technique and obtaining results, comparatively studiedrecommended practice (rhizome treatment by carbendazim 50 % WP @3g/liter and 6 spraying of Carbendazim 1 % + Mancozeb 2 %) over farmer's practices (absolute control). Results revealed that higher yield (17.22 t/ha) was obtained in recommended practicesthan farmer's practices (13.84 t/ha). Similarly average net return (Rs 507600/ ha)with Benefit-cost ratio (2.80) was higher in recommended practices than farmer practices in which return (Rs. 198563/ha) with Benefit-cost ratio (1.28) was obtained.

Woodlots importance as livelihood security in Kashmir (District- Ganderbal)

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Abstract

The livelihoods among rural communities in Republic of India is complicated, dynamic and multidimensional development. Forest woodlot farming forms a key link in enhancing the economic and social way of life of rural communities. Forest resources from woodlots are the source of revenue, employment, shelter, housing materials, cloth, ornament, fuel, fodder/ grazing, timber, food, vegetables, medicines, fertilizer, fibre, floss, oilseed, cottage industries and handicrafts and other Non-Timber Forest Products (NTFPs).The study investigated the woodlots types and their livelihood contribution in the Ganderbal district of Kashmir. Multistage random sampling technique was employed to select 155 farm woodlots from 12 sample villages.The prevalent woodlots established were plantations of Populus, Salix, Robiniaor mixed species.Of the total household woodlot income, Poplar woodlot contributed highest share (59.86%), followed Salix woodlot (24.29%), Robinia woodlot (9.80%) and mixed woodlot (6.05%). Among the resources, Populus timber contributed maximum share in woodlot cash income followed by Salix timber, fuelwood, wicker, tree browse and leaf litter. The findings suggested that woodlot farming in the Ganderbal district is the key alternative for forest resource production, livelihood resilience and socioeconomic improvement.

Keywords: *Farming, Forests, Livelihoods, Resources, Socio-economic and Woodlots,*

Evaluation of bacteria from termite gut for faster retting of jute plant and quality fibre extraction

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Abstract

Jute is the second most important cash crop and cheapest golden colour natural fibre crop next to cotton. Its fibre is obtained from the phloem part of the plant through the microbial retting process. In the present study, bacterial retting protocol was optimized to carry out faster retting and produce high quality fibre. A total of 47 bacterial isolates were isolated from wood eating termite gut and screened for pathogenicity test. Isolates TNA-7, TNA-13 and TKB-1 showed ?-hemolysis activity, indicating pathogenicity to human beings. Those isolates were heat killed and discarded. Remaining 44 isolates were screened qualitatively for pectinase, xylanase, cellulase and laccase activity. Two isolates viz. TNA-2 and TNA-15 were selected on the basis of high zone of potency index for pectinase and xylanase

activity. Based on the 16s rDNA analysis of these 44 bacterial isolates were grouped into 13 different genera. The selected bacterial isolates were identified as Bacillus cereus TNA-2 and Bacillus cereus TNA-15. To test the retting efficiency of the selected bacterial isolates with different combinations of isolates were applied for retting under field conditions. Testing fibre quality parameters, it was observed that bundle strength varied from 20.5 to 23.3 g/tex in all the treatments. As compared to control colour was improved to golden yellow with bacterial inoculation, fineness also improved with Bacillus cereus TNA-15 and co-inoculation as compared other two treatments. Root content and defects percentage were also reduced with bacterial inoculation as compared to control. Retting with selected bacterial cultures improved the grade of retted jute fibre to TD2 +75%? as compared to control TD3+30%?. The bacterial inoculated treatments reduced the retting period from 17 days to 10 days with production of high quality jute fibre. This retting technology has the potential to be adopted by the farmer's in large scale for producing high quality jute fibre.

Keywords*:Termite gut, Pectinase, Xylanase,16S rDNA analysis, Bacterial retting, Quality fibre.*

Phenotypic characterization and Genetic Diversity of Indigenous Aromatic Rice of West Bengal

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Abstract

The state West Bengal is one of the homes to many locally adapted aromatic rice land races. The present study was evaluated 48aromatic indigenous rice to estimate the extent of genetic divergence using ten morphological characters at the Instructional Farm of RRS (OAZ), UBKV, Majhian, West Bengal during 2016-2021. The experiment was laid out in RCBD with three replications. Based on six year evaluation, among the germplasm maximum grain yield plant-1 was observed in Kerela Sundari, (81.73 gm) followed by Sugandhi(72.88 gm), Chamarmoni(66.37 gm) and least was in Chamatkar(22.68 gm). Character associations study revealed that tillers plant-1, panicle number plant-1, number of grains panicle-1, fertility percentage, test weight (g), L/B ratio were the most important selection criteria for improving grain yield of aromatic rice. Based on D2 values the morpho-physiological parameter 48 rice genotypes were grouped into six clusters. Cluster I comprises maximum 28 genotypes followed by Cluster II had8 genotypes, Cluster III were five genotypes. The other Cluster IV and V were three genotypes except Cluster VI (monogenotypic). The maximum intra cluster distances was found in Cluster II (1397.52) where as average inter cluster distances was maximum in betweenCluster III and Cluster VI (6941.51), which indicated wide genetic diversity among the genotypes of different groups than those of same cluster.On the basis of the cluster means the important cluster was cluster II for number of grains panicle-1, fertility percentage, test weightand grain yield plant-1followed by cluster V. The result of cluster mean clearly indicated that Chamarmoni, Sugandhi, Kerela Sundari, Kathari Bhog, Khejurphuliand Baran Shall were the most prominent to aromatic rice for yield responses of West Bengal.

Key words: *Aromatic rice,genetic diversity, cluster, yield*

Application of beta regression in forewarning pest attacks in crops

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The commonly employed statistical tool for analysing "cause and effect" relationship is the regression analysis. It has been employed to study the effect of weather variables on the pest infestation data, which are measured in proportional scale, too. However, this technique may not be appropriate in statistical analysis of proportions as the proportions are restricted to the interval (0, 1) and as such the assumption that the error term is normal and another one being the error term has constant variance is violated. To this end, for proportions that are obtained from discrete counts, logistic or binomial regressions are appropriate techniques (Quinn & Keough, 2002). For proportions that are not obtained from counts, there is still no concrete agreement on the most suitable techniques. A number of researchers have identified different modelling strategies,which could be employed to model continuous random variables that assume values on (0,1) (Maier, 2014; Cribari?Neto &Zeileis, 2010; Hijazi & Jernigan, 2009; Ferrari &Cribari?Neto, 2004; Kieschnick and McCullough, 2003).

The data collected under NICRA funded projects do have data where %incidence is studied taking weather variables as the independent variables. In such situations, the usual regression analysis is not appropriate as proportions take value between zero and one only and their variance is usually not constant across the range of the predictor. For such situations, transformations may be employed but this again may lead to bias in estimation. The researchers have developed techniques to model continuous proportions that are easier to interpret and more flexible than transformation. To model proportions, some have employed beta regression and some have employed Dirichlet regression. We have employed Beta regression to fit the data pertaining to pest infestation. The developed model could be employed for forewarning pest infestation by using weather parameters as the independent variables using R software.

Keywords: *Pest infestation, Beta regression, Dirichlet regression, Modelling, forewarning, Percentage data.*

Acaricidal Resistance and role of detoxifying enzymes in Oligonychuscoffeae Nietner on tea.

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Acarine pests inflict heavy losses to the tea industry in Terai and Dooars region of West Bengal, India. Synthetic pesticides of different groups are routinely applied in various conventionally managed tea plantations to keep the pest under control. Despite such routine application of pesticides, there are still frequent reports of pest control failures even at recommended doses from different tea plantations. Repeated management failure of this pest have been reported from tea ecosystem of Northeast India.

Therefore, susceptibility status of the pest to the old as well as new chemistries needs to be monitored regularly for effective and economic management of the pest under field condition. Considering these, experiments were conducted in the Department of Agricultural Entomology and in the Department of Biochemistry of Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal during 2018-19 and 2019-20 to study the status of acaricidal resistance and estimation of detoxifying enzymes activities. Results of the two years study revealed that Naxalbari population of O. coffeae acquired the highest resistance to all the acaricides tested followed by Cooch Behar population.Samsing population of O. coffeae was comparatively less resistant. Population collected from Naxalbari showed higher activities of GEs, GSTs and Cytochrome P450 during both the years of study.The present field recommended doses of dicofol, ethion and fenpropathrin are no more effective for management of red spider mite as the pest has developed low to high level of resistance against these acaricides.

Key words: *Oligonychuscoffeae, tea, acaricidal resistance, detoxifying activities, LC50.*

Comparative Performance of Green Gram (Vigna Radiata L. Wilczek) Under Single Super Phosphate and Nano-Phosphorus

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Abstract

Green gram is the third most important pulse crop grown in India. Phosphorus is the second-most vital element after nitrogen for its effect on the productivity and health of aquatic and terrestrial ecosystems. Legumes needed phosphorus in comparatively huge quantities for their growth, expansion of leaf area, biomass production and nodulation. Use efficiency of molecular phosphatic fertilizer is very less under acidic soil due to fixation by clay colloids. In this context nano-phosphorus emerging as alternatives to conventional fertilizers,released phosphorus at a slower rate throughout the crop growth; plants are able to take up most of the nutrients without any waste.

The experiment was laid out in Randomized complete block design with seven treatments and three replications. Treatments comprises of T1: 100 % RDP through SSP; T2: 75 % RDP through SSP+1 ml /l of nano-p at 15 DAS; T3: 50 % RDP through SSP+1 ml /l nano-p at 15 DAS; T4: 25 % RDP through SSP+1 ml/l nano-p at 15 DAS; T5: 1 ml/l nano-p at 15 DAS +1 ml/l nano-p at 30 DAS; T6: 2 ml/l nano-p at 15 DAS and T7: Control (No phosphorus). Nitrogen (20 kg/ha) and potassium (40 kg/ha) was applied uniformly in all the treatments. Plot size of 6 m x 5 m was maintained. Green gram variety IPM-2-14 (Shreya) was used in the trial.

Results of the experiment revealed that whenever nano-phosphorus was applied either in combination or in alone performed better in terms of growth and yield of green gram over single use of molecular phosphatic fertilizer. According to pooled data application of 2 ml/l of nano-phosphorus at 15 DAS (T6) recorded significantly tallest plant (18.54 & 53.94 cm at 30 & 60 DAS respectively), highest LAI (0.87 & 2.50 at 30 & 60 DAS respectively), larger root volume (1.73 & 2.47 cc at 30 & 60 DAS respectively), highest dry matter (266.81 & 922.64 g m-2 at 30 & 60 DAS respectively), longest pod

(8.24 cm), highest number of pod/plant (25.60) which ultimately helped in producing 33.13 % more grain yield over 100 % phosphorus through single super phosphate (SSP). Available phosphorus was found highest (27.48 kg/ha) in the treatments receiving 100% phosphorus through SSP (T1). Highest uptake of phosphorus (15.22 & 9.93 kg /ha) was found under T6 during both the year of experimentation.

Economic analysis revealed that T6 fetches highest values of net return (? 37447.71/ha & 35282.20/ha) and B: C ratio (1.35 and 1.26) during both the year of experimentation.

It was concluded from the 2 year experimentation that application of 2 ml/l of nano-phosphorus 15 days after sowing or 1200 ml/ha was proved best in terms of growth, yield and economics of green gram production, hence farmers of terai region can grow green gram during summer season (middle of February to first week of May) profitably.

Design and Optimization of Battery Electric Weeder by Using Response Surface Methodology

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Abstract

Weeding operation is most important intercultural operations which aims at controlling unwanted plants between the rows. To overcome the limitations of traditional method of weeding, eco-friendly battery electric weeder is expected to make a revolutionary change in the market with advantage of reducing the increased pollution, less dependence on fossil fuel and unexpected rise in fuel prices. By keeping the above facts, the present investigation has been carried out. The designed and developed battery electric weeder had an electric motor of 350 W, 24 V BLDC capable to propelled the vehicle. The battery electric weeder was designed with an aim to traversing between the row crops of 45 cm spacing and it was tested on the experimental field for optimization of the operating parameters for soyabean crop. The independent parameters selected for optimization were three approach angles of sweeps (60°, 70° and 80°), three forward speed (2 km/h, 2.5 km/h and 3 km/h) and three depth of operation (2 cm, 3 cm and 4 cm). The RSM result showed that the weeder satisfactory perform with approach angle (70°), forward speed (2.437 km/h) and depth of operation (2.368 cm) with minimize specific draft of 0.323 N/mm and maximum weeding efficiency of 88.38 %. The theoretical field capacity, effective field capacity and field efficiency of battery electric weeder were 0.11 ha/h, 0.08 ha/h and 74.42 % respectively. The saving over the cost of operation was observed as 27.39 %. In overall the operation economic point of view the developed battery electric weeder has satisfactory performance.

Keywords: *Weeder, Electric Vehicle, Battery, RSM and Agriculture*

Impact of Vegetation Cover on Temperature under Changing Climate in the Agriculture Dominated State of India

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Abstract

The long-term changes in climate variables may have permanent significant impacts on the growth and yields of crops. The change in temperature is due to changes in regional and global scale thermodynamic, frequency, persistence and duration of certain regional circulation patterns. The changesin land use also affect the regional temperature and it effect depends on the type of Land Use Land Cover conversion from one type to another. The detection of trend in temperature variables and identification of its causes over a long time period is important for understanding climate change for a region which will help agricultural scientists, and policy makers.Therefore, this study is planned to investigate the impact of vegetation cover on temperature variables in the agriculture dominated State of Indiataking satellite derived surrogate variable the Normalized difference vegetation index (NDVI).The specific objectives were toanalyses the district wise long-term spatio-temporal variability in Tmin, Tmax and Tmean during 1951-2020, on daily, monthly and annual basis andidentification of impact of NDVI on variation in temperature on monthly basis in last two decades (2001-2020). The trend and magnitude in the time series on daily, monthly, annual and seasonal basis were analyzed using Mann-Kendall and Sen's slope estimator tests respectively. The spatial distribution of trends in the time series was carried out using ArcGIS software. The results show the increasing trend in minimumand mean temperature on daily, monthly and annual basis.However the maximum temperature shows the increasing and decreasing trend over different district of Haryana. It is alsoobserved that western Haryana have the maximum increase and northern part of Haryana shows the minimum increase in temperature during the analysis period. Overall, a significant increasing trend of 0.83 0C and 0.38 0C was observed in minimum and mean temperature over entire State of Haryana in the last 70 years. However, a non significant decrease of 0.18 0C in maximum temperature was found in the study area. The negative correlation was observed between NDVI and temperature variables showed vegetation cover lowers the temperature at a regional scale.

Keywords: *Temperature, NDVI, Sen Slope Estimator, Mann Kendall, Haryana*

Mapping of Sunflower Crop Using Sentinel-1 and Sentinel-2 Satellite Data in Kurukshetra District, Haryana

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Abstract

Sunflowercrop is one of the significant sources of vegetable oil across the globe and grown worldwide including in India. Ambala, and Kurukshetra districts of Haryana contribute major produce of Sunflower in Haryana and thus mapping of Sunflower crop is important. Well known advance classification methods and data sources are not acknowledged much for improving crop classification at plot scale through required for precision farming.Currently available remote sensing data from Sentinel, advance algorithm like Support Vector Machine (SVM),and the accessibility of field through geo-enabledmobile systems,makes the mapping of crop acreage an exciting field of research. The core objective of this research is to look into the Support Vector Machine (SVM) classification algorithm efficiency and an appropriate data combinationto identify sunflower crop through a Cloud computing system (i.e. Google Earth Engine, GEE) in Kurukshetra District of Haryana. A series of Sentinel 1 (S1) and Sentinel-2 (S2) images are classified using SVMand relatedtuned parameters like kernel type, degree, gamma, and cost. The results show that optical data from sentinel-2 provides an Overall accuracy (OAA) of 98.09% with Kappa Coefficient of 0.96.The combinations of SAR and optical time series provided better overall accuracy of 98.44% and Kappa coefficient 0.97. The method and band combination identified is efficient and applicable to map other crops over a larger part of the country.

Keywords: *Sunflower, Google Earth Engine, SVM, Sentinel, Haryana.*

Climate Change and Sheep Husbandary Challenges in India with Reference to Himalayan Ecosystems

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Climate change threatens human society in the 21st century and endangers food security worldwide, especially in developing countries. India is one of the largest developing country in the world with only 3 percent of land area holding of about 11 percent of world livestock. Livestock husbandry is one of the essential livelihoods for farmers and herders in India. Ensuring food provision safety is one of the most crucial issues the government faces. As reported, the per capita consumption of animal food, including mutton, milk, eggs, and pork, has increased by more than 130% in India during last decades. However, it remains unclear how climate change will impact livestock husbandry in the future and thus needs to disentangle, evaluate, and predict how climate change will affect livestock husbandry in the future. Identifying and quantifying the climate effects on sheep and goat distributions is a hot topic in recent research. It is predicted that for the sheep and goat breeding industry to respond to climate change. The varying climatic conditions affect the disease incidences in sheep by influencing their immune competence, virulence of infectious agents, and strength of transmission mechanisms. There is a dynamic correlation of temperature and precipitation with sheep and goat density. Elevated environmental temperature due to climate change may lead to increased development rate in certain infectious pathogens and cause higher population size. In addition, climatic factors such as temperature, humidity, and rainfall are established to affect the vector population dynamics and disease transmission potential. Severe water stress along with heat stress can cause immune suppression in sheep during summer. Moreover,

studies established a strong positive correlation between frequency of extreme events and pest and disease incidences. It has been found in Himalayan regions and especially in fragile ecosystems recent mean temperatures have consistently increased by between 1°C and 4°C compared to the 30-year monthly averages. Moreover, climate change induced heat stress is thus one of the complex factors making sheep management and husbandry challenging in many geographical locations in the world. It has been found that heat stress (THI > 75) and elevated glucocorticoid levels (indexed using faecal glucocorticoid metabolites) are linked to embryo loss in Merino ewes. It is hard to predict livestock distribution precisely under changing climate. Technology driven smart livestock husbandry with focused breeding and production requirements and as per demand of changing human populations dynamics is need of the current research and extension focus.

Effect of nano-urea application on soil mineral nitrogen and microbial activity under maize-wheat cropping system

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Abstract

The nitrogen (N) use efficiency in Indian farming scenario rarely exceeds 40%, leading to poor crop response to fertilizer N input. Globally researchers are continuously emphasizing on development and promotion of alternate novel fertilizers. Recently, Indian Farmers Fertilizer Cooperative Ltd. (IFFCO) developed nano-urea aiming at efficient N use. Field evaluation of the nano-urea were undertaken in a maize-wheat system at ICAR-Indian Agricultural Research Institute, New Delhi. Mineral N ranged from 17.63 to 32.22 µg/g of soil in the experimental plots. On an average the mineral N content in soil was higher in flowering stages of crop compared with that in the post-harvest soil irrespective of crop and experimental years. Results indicated that recommended N application along with two sprays of nano-urea (N100+Nano-N) had highest mineral N content in soil. Application of 75% recommended N along with two sprays of nano-urea (N75+Nano-N) registered similar mineral N compared with that under N100. The treatment N100+Nano-N registered highest values of dehydrogenase activities (DHA) at flowering stage of maize and wheat during both years. Application of N100 registered significantly higher DHA in soil, compared with application of 50% of recommended N doses (N50). Soil microbial biomass C (MBC) was similar under N100, N75+Nano-N and N100+Nano-N. In general, higher rates of N application resulted in higher mineral N, DHA and MBC in soil. Based on two years of field experimentation, the possibility of curtailing up to 25% of the recommended dose of N by application

of two sprays of nano-urea may be indicated. Inclusion of nano-urea in fertilization schedule did not show any adverse effect on soil mineral N and microbial activities.

Key words: *Dehydrogenase, Microbial biomass carbon, Mineral nitrogen, Maize-wheat*

Effect of nano-urea application on productivity and economics of maize-wheat system

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Abstract

The nitrogen (N) use efficiency in Indian agriculture scenario rarely exceeds 40%, which lead to poor crop response to fertilizer N input, excessive use of urea, increased cost of production, environmental pollution and adecline in farmers' net income. Globally researchers are continuously emphasizing on developmentandpromotionofalternatenovelfertilizers,besidesimproved agronomic management to enhance N use efficiency.Recently,IndianFarmersFertilizerCooperativeLtd. (IFFCO) developed nano-urea aiming at efficient N use. Fieldevaluationof the nano urea were undertaken in a maize-wheat system atICAR-IndianAgricultural Research Institute, New Delhi. Rate ofN fertilizer application and spraying of nano-urea significantly influenced productivityand economics of maize-wheat system.Results indicated that application of 75% recommended N along with two sprays of nano-urea (N75+Nano-N) registered similar grain and straw yields compared with that under recommended N application (N100). The N100 recorded highest values of harvest index (HI), although N75+Nano-N registered similar values of HI as that of the former. The N100 recorded significantly higher net return and benefit cost ratio (B:C) over no N(N0) or 50% of the recommended N application (N50).The treatments N100 and N75+Nano-Nhad similar B:C ratio for both crops during both years of experimental period, except for wheat in 2020-21 where the former recorded higher B:C compared to latter.Therefore, there is a possibility of curtailing up to 25% of the recommended dose of N by application of two sprays of nano-urea without any penalty on crop productivity and farmers income.

Keywords*: Economics, Harvest index, Maize-Wheat, Nano-urea, Yield*

Ornamental Bird Rearing - The Alternative Sustainable Livelihood Option for Womenfolk of Terai Region

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Background: North Bengal comprises of about 18.35% percent of the State's total area. Agriculture remains the prime occupation for many in the districts of North Bengal. Tourism remains and will have greater opportunity to flourish as an integral part of economic development as well as societal upliftment. Beautification of the stay areas for tourist has been greatly demanded where incorporation of ornamental birds holds a major area. The womenfolk of these districts are involved in agriculture and animal husbandry practice as a part of family and no such separate income generation activity is visible. These untapped human resources may be used in this new farming practice which will help them to earn a lucrative amount vis-à-vis will enable them to be empowered socially. Considering the above situation Krishi Vigyan Kendrahas entered into a new venture of promoting ornamental bird rearing for the unemployed women folk of the society in particular and the unemployed rural youth in general.

Technology:Low-cost inputs primarily with 10 pairs of birds and feed for 3 months. The farm women themselves will manage to construct a house with net and some wooden structure to rear the birds, for whichskill development training will be imparted to the selected beneficiaries with continuous technical backstopping and follow of action from the KVK. The bird rearing cage will be provided with standard number of feeder trays, water pots and standard number of earthen pots for laying eggs. KVK is also providing diagnostic help and advisory services to the farm women.

Effects of This Technology on Production and Economic Gain

Unit size	Cost of cultivation (Rs.)		
Per month	Gross return (Rs)		
Per month	Net return (Rs)		
Per month			
10 pairs of birds	900.00	2100.00	1200.00
After 4 months			

20 pairs of birds 1700.00 4200.00 2500.00

Suitability with Existing Farming System

Category Ornamental Bird Rearing

Duration of work (hrs/day) 1.5

Place of work Homestead

Risk of work (%) 0

Biodiversity Biodiversity is not destroyed.

Monthly income (Rs) 1200-2500

Additional time involvement for the work Not moving outside the home for which they can take care of their children

Marketing Stable

Key Words: *Ornamental Bird, Beautification, Unemployed, Womenfolk, Terai Region, Krishi Vigyan Kendra*

Advances In Biological Control For Insect Pest Management

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Abstract

An estimated one third of global agricultural production, valued at several billion dollars is destroyed annually by over 20,000 species of field and storage pests. Synthetic, broad-spectrum insecticide is a satisfactory and permanent solution for pest control; however, the excessive use of chemical insecticides is a threat to human health, natural ecosystem and environment. Societal concerns over pesticide use have resulted in the development of new biologically based pest management strategies that are ecologically sound, reliable, economical and practical. These lead to the development and registration of naturally occurring and genetically altered bio-insecticides, which include arthropod natural enemies, entomopathogens (bacteria, nematode, virus, and fungus), plant-derived insecticides and insect hormones. Recent global bio-pesticide products registered include bacteria (104 products, mostly are B.thuringiensis), nematodes (44 products), fungi (12 products), viruses (8 products), protozoa (6 products) and arthropod natural enemies (107 products) (Waage, 1996). Bio-pesticides, unlike the chemical pesticides, can be produced at an appropriate scale with technologies that are well within reach of most developing countries. This could make possible the development of local bio-pesticide products that target local pests. However, advance knowledge in biotechnology and molecular biology can help assess the production of more potent and cost-effective bio-pesticides.

Integrated Insect Pest Management in Field Crops

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Abstract

Adoption of integrated pest management (IPM) strategies is the best solution to tackle the pest problems. IPM provides a framework for integrating knowledge, skills and information on pest management. An IPM practice in crop production initiatives includes regular pest monitoring, research on the optimal use of pesticides, complementary weed control strategies, and alternative cultural and biological controls. In this regard, several efforts have been made to develop, verify, demonstrate and document location specific IPM technologies suited to different ecosystems. Since IPM is a dynamic process, therefore, it needs continuous up gradation of the technology as per the changing pest scenario. To achieve the target of increasing the productivity levels to meet the future demand, it requires adoption of modern and intensive agricultural practices by the farmers. However, concomitant with the practice of intensive agriculture, there is aggravation of biotic constraints like insect pests, diseases and weeds. Integrated pest management since its introduction in the late 1950s, when the focus was on combining suitable methods to limit pests in a crop, within the framework of sustainable agricultural development. The concept of IPM has been defined in different ways by different workers. Stern et.al. (1959) defined applied pest control, which combines and integrates biological and chemical control. Chemical control is used as necessary and in a manner, which is least disruptive to biological control. Integrated control may make use of naturally occurring biological control as well as biological control affected by manipulated or induced biotic agents. Smith and Reynolds (1966) defined integrated pest control as a pest population management system that utilizes all suitable techniques in a compatible manner to reduce pest populations and maintain them at levels below those causing economic injury. FAO, 1967 defines integrated control as a pest management system that in the context of the associated environment and the population dynamics of the pest species, utilizes all suitable techniques and methods in as compatible manner as possible and maintains the pest populations at levels below those causing economic injury.

Use Of Pheromone Traps/Dispensers for Integrated Pest Management

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Abstract

Chemicals secreted by insects are being used to modify the behaviour of the insect for the advantage of the pest managers. Sex pheromones are used for trapping the insects and mating disruption. Such pheromones of several lepidopteran insects have been identified, synthesized and used for population management as in the case of codling moth, Cydiapomonella , gypsy moth Lymantria dispar and several bark beetles. Aggregation pheromones have been successfully used for trapping bark beetles. Aggregation

pheromones of red palm weevil and Rhinoceros beetle of coconut are also available in market. Different types of pheromone traps such as sleeve type trap, delta and sticky traps are also manufactured and sold by different firmsPheromones are chemical substances released by insects which attract other individuals of the same species. Volatile sex pheromones serve as long-distance signals, emitted by receptive individuals to attract suitable mates. They can be effective over distances of hundreds of meters and possibly even kilometers. In the majority of cases studied, volatile sex pheromones are produced by females to attract conspecific males. However, the situation is sometimes reversed, as seen in some species of weevils and cerambycid beetles, wax moths and phytophagous stink bugs (Hemiptera), where it is the males that produce sex pheromones rather than females. There are also a few cases where both sexes produce pheromones to attract the opposite sex, but during different temporal windows.

Physiological Disorders of Agricultural Crops

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Abstract

Yield reduction and quality deterioration of agricultural crop produce occurred primarily because of biotic and abiotic factors. Biotic issues include insects, pests, etc. whereas abiotic aspects of deterioration consist of environment, nutrition and growth regulators. The action of environmental factors that are outside the optimum ranges leads to the deterioration of physiological process during the pre- and post-harvest periods, which, in its turn, leads to the incidence of physiological disorders. Thus, physiological disorder may be defined as the abnormal growth pattern or abnormal external or internal conditions caused by adverse environmental conditions (such as deviation from normal state of temperature, light, moisture, nutrient, harmful gases and inadequate supply of growth regulators) during growth in fields or orchards or during harvest, storage, and marketing. Whilst the symptoms of physiological disorders may appear disease-like, they can usually be prevented by altering environmental conditions. However, once a plant/plant part shows symptoms of nutrient deficiency it is likely that season's yields and quality will be affected adversely.

Strategies And Management of Diseases in Paddy Under Climate Change Scenario

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Abstract

Rice is the most important staple food crop in India and is therefore, grown in different agro-climatic regions from Kashmir to Kanyakumari. Nearly all states and union territories of India produce rice. The most important states are West Bengal, Bihar, Uttar Pradesh, Assam, Orissa, Andhra Pradesh, Tamil Nadu, Punjab and Jammu & Kashmir.Rice cultivation is an integral component of rich cultural heritage

of Jammu & Kashmir state. The crop is grown on 100% irrigated ecology in Kashmir valley and melting snow is the source of irrigation. The crop is grown in all districts of Kashmir valley on an area of 0.159 m ha. Rice in the state is grown across diverse agro - ecological conditions ranging from subtropical zone of Jammu (> 200m amsl) to temperate high altitudes region of Kashmir (2300 m amsl) spread between 30.4oN to 34.38 0 N latitude and 74.00E to 75.25oE longitude. Of the total area of 261.35 thousand ha under rice in the state, 137 thousand ha (55%) are cultivated in Kashmir and being a staple food of the valley, it is a primary source of calories in people's diet compared to wheat and maize. This ranks next to none with respect to production (5.59 lakh tons) and productivity of 2.2 t/ha. Rice production scenario is rapidly changing in various agro-climatic regions with a marked change in different parameters of climate and other farming situations in India. The crop suffers from attack of various types of diseases caused by diverse types of fungal, bacterial or viral pathogens. The strategy of disease management depends on topography, soil type, cropping system, climate, varieties used, agricultural techniques followed by the farmers and also the socio-economic impact of the diseases.

Entrepreneurship development through Mushroom Production in Sub Himalayan region of West Bengal

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Abstract

Sub Himalayan Region of West Bengal experiences a typical sub-humid tropical climate with annual average rainfall of nearly 3,000mm; average maximum and minimum temperature 32oC and 12oC. The weather is very much suitable for production of oyster mushroom in all round the year and milky mushroom production in summer season. The good market facility of the edible mushroom is available in nearby states like Assam, Meghalaya and neighboring country, Bhutan. Considering the above, Krishi Vigyan Kendra, Coochbehar promoted this technology among rural youths and women for entrepreneurship development from 2014-2021. Entrepreneurs were also developed for maintaining smooth marketing channel to nearby country and states. Out of total 346 nos. of rural youths 86 nos. are actively engaged in production of mushroom on commercial scale, out of which 12 youths have established a small-scale industrial unit and presently earning net income of Rs. 5.14 lakh per year per unit and also generating 3890 nos. of mandays per year. Interestingly, out of 190 nos. of farm women of 32 SHGs, 118 nos. of 24 SHGs are producing mushroom as source of income generation. 5 individuals have adopted the technique of mushroom spawn production as source of vocation for income generation.

Average annual net incomethrough this vocation is Rs. 2.8lakh per individual, whereas mandays created through this vocation is 1170 per year. Inspired by the scientists of Krishi Vigyan Kendra, 6 individuals are now directly engaged in collecting and marketing the spawn produced in the district to nearby states and country and thereby earning average Rs. 2.90 lakh annually with generation of nearly 2,400 mandays per year.

Keywords: *Sub Himalayan Region, Oyster mushroom, milky mushroom, entrepreneurship development, rural youth, SHG, Krishi Vigyan Kendra.*

A study on B2B, B2C and C2C type of agricultural e-commerce in West Bengal

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Abstract

Agricultural growth of anynations depends on the marketing of the crops. It is observed from various studies that the Indian farmers perceived different types of marketing constraints due to large number of middle man and marketing chain. So for increasing the producer share in consumer rupees it is necessary to reduce the marketing chain and number of middle man. For this reason an experimental trial was taken on marketing of agricultural crops through Kisankarts(Startup) in North Bengal region of West Bengal during 2019-2021. It is found from the study that agricultural start up marketed the agricultural crops withminimise the role of middle man and increasing theproducer share in consumer rupees.

Key words: *Marketing constraints, Middle man, Marketing chain, Producer share in consumer rupees, Kisankarts, Startup*

Application of dielectric constant for detection of subclinical mastitis: an Overview

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Abstract

Mastitis occurs throughout the world wherever dairy cattles are found.It is the costliest disease of dairy animals because it leads to reduced milk production, involves treatment cost, milk withholding following treatment and premature culling. This diseasereducing quality and quantity of milk resultant significant economic lossto farmers and food industry.When mastitis begins to develop, the mammary gland has an inflammatory response yielding an increase in immune cells and eventually blood cells. When mastitis becomes more severe within the milk, the capacitance of immune and blood cells is higher than the capacitance of healthy milk therefore, an increase in immune cells (or blood) within the milk increases the capacitance of the infected milk. The more severe the infection, the greater is the effect on the milk's capacitance. Detection of mastitis by microscopic method i.e. counting of Somatic Cells is time consuming and lengthy procedure. Counting of SCC through somatic cell counter is very costly and has no practical applicability for the farmers. Instrument like electrical conductivity, pH meter which is used for identifying this disease does not gives more accurate reading, therefore, It is pertinent to mention here that an instruments need to be developed which is more farmers friendly and can give precise reading also. This paper will give an overview about the alternative methods which is useful in detection of mastitis.

Key words: *Cattles, Dielectric constant, Instrument, Mastitis, Somatic Cell Count*

Association of stress responsive genes and TF swith Jelly seed in mango

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Abstract

Mango is an important commercial crop of India which supports livelihood options for several orchardists. "Dashehari" is one of the leading mango varieties of North India. "Dashehari"has gained popularity because of its unique taste and ?avour. The variety is very popular due to its high pulp content, aroma and unique characteristic taste. During mango fruit ripening, jelly seed development has been experienced as one of the major disorder in some of the pockets, where "Dashehari"is commercially grown. Understanding the molecular basis for this malady is important, therefore, efforts were made to understand role of stress responsive genes/TFs,and relates its role in jelly seed development.In this study, we have mined several pathogenesis related genes (PRs, STH2, Thamutin etc.), ERFs, TIFY, MYB, heat and oxidative stress responsive genes (zinc finger A20, AN1 domain-containing, heat stress transcription factor C-1-like and A-5-like, monodehydro ascorbate reductase, L-ascorbate peroxidase) in the transcriptome data of mango jelly seed tissue. Expression analysis of PRsERFs, TIFY, MYB, heat and

oxidative stress responsive genes were performed in ripe and jelly seed tissues of mango. PRs, ERFs, TIFY, MYB, heat and oxidative stress responsive geneswere significantly up-regulated during mango fruit ripening as well as jelly seed formation. Expression patterns of the genes during ripening and jelly seed indicates that they are involved in mango ripening and jelly seed formation by the different transcription factor signalling pathway.These studyshed light towards important role of PRs, TFs and stress responsive genesin mangoripening as well as jelly seed formation.

Key words: Mango, jelly seed, TIFY, ERFs, PRs etc.

Proteome analysis of salt responsive proteins in sorghum [Sorghum bicolor (L.) Moench] genotypes

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Salt stress is a significant threat to agriculture as it adversely affects the growth and yield of crops worldwide. Sorghum is a C4 cereal grain crop which is well adapted to harsh environment. It is a potential model for gaining better understanding of the molecular mechanism due to its wider adaptability to abiotic stresses. In the present study, different methods were exploited to standardize the protein extraction forfurther electrophoretic pattern of sorghum leaves under different salinity levels. The extraction of soluble protein with lysis buffer, followed by its clean-up was found to be the most effective method. The profiles of salt-responsive proteins were analyzed in G-46 and S-713 sorghum genotypes based on their tolerance behavior towards salinity. The change in kaffrin level based upon the concentration and exposure time to salts suggestedthat the stored proteins served as energy source under stress conditions. The relative expression of salt-responsive genes were studied using Reverse Transcriptase-Polymerase Chain Reaction (RT-PCR) which might be used as a molecular screening tool for identification of salt-tolerant genotypes in affected areas. The validated responses were examined in terms of metabolic changes and the expression of stress-induced proteins-viz. heat shock proteins (hsp) via immunoblotting assay. The results showed that the two sorghum genotypes adopted distinct approaches in response to salinity, with G-46 performing better.

Keywords: *Sorghum, salinity, protein, stress, abiotic, electrophoretic.*

Changes in rhizome reserves composition during 4 different stages of plant development in Curcuma caesia

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Abstract

Curcuma caesia commonly known as black turmeric is a wild species of the family

Zingiberaceae.Curcuma is one of the largest genera in Zingiberaceae which has around 80 species. The materials were collected from hilly tract of Kalimpong district small village Pedong from local people, the harvested rhizomes were carefully washed with clean water. It was then peeled, steamed for 10 minutes to remove the raw odour. Little is known concerning the changes in biochemical accumulation during dormancy, sprouting, maturation and flowering in turmeric rhizomes. Therefore, the objective of this study is to find out the optimum stage of plant growth for maximum nutraceutical content in the rhizome reserve composition of Curcuma caesia.The data reveals the maximum length of rhizome (5.63cm)was recorded in Sprouting stage,and a closer view of data exhibit that the minimum (4.13 cm) in flowering stage. However maximum diameter of rhizomes (3.68 cm) was observed in Sprouting stage, and minimum (2.24 cm) in flowering stage. Among the various developmental stages of rhizomes there wasn't much statistically difference in their weight. The maximum weight was found in (176.34 mg) whereas least (96.85 mg) was noted in flowering stage respectively. There wasn't a significant change in the harvest index during different developmental stages of rhizome. However, the highest (45.24 %) was found in flowering stage and the lowest (40.13 %) was recorded in Sprouting stage.It can be concluded that among different developmental stages of Curcuma caesia rhizome reserve studied, active growth stage recorded overall maximum nutraceutical constituents i.e. total reducing sugar (2.78 mg/g $^{-1}$ f. wt.) and non reducing sugars (4.01 mg/g $^{-1}$ f. wt.), ascorbic acid (5.80 mg/g $^{-1}$ f. wt.), total phenols (5.80 mg/g $^{-1}$ f. wt.), protein (4.06 mg/g $^{-1}$ f. wt.), starch (4.16%) and curcumin content (4.96 %).

Key words: Curcuma caesia, rhizomes, Sprouting stage, nutraceutical, curcumin

Performance Of Twenty-Three Genotypes in Tomato (Solanum Lycopersicum L.) Germplasm

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Abstract

The field experiment was conducted at P.G Research Farm, College of Horticulture, Sri Konda Laxman Telangana State Horticultural University, Rajendranagar, Hyderabad during kharif, 2018. Twenty three genotypes were evaluated with three replications for fifteen yield and yield attributing characters, which are diverse in origin. The study analysis and variance that there was significant difference between genotypes indicating presence of sufficient variability in all 15 characters studied.Wide range of variability was observed for average fruit weight (1236.05) followed by plant height (776.81) and number of fruits per plant (360.07) indicating the scope for selection of initial breeding material for further improvement.On the basis of mean performance, five genotypes for fruit yield viz., EC-620382 (2.39 kg), EC-620428 (2.30 kg), EC-620463 (2.26 kg), EC-620427 (2.25 kg) and EC-631379 (2.20 kg), may be released as pureline or inbreeding programme after testing their stability over location and years for commercial cultivation.The genotypes with superior quality traits viz., EC-620428 for ascorbic acid(36.25

mg/100gm),EC-631379for TSS (7.47 0Brix),EC-620422 for beta-carotene (2.16mg/100gm)andEC-615055 for lycopene (3.98mg/100gm) can be included in pedigree selection for further improvement.

Keywords: *Tomato,Solanum lycopersicum, yield, yield attributes*

Effect of Foliar Nutrients for enhancing productivity in Bt. Cotton under rainfed conditions

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Abstract

Cotton (Gossypium spp.) popularly known as "the white gold" is an important commercial fiber crop grown under divers agro-climatic conditions around the world. It provides fiber and raw material for textile industry along with cotton seed and plays a vital role in economy of the country. The role of different nutrients in plant tolerance to drought stress is significant because they regulate multitude of metabolic processes. The present study was conducted at Agricultural Research Station, Dharwad farm during the year 2019-20, 2020-21 to investigate the influence of foliar application of different Nutrients on morpho-physiological parameters for enhancing the productivity in Cotton under rainfed condition. The experiment consisted of eight treatments applied which were 2% urea, 2% KNO3, 1% Thiourea, Salicylic acid @ 50ppm, Glycine Betaine @ 100ppm, Salicylic acid @100ppm and PPFM 1%. Among all the treatments, foliar application of KNO3 at weekly interval of four sprays after 50% flowering recorded significantly highest plant height, monopodia, sympodia, number of bolls per plant, total dry matter production and boll weight per plant under rainfed condition. Also, 2% KNO3 application recorded highestPhotosynthetic rate (28.5 µ mol CO2m2S-1), compared to control (25.9µ mol CO2m2 S-1) and seed cotton yield (2210kg/ha)as compared to other treatments and control (1920.1 Kg/ha) and it was on par with Glycine Betaine @ 100 ppm single spray at 50% flowering (2005.7 Kg/ha).

Prevalence of Pink Canker (Corticiumsalmonicolor) of Apple in Himachal Pradesh

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Abstract

Pink canker disease is sometimes known as twig or limb blight canker and die back. Pink canker, caused by Corticiumsalmonicolor, is among the most prominent apple diseases, leading to substantial productivity losses. Enormity of pink canker in different locations i.e., Sirmaur, Kullu, Mandi, Kinnaur and Shimla district of Himachal Pradesh, located at different altitudes ranging between 900-2500 m above mean sea level (a.m.s.l.), were carried out during normal canker development period i.e., June to December during two consecutive years 2017 and 2018. It was evident that disease was widespread in

Sirmaur, Kullu, Mandi, Kinnaur and Shimla district of Himachal Pradesh and was more prevalent and occurred frequently in almost all apple growing areas surveyed. The incidence of pink cankerwas maximum (60.87%) in Rajgarh of Sirmaur district followed by Kotkhai of Shimla district (55.92%),whereas it was minimum at Bhavanagar (6.34%) followed by Sharbo (7.99%) in district Kinnaur. Per cent disease index (PDI) of pink canker was maximum at Rajgarh (36.34%) followed by Charna (29.16%) of Sirmaur district, while minimum percent disease index was at Purbani (1.19%) followed by Bhavangar (1.34%) in Kinnaur district. The percent disease index of pink canker ranged from 1.19 to 36.34 per cent during 2017-18 crop seasons.

Keywords: *Pink Canker, Apple, Himachal Pradesh, Disease Incidence, Percent Disease Index.*

Effect Of Organic Inputs on Seed Production of Radish

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Abstract

A three year field experiment was conducted to evaluate the effect of different organic inputs on seed production of radish cv. Chinese Pink at Vegetable Research Farm, Department of Vegetable Science, Dr. Y S Parmar University of Horticulture and Forestry, Nauni, Solan, Himachal Pradesh during the Kharif season of 2019, 2020 and 2021. The experiment consisted of seven treatments with three replications and was laid out in Randomized Block Design. The treatments were T1: Control, T2: FYM @ 20 t/ha, T3: Vermicompost @ 8 t/ha, T4: FYM @ 10 t/ha + vermicompost @ 4 t/ha, T5: FYM @ 20 t/ha + Vermiwash @ 1:1 (v/v - water+vermiwash) spray, T6: Vermicompost @ 8 t/ha + Vermiwash @ 1:1 (v/v - water+vermiwash) spray, T7: FYM @ 10 t/ha + Vermicompost @ 4 t/ha + Vermiwash @ 1:1 (v/v - water+vermiwash) spray. Pooled data of three consecutive years revealed that application of FYM @ 10 t/ha + Vermicompost @ 4 t/ha + Vermiwash @ 1:1 (v/v - water+vermiwash) spray (T7) registered maximum plant height (127.30 cm), more number of pods per plant (690.57), more seed yield/plant (30.35 g) and seed yield (5.93 q/ha). This treatment also resulted in maximum 1000 seed weight (11.83), germination (94.77 %) and seed vigour index-I & II (2,420.51& 669.33) along with highest net returns (Rs 458135.70/ha) with benefit cost ratio (3.40).

Study on constraints facedby farmers in watershed and non-watershed areas of Bundelkhand region in Central India

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Abstract

In India, the conservation programs for natural resources like, soil, water, vegetation and live-stock on the basis of watershed is being implemented throughout the countryto serve the primary production systems. Although watershed has been in existence since long time, it became popular in eighties when large number of model watersheds under the aegis of National Watershed Programme were launched in the country. The study was an endeavor to investigate the important aspects of communication behavior i.e. sources and channels of communication utilized by farmers and constraints faced by them. The findings of this study had provided the necessary guiding insights for developing the need based communication strategy for other parts of the country with similar situation and commitments. Hence, the study was conducted in ORP watersheds, namely, Sheetalpur in Hamirpur, Tejpura in Jhansi &Bajni in Datia districts of Bundelkhand region in central India. The data collected from 150 farmers resulted that the major sources of communication utilized by the farmers in watershed areas were agricultural scientist (76%) followed by soil conservation officer (68%), agricultural officers-Bank (42%), animal husbandry officers (39%), progressive farmers (32%) and sarpanch (29%), and whereas in non-watershed area major sources of communication were sarpanch (53%), progressive farmers (46%), soil conservation officer (19%), animal husbandry officer (17%) and agricultural officer - Bank (16%). Similarly, major channels of communication in watershed areas were training (82%), radio (68%), demonstration (62%),T.V. (59%), meeting (36%), panchayat (34%) and Gossip group (19%) whereas in non-watershed areas major channels of communications were gossip group (65%), panchayat (63%), radio (49%), meeting (32%), demonstrations (26%) and training (16%). Further, the mean scores of communication behavior of overall farmers of watershed and non-watershed areas were worked out in view of the recommended soil and water conservation practices. The mean scores of information receiving behavior, information use behavior and communication behavior of farmers of watershed areas were higher than the corresponding mean scores of non-watershed areas. This indicates that the farmers of watershed areas had better communication behavior towards recommended soil and water conservation practices than non-watershed areas. The major constraints faced by the farmers in adoption of suitable soil and water conservation technology are high cost of technology (52%), low benefit at initial stage of adoption (46%), finance (42%) and training (37%) which needs to be taken care of. Therefore, it is recommended that the technologies and facilities available to the farmers of watershed areas should also be provided to the farmers of non-watershed areas for sustainable production and productivity in the region.

Keywords: *Communication, behavior, watershed, constraint, resource, Bundelkhand*

Performance of rabi maize (Zea mays L.) as influenced by date of sowing

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Abstract

Rabi maize is now gaining popularity in the northern part of West Bengal due to its high yield potentiality and economic sustainability. Present investigation was conducted during 2019-20 and 2020-21 at the

instructional farm of Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal, to find out best suitable sowing window of rabi maize after harvesting of kharif rice for maximum yield. The experiment was arranged out in randomized block design with three replications having 7 different dates of sowing viz. D1=1stNovember, D2=8thNovember, D3=15thNovember, D4=22ndNovember, D5=29th November, D6=6thDecember and D7=13thDecember and replicated thrice. Maize variety DKC 9081 was used in the trial and sown with a spacing of 60 X 30 cm. Results revealed that 1stNovember sown (D1) crop recorded highest germination (93.29 %) which was closely followed by 8thNovember sown (D2) crop and thereafter there was a declining trend of germination irrespective of sowing dates and year of experimentation. On an average variety took 153 to 159.50 days to mature. Maturity was delayed by 1 to 6 days with the dates of sowing. 8thNovember sown (D1) crop mature 6.5 days earlier as compared to 13th December sown crop (D7). Dates of sowing had pronounced effect on yield attributes of maize and recorded highest values of cob length (22.12 & 21.73 cm), cob diameter (19.56 & 18.57 cm), no. of rows cob-1 (17.07 & 17.43), number of grains row-1 (42.93 & 42.60) and seed index (40.08 & 44.60 g) whenever sown in 15thof November (D3), which ultimately leads to higher grain (12.59 & 13.84 t ha-1) of maize during both the years of investigation followed by D5, D4 and D6.

Keywords: *Germination, Maize, Maturity, Sowing date and Yield*

Utilization of biochar for carbon sequestration and farm waste management

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Abstract

The main challenge facing the future of agricultural production is to produce almost 50% more food upto 2030, and double the production by 2050. Enhanced soil productivity, management of agricultural waste and assured sustainability are the major concerns to feed the increasing population of the world. Agriculture contributes to over 20 percent of global anthropogenic greenhouse gas emissions. The change in temperature and rainfall patterns is also affecting organic matter content, functional ability of soil and the populations of soil organisms. Agricultural soil is dynamic biological system that stores and releases greenhouse gases which makes soils an important source of greenhouse gases but also a potential sink if managed properly. Management of crop residues in fields after harvesting of crops is emerging concern which calls for attention of researchers for efficient crop residue management. In India, about 93 million tonnes of crop residues are burned each year primarily to clear the fields in the form of straw and stubble after the harvest of preceding crop. One of the approaches for efficient utilization of biomass involves carbonization of biomass to highly stable carbon compound known as biochar and its utilization as a soil amendment. Biochar is the product of thermal degradation of organic materials in the absence of air (pyrolysis), and is distinguished from charcoal by its peculiar characteristics as a soil amendment. Biochar, a porous material, can help retain water and nutrients in the soil for the plants to take up as they grow. Biochar not only offers a lot of environmental solutions, it can also provide the farmer and rural communities with a host of benefits in the form of improved soil quality;

greater crop yields; higher fertilization efficiency; reduce contamination of groundwater from herbicides and other pollutants; and potential ability to sell carbon credits and offsets in emerging carbon markets.

Key words: *Crop residue management, biochar, carbon sequestration*

Indigenous Technical Knowledge (ITK) practices against Scirtothrips dorsalis Hood and Myzus persicae Sulz infesting chilli

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Abstract

An experiment was conducted to evaluate the efficacy of different Indigenous Technical Knowledge (ITK) practices along with one insecticidal treatment against chilli thrips (Scirtothrips dorsalis Hood) and aphid (Myzus persicae Sulz) during rabi season of 2014-2015 at District Seed Farm, A/B block, B.C.K.V., Kalyani, West Bengal. All the treatments were effective in reducing the population of aphid and thrips except the untreated control (UTC) plots. Among the ITK practices, 3 % NSKE and 3 % Panchagavya solution recorded the lowest mean number of aphids (1.91 & 2.30/ leaf respectively) and thrips (1.38 & 1.55/leaf respectively). The mean population of aphid in the remaining ITK practices ranged between 2.89 to 4.05/leaf while that of thrips ranged between 2.04 to 2.37/leaf. However, imidacloprid 17.8% SL @ 0.3 ml/ litre of water performed the best in comparison to ITK practices and recorded lowest mean number of aphids/leaf (1.28) and thrips/leaf (0.45) respectively. Different ITK practices contributed to the tune of 73.19 to 87.14 % reduction over control in aphid population, while that for thrips population ranged between 60.11 to 77.28 %. In comparison, imidacloprid 17.8% SL recorded the highest % reduction in the population of both aphids (91.16) and thrips (92.25).

Keywords: *Indigenous Technical Knowledge (ITK), chilli, Scirtothrips dorsalis Hood, Myzus persicae Sulz., NSKE, Panchagavya.*

Development of microbial consortium from microbes isolated from cow products based bio-formulations

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Abstract

Vrikshayurveda, was composed between 6,000 BC, is a testimony of importance of cow in agriculture.

Several formulations (viz; Panchagavya, Amritpani, Cow pat pit, BD-500, BD-502, jeevamrita, Beejamrita, Biodynamic liquid pesticide) prepared with cow products are being used in agriculture for improving soil fertility, productivity, produce quality and insect pest management. After closely working with these formulations over two decades, microbial and nutritional analysis and field application confirmed that these are cheap, rich source of agriculturally important microbes' nutrients and can be used in organic production of various crops.Based on enumeration of microbial population on different selective media, the isolated colonies in different media were streaked on fresh agar plates for further screening. All isolated bacteria are tested for PGP properties, among all bacteria test isolates V10, V11, V12 and P8 observed highly positive for Zn solubilization while for P- solubilization test isolates V10, V11, V12 and P8 showed very good results. In the case of siderophore production total 9 isolates (V11, V12 and P8) showed positive results as compare to other test isolates. All isolated bacteria are tested for PGP properties, among all bacteria test isolates V10, V11, V12 and P8 observed highly positive for Zn solubilization while for P- solubilization test isolates V10, V11, V12 and P8 showed very good results. In the case of siderophore production total 9 isolates (V11, V12 and P8) showed positive results as compare to other test isolates. These three bacteria were selected for development of microbial consortium and consortium is named as CISH-bioenhancer. CISH Bio-enhancer is effective product of beneficial microbes isolated from popular bio formulations like panchagavya and vermiwash. It is very useful for seed/seedling treatment, fortification of compost, nutrients, growth and stress management in horticultural and other crops as evident/assessed in field trails. These microbes produce IAA, ammonia, HCN, siderophores and solubilize P and Zn. Its validation at farmers' fields showed significant increase in yield of wheat (66.67%), water melon (17.65%) and musk melon (25%).

Key Words: *Panchagavya, Amritpani, Cow pat pit, Bio-enhancer, Siderophore, Consortium*

Therapeutic Potential of Essential Oils against Cytokine Storm and COVID-19

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Abstract

Coronavirus has caused a global health threat. Unfortunately, there are very limited approved drugs available with established efficacy against the SARs-CoV-2.Airborne pathogenic bacteria, fungi and viruses pave way for respiratory illness. Predominant infectious diseases transmitted by airborne pathogens are COVID-19, Common cold, Influenza, Whooping cough, Chicken pox, Mumps, measles, TB and Diphtheria. Man being a social animal can't refuse the inevitable needs like the social interaction or could not avoid stepping out of home for education, learning, and work place. Essential oils are mainly applied through inhalation or through ingestion. The essential oils are mixture of many organic compounds. Their biological activity and fragrance are governed by the chemical composition.Essential oils are known to have anti-inflammatory, immunomodulatory, bronchodilatory, and antiviral properties and are being proposed to have activity against SARC-CoV-2 virus. Inhalation of essential oil is effective at relaxation and stress relief, mood enhancement, relief of minor discomforts. They boost the immune, respiratory and circulatory systems. At present, only computer-aided docking and few in vitro studies are available which show anti-SARC-CoV-2 activities of essential oils. This paper will brief, review the role of essential oil in the treatment of cytokine storm and COVID-19.

Keywords: *Anti-inflammatory, Bronchodilatory, Docking SARC-CoV-2,Immunomodulation*

Isolation of Plant Growth Promoting Rhizobacteria and their Delivery through Bioplymer Matrix

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Abstract

Nitrogen is an important mineral nutrientessential for plantgrowth, developmentandmany physiological process and metabolism. Nitrogen fixation in soil is important forsustainable agricultural productivity. Nitrogen fixing bacteria, reduce the dependence of plants on synthetic nitrogen-based fertilizers. Symbiotic relationship between leguminous plants and nitrogen fixing bacteria in the root system fix nitrogen demand of the plant. Biogeochemical cycles mediated by the rhizobiome enrich the soil with biological and nutrient fertility in the soil. The shelf life of plant growth promoting bacteria in the conventional carriers like talc, peat mass etc is less. The establishment of PGPR in the rhizosphere is also limited by the less viable bacteria in the carrier. Hence the present work was aimed to isolate PGPR from the rhizosphere soil of Arachishypogaeaand to deliver them to field using biopolymer carriers. PGPR were isolated from the rhizosphere soil by serial dilution and pure culture techniquesin Jensen's Medium. The bacteria were characterized by staining andbiochemical test for using carbon and other metabolites. The growth rate of the isolated PGPR in biopolymer matrix with different proportion of biopolymers were examined. Different bacteria were isolated from the rhizosphere soil and the root nodules of Arachis hypogaeaThe growth rate of the pure culture and the mixed culture in different biopolymer matrix was higher than the control carrier.

Key words: *Biopolymers, legumes, PGPR, rhizobiome, Soil fertility*

Sleep Induction by Natural Neurocosmetic Nanocream

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Abstract

Sound sleep is an essential part of integral well being of human being.The recommended sleeping time is 7-8 h/ day and 10h/ day for adults and children respectively.Lack of sleep for prolonged time leads to the early development of chronic disorders. 37.5 % of Asians suffer from insomnia. About 20-30% of general population in India suffers from various types of sleep disorders.Intake of sleeping pills and cognitive behavioral therapy are the current treatment strategies followed for insomnia. Sleeping pills are induce addiction and dependence.. The present work was aimed to formulate a natural neurocosmeticnanocreamcontaining phytoactive compounds. The nanocream was characterized by TEM, FTIR and GCMS to ascertain the nanosize and the compounds present in the cream. The effectiveness of the cream in inducing sleep was assessed in human volunteers of age varying between 25 and 80. TEM attests the nano size of the emulsion. Fourier Transformed Infrared Spectroscopy (FTIR) confirms the presence of functional groups present in the natural sedative compounds. Gas

Chromatography-Mass Spectrum (GC-MS) shows the presence of phytoactive compounds. Molecular docking studies revealed the positive modulatory effect of phytoactive compounds on GABA receptors. The compounds facilitate the opening of chloride ion channel and induce sleep by natural means. 99 % of the test and control groups experienced the sedative effect of Nano Emulsion Cream. 96 % of people slept within 30 minutes of application. 3% of people slept within 40 minutes of application. The study demonstrated the efficiency of natural nanocream in inducing sleep.

Key words: *Circadian rhythm, GABA receptor, diazepam, insomnia, neurocosmetics, phytoactive compounds.*

Preparation and Evaluation of Fermented Functional Noodles from Black Rice

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Abstract

Diabetes is one of the major chronic diseases prevailing around the world especially in India and China. The percentage of pre-diabetic peoplehas increased significantly in COVID era. White rice has a high glycemic index of 80-89. Consumption of white rice as a staple food, changing food habits to junk foods rich in fats and high calories and sedentary life style with minimum or no physical work is the major reason behind the alarming increase in diabetes mellitus.Black rice which is considered to be the Forbidden Rice is the richest source of anthocyanin and other phytoactive compounds that serves as inhibitor of amylase and glucosidase.Black rice has a glycemic index of 40-50with 68.23% more protein, 87.75% more fiber, 65.71% more iron, 99.20% more tocopherol, 60.39% more zinc than white rice.Noodles are the favorite food for many children and adolescents which drives the great growth in noodles market. The present work was aimed to prepare noodles using fermented black rice. Noodles were prepared from fermented black rice with different concentration of protein source. Fermentation of black ricenoodles showed reduced glycemic index than white rice. It showed increased bioavailability of amino acids, Fe, Zn, prebiotics, probioticsand antioxidants.

Key words: *Anthocyanin, antioxidant, black rice, glycemic index, minerals, proteins*

Survey on Insect Pests of Yard Long Bean (Vigna Unguiculata Subsp. Sesquipedalis L.) in Major Growing Areas of Southern Karnataka.

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Abstract

The roving survey was conducted a on yard long bean in different growing regions of southern karnataka, India viz., Shivamogga, Badravati, Shikaripur and Udupi districts during July 2018 to February 2019 to

study the pest incidence and their level of infestation on yard long bean. During the survey eleven pest species of insects were recorded viz., aphids, pod borers, thrips, red spider mite, leaf miner, leaf beetle, pod bug, green sting-bug, hairy caterpillar, pulse beetle and semi looper were the main damaging pest in descending order. It was revealed that aphids and pod borers were the major insect pests in the study areas. They were found to severely infest in yard-long beans. And natural enemies like Chrysoperla zastrowi, Spiders and Coccinellids like, Coccinella transversalis (Fab.) and Cheilomenes sexmaculata (Fabricius) were recorded during survey. The peak population of insect pests and natural enemies were noticed during Kharif than in Rabi.

Keywords: *Yard long bean, Insect pest, Roving survey, Natural enemies and Seasons.*

Influence of liquid organic manures on growth and yield of V-1 mulberry (Morus alba)

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Abstract

A field experiment was conducted to study the influence of liquid organic manures on growth and yield parameters of V-1 mulberry planted at 90+150 × 60 cm spacing at department of sericulture during 2020-21. The results revealed that soil application of bio digested liquid organic manure equivalent to 150 % N ha-1 (T9) increased the mulberry yield attributing parameters viz., plant height (138.48 cm), number of shoots per plant (25.00), number of leaves per plant (330.53), leaf area (165.20 cm2) and leaf yield (826.66 g/plant) compared to control. Non-significant difference was observed with respect to internodal length of mulberry and lower leaf dry matter content was also recorded in the mulberry plot applied with bio digested liquid organic manure equivalent to 150 % N ha-1 (T9).

Keywords: *Mulberry, jeevamrutha, amritpani, bio digested, growth and yield*

Costs and returns of soil application of liquid organic manures to mulberry garden and cocoon production of PM x CSR2 and FC1 x FC2 silkworm breeds

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Abstract

The study was carried out during the year 2020-21 under irrigated condition at Department of Sericulture, UAS, GKVK, Bengaluru to work out the cost and income generated in mulberry and cocoon production as influenced by soil application of liquid organic manures to mulberry garden. The unit cost of mulberry

production was lower in control (100 % RDF) compared to liquid organic manures. Whereas, gross returns and net returns were higher in treatment T9 (bio digested liquid organic manure equivalent to 150 % N ha-1) from both cross breed and double hybrid silkworm breeds. Higher B:C ratio of 2.65 and 3.35 was recorded in the treatment bio digested liquid organic manure equivalent to 150 % N ha-1 (T9) compared to control (2.5 and 3.31), respectively in cocoon production of cross breed and double hybrid silkworm breeds.

Keywords: *Mulberry, jeevamrutha, amritpani, bio digested, costs, returns, cocoon production*

Study the performance of wedge grafting in Indian jujube under different growing conditions

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Abstract

The experiment was conducted at the experimental orchard and in the polyhouse of the Department of Horticulture, CCS HAU, Hisar during the year 2019-20 to find the effect of grafting time and growing conditions on ber cultivars Gola and Umran. Among different time of grafting operation.The minimum number of days taken to sprouting was recorded during 4th week of February which was followed by 1st week of March under polyhouse condition in cv. Gola. The graft success was recorded highest under polyhouse condition when grafting was performed during 3rd week of February which was followed by 2nd and 4th week of February and in open field during 4th week of February in cv. Umran. The growth parameters i.e., shoot length, shoot diameter and number of leaves were recorded significantly higher when grafting was performed during 4th week of February under open field condition in cv. Gola. The study delves that the performance of wedge grafting in Indian jujube best resulted showed during 3rd week of February under polyhouse condition and 4th week of February under open field condition in cv. Umranand Gola cultivars.

Keywords: *Wedge grafting, environmental conditions, Gola, Umran, propagation*

Evaluation of different Guava (Psidium guajava L.) Varieties for Genetic, Biochemical and Morphological Variation Under Semi-Arid Region of Haryana

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Abstract

Guava is an important fruit crop of tropical and sub-tropical area and belongs to Myrtaceae family. In

this experiment fifteen varieties of Guava were selected for the analysis of variability in growth, fruit, qualitative traits and genetic variation. Results showed that the significant variation in morphological and biochemical parameters among different varieties. Most of the varieties had round type of fruit shape, smooth surface of fruit, yellowish green fruit skin colour and creamy-white color of fruit pulp. The maximum fruit length was found in KG Guava and minimum in Lalit in both the seasons. The fruits diameter and weight were maximum in KG Guava and minimum in Allahabad Safeda in both rainy and winter seasons. TSS and TSS-acidity ratio had maximum in Hisar Safeda and minimum in Arka kiran in both season. Hisar Safeda had minimum titratable acidity and maximum in Arka kiran in both season. L-49 had maximum ascorbic acid and Aishwarya had a minimum in both rainy and winter seasons. In molecular characterization, out of 40 primers, 35 amplified primers showed the polymorphism among selected guava varieties. Diversity analysis detected a total of 117 alleles ranging from 2 to 7 alleles with an average of 3.34 per locus. The polymorphic information content had an average value of 0.59 across all 15 varieties with the range of 0.08 in mPgCIR251 to 0.84 in mPgCIR255. The primer mPgCIR236 can be used to distinguish Pant Red from other varieties. Clustering of varieties distinctly separated into two major groups and PCA (2D and 3D) further showing results according to the clustering in Dendrogram. In population structure analysis all the varieties were grouped into two populations and all were categorized as pure population. So that this work can help in further breeding program in selection of particular trait or varieties.

Species specific short mitochondrial primer for Brown planthopper, Nilaparvatalugens

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Abstract

Brown planthopper (BPH), Nilaparvatalugens (Stål.) is the most destructive sucking insect pest of rice. As this pest has been known to increase its geographical range and is even continuing to do so due to climate change. Its, difficult to identify when other plant hoppers complex infesting rice together. Its correct identification at an early stagy is paramount for biosecurity and effective management. Therefore, in this study we have developed a mitochondrial cytochrome oxidase I (COI) based marker short marker(NL1F and NL1R) for its easy detection using Polymerase Chain Reaction (PCR). The marker was developed based on nucleotide differences in COI gene in Primer3Plus. The designed primer was cross checked with four other species and in BPH collected from different locations of India. The sensitivity of the primer was also checked using DNA at a concentration of 100, 50, 30, 10, 1 and 0.1 ng/µl. This study will help in a rapid and easy identification of BPH for its early management.

Keywords: *Brown planthopper, Species-Specific Markers, Species identification, Polymerase Chain Reaction, mitochondrial cytochrome oxidase I (COI)*

Study on livelihood assessment analysis in Jammu region

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Abstract

The study was conducted to identify the present status of existing practices and its impacts on farmer's livelihood in comparison to organic, inorganic and integrated farming. Following three stage sampling procedure, a total of 120 farmers (40 organic, farming, 40 inorganic and 40 integrated farming) were selected from the study area of Jammu district on the basis of having interventions from the different SKUATS institutes. Descriptive statistics were derived and calculated for analyzing the socio-economic data. Propensity score matching (PSM) was applied with kernel matching and radius matching methods to assess the impact of organic, inorganic and integrated farming on farmer's employment creation andincome generation. The result of baseline survey showed that out of 12 sample farmers: less than 0.02 ha of cultivated land are landless (15%), marginal (18%) small (44%) medium (14%) and large (09%) were present. The highest employment duration for male was 152.5 man days/year for farming system C-L-P-H under integrated farms and for organic and inorganic it was 125.5 and 104.5 man days /years respectively. The higher returns from the cropping system pulse-mustard-wheat with B:C ratio 2.03 and rice-maize-vegetable id 1.97. Averagecalorie intake of food secure households was 2910kcal, 2793 kcal and 2854 kcal for integrated and mixed farming. To assess the livelihood pattern through asset pentagon approach, net worthy improvement was found based on different capitals of farm households practicing integrated farming in comparison to organic and inorganic farming. Finally based on different problems a constraints facing index was calculated in order to suggest policy recommendation.

Keyword: *livelihood of farmer, employment, income, integrated farming, PSM.*

Effect of different spacing of eucalypts (Eucalyptus teriticornis) based agroforestry system on performance of agricultural crops

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Abstract

The shrinkage of land is a big problem in the present time and to harvest the full opportunity of the land under different agroforestry system seems to be one the solution to the spatial and temporal arrangement of the different crops. The field experiment based on agroforestry system was conducted to find out the

suitable crop combinations for rabi seasonand its economicsat Farm Forestry, CCSHAU, Hisar, in which, eucalypts(P-23) planted in October 2018was taken as forest tree with spacing:6x3, 7x3, 8x3, 9x3m and Rabi crops viz. Wheat (HD-2967), Barley(BH -393), Mustard (RH-30) as agricultural crops. The edaphic factorslikepH (7.92-8.02),EC1:2 (1.7-2.1dS/m),OC (0.30-0.39%) of the field with different spacing were inclined to salinity, However,Minimum grain yield reduction(11.34%) was observed in barley at eucalypts spacing 9x3m followed by 8x3m as compared to sole crop. In addition to this mustardcrop wasfound suitable under eucalypts based agroforestry system in 9x3m spacing. Maximum B: C ratio was obtained with eucalypts + mustard agroforestry system under two spacing 8x3m and 9x3 m i.e., 1.66 and1.67, respectively.

Keywords: *Edaphic conditions, Eucalyptus, Organic Carbon, rabicrops and spacing*

Pest Disease Management in Sesamum Through Organic Methods Under Cluster Frontline Demonstration on Oil Seeds in West Godavari District Of Andhra Pradesh

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Abstract

Organic farming has significantly increased in importance in recent decades.Organic farming is an agricultural system which deliberately renounces the use of synthetic and dangerous inputs. They usually include high risks long term contamination of land and water resources and intoxication risks for farmers and farm families.Organic farmers try to avoid direct and potentially harmful control measures.Kvkvenkataramannagudem has conducted cluster frontline demonstration of oilseeds on sesamum crop from last 5 years. During the year 2021-22improved sesamum seed YLM 66 and along with improved organic package of practices were demonstrated to 75 organic farmers. They belong to singarajupalem, pullalapadu and marlamudi villages in west Godavari district. Sesamum is one of the oldest oilseeds crop it is well adapted to harsh environment and constitute an alternative cash crop for small farmers. Farmers were adopted organic pest and disease management practices in sesamum, from sowing to harvesting stage. sesamum seed is treated with raw cowmilk this was helpful against the seed borne pathogens and also protect the crop up to 20DAS from viral diseases. Before sesamum they grown navadanyalu and incorporated them into soils at 45 DAS.last ploughing farmers add nearly 5-6 tons of ghanajeevamrutham,2kgs of biofertilizers and 1kg of trichoderma& pseudomonas consortia to soils which are very helpful for controlling the soil borne pathogens.panchagavya along with jeevamrutham was used as plant growth promoting purpose and this one sprayed at an interval of 10 days at every 20DAS. Major pest and diseases like leaf webber,leaf hopper,phllody,sucking pest,dry root rot and alternaria blight were effectively controlled by spraying of agniastram along with neem

cake at 40 & 65 DAS. Adoption of these practices farmers got an average yield of 3 quintals/acre with a gross income 30000 rupees/ac and average cost of cultivation for one acre is 4850 rupees only.

***Key words**: sesamum, organic farming, yield, gross income, pest and diseases*

Using soil Conditioners For in-situ Moisture Conservation in Subtropic Inceptisols Under Rainfed Conditions

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Abstract

Dryland soils are generally light in texture, low in organic matter and soil moisture retentive capacity. Frequent and prolonged dry spells adversely affects the crop growth to such an extent that the yield of main kharif cereal crop maize is lower than national average. A study was conducted to determine the efficient use of biochar and polymers on crop growth and soil moisture conservation in maize under rainfed conditions. A pot experiment was conducted with treatmentscomprising unfertilized control, 100% RDF (NPK), biochar (5 and 10 t/ha), polyacrylamide PAM (10 and 20 kg/ha), Pusahydorgel (2.5 and 5 kg/ha) and their combinations replicated thrice in factorial CRD. The results revealed that incorporation of biochar and polymers (PAM and Pusa hydrogel) significantly improved the soil moisture compared to the application of 100% RDF and control. In comparison to 100% RDF and control, the soil moisture content was maximum 1.66 and 1.82 times in PAM20, respectively which was statistically at par with combined application of biochar and polymer (B10PAM10).Among the treatments, combined application of B10PAM10 significantly influenced the crop growth and obtained highest plant height and plant biomass. The study concluded that using soil conditioners could be an effective strategy for in-situ moisture conservation and offsetting detrimental effect of dry spells in lesser endowed soils under rainfed conditions.

***Keywords:** maize, biochar, polymer, rainfed, moisture conservation*

Effect of Feeding Graded Level of Dried Cauliflower Leaves Powder (CLP) On Blood Biochemical and Enzymatic profile of growing kids

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Abstract

The aim of this study was to investigate the effect of feedingconcentrate mixture containing dried

cauliflower leaf meal on theblood biochemical, enzymatic and antioxidant profile of growing kids. Total fifteen male kids with average equal body weight were randomly divided into three groups with five kids in each group. First group was fed with control feed, second and third group were fed with 20% and 30 % CLP in concentrate feed respectively. The duration of experiment was 120 days. To correlate the results of nutritional findings, periodic monitoring of blood parameters was carried out. Blood was collected at 0, 90 and 120 days of experimental feeding trial by jugular vein puncture in the morning (before feeding).Dietary supplementation influenced the blood biochemical, enzymatic and antioxidant profile of growing kids showed non- significant difference in case of haematological parameter, In case of Blood biochemical parameter, TP showed significant difference in treatment group as compare to control group. Glucose, Cholesterol and Urea N value improved in treatment group. T3, T4 and TSH showed non-significant difference. The findings of this study showed that a CLP-enriched diet is a viable strategy for improving the glucose level and showed antidiabetic effect and lowered serum cholesterol level in dried cauliflower leaf meal supplemented group.

Keywords: *CLP, Kids, Biochemical and Enzymatic*

Effect of Feeding Cauliflower Leaf Powder (CLP)-enriched Diet on the Carcass and Meat Quality of Rabbit

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Abstract

The aim of this study was to investigate the effect of a cauliflower leaf powder (CLP)-enriched diet on the carcass and meat quality of rabbit meat. Total eighteen male rabbits weaned at 45 days of age with average equal body weight were randomly divided into three groups with six rabbits in each group. First group was fed with control feed, second and third group were fed with 20% and 30 % CLP in concentrate feed respectively. The duration of experiment was 90 days. Dietary supplementation influenced the meat traits of rabbits: CLP meat showed significantly higher carcass length and meat bone ratio, vitamin A and vitamin E content and Sensory evaluation showed higher acceptability and juiciness in 30 % CLP supplemented group. A significantly lower lightness (L*) and redness (a*) values in 20 % CLP supplemented group. In terms of fatty acid profile, 30% CLP supplementation caused a significant decrease in SFA and increase in PUFA percentage of rabbit intramuscular fat. The statistical analysis also showed a significant effect of dietary fortification on phenolic content. This study highlighted that dietary fortification with CLP is a valid strategy to produce rabbit meat with better technological and functional quality.

Keywords- *Cauliflower, Dressing, Meat, Rabbit, TPC*

Distribution of DTPA -extractable Iron in some soil series of Cooch Behar and effect of Iron on Palak (Beta vulgaris var. bengalensis)

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Abstract

Iron (Fe) is one of the most essential micro nutrients for growth and development of palak the leafy vegetables, which contain higher amount of Fe (iron). It is commonly grown for its tender and soft succulent leaves. Iron is found in food in two forms which are hemi and non-hemi iron, where the hemi iron can provide 40 percent of the iron which is from meat, poultry and fish and the non-hemi iron can provide 60 percent of the iron in animal tissue and all the iron in plants (fruits, vegetables, grains and nuts) causing the meteoroids (hemi/non- hemi) so important in the dietary regulatory.Keeping this in mind the present investigation was conducted with Indian spinach or palak with the following objectives: 1.To delineate the distribution of DTPA - extractable iron (Fe) in some soil series of CoochBehar District in West Bengal. 2. To compare among the different sources of Fe- nutrition to assess the best one in terms of green yieldand uptake of crop.3. To determine the effect of Fe - nutrition on the residual iron status in soil. In order to assess the distribution of DTPA - extractable Fe in soil covering four identified soil series CoochBehar District (Lotafela ,Matiarkuthi, Rajpur and Balarampur soil series) of West Bengal, soil samples were collected with GPS tools and a distribution map of DTPA -Fe was made . The extractable - Fe varied from (23 to 64.9 mgkg-1) in Lotafela series, (10 to 89.4 mgkg-1) in Matiarkuthi series, (25.7 to 109.7 mgkg-1) in Rajpur series, (13.2 to 64.7 mgkg-1) in Balarampur soil series. The soils are acidic in reaction and sandy loam in texture with wide variation in oxidisible organic carbon (6.7 to 9.1 gkg-1) and clay content (10 to 15.9%). The order of DTPA - extractable Iron was Rajpur series> Matiarkuthi > Lotafela >Balarampur series. In another study , a field experiment was conducted with palak (Beta vulgaris var. bengalensis) with different treatment combinations T1(Control)[NPK (Nil) +FYM(Nil)+ Fe fertilizer(Nil)];T2 [NPK+ FYM (Nil)+FeSO4 as soil application] ;T3 [NPK+ FYM(Nil) +Fe-EDTA as soil application];T4 [NPK+ FYM (Nil) + FeSO4 as foliar application] ;T5 [NPK+ FYM (Nil) + Fe-EDTA as foliar application] ;T6 [NPK+ FYM(10 t/ha)+ Fe fertilizer (Nil)]T7[NPK+ FYM (10 t/ha)+ FeSO4 as soil application];T8[NPK+ FYM(10 t/ha) + Fe-EDTA as soil application] ;T9 [NPK+ FYM(10 t/ha) + FeSO4 as foliar application] ;T10 [NPK+ FYM(10 t/ha)+Fe-EDTA as foliar application];T11 [NPK+ FYM(20 t/ha) + Fe fertilizer (Nil)];T12[NPK+ FYM (20 t/ha)+ FeSO4assoilapplication];T13[NPK+FYM(20t/ha)+Fe-EDTAas soil application];T14[NPK+ FYM(20 t/ha)+ FeSO4 as foliar application];T15[NPK+ FYM (20 t/ha) + Fe-EDTA as foliar application] to assess the yield of crop(palak)and uptake of Fe in plants . The maximum yield (tha-1) was obtained (15.3) atT8 over the control T1 (5.3 tha-1) at 42 DAS.The maximum uptake (9.09kgha-1) of Fe was determined in the treatment atT9 at 35DAS. A significant positive correlation was observed betweenthe uptake of Fe and yield of palak at 28DAS (r=0.857**), 35DAS (r= 0.593*) and 42DAS (r=0.585*) while a negative correlation was observed between the residual status of iron in soil and plant uptake in all the stages of cutting (28, 35 and 42 DAS). The mode of application (foliar or soil) of Iron as micronutrient to the crop in association or without FYM (Farm Yard Manure) had significant effect on yield and uptake of the crop. The besttreatment combination was in terms of producing maximum green yield (15.3) (tha-1) of the crop in T8 at 42DAS (3rd cutting).

Deciphering unculturable Microbial diversity of cabbage rhizospheric soil of Singtam (Sikkim) and their characterization

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Diversity of microbial communities is a conscious indicator of soil health and plays a crucial role in maintaining the soil functions and ecosystem services in the rhizosphere. The present study was carried out with an aim to get access the information about microbial diversity of cabbage rhizophere from aorganic vegetable fieldof Singtam, Sikkim.The soil community analysis was done using metagenome sequencing approach.The metagenome was sequenced with the IlluminaHiSeq 2500 platform for paired-end reads. A total 40717 contigs with 584 bp scaffold N50were assembled using Metawrap Assembly pipeline.The total contig length was 24975197 bp and average contig length was 613.38 bp.Atotal32,884 reads were analysed by Kaiju for taxonomic classification and abundance. Out of 32,884 the maximum reads belongs to bacteria i.e32,415 (98.57%), followed by archaea 361 (1.01%), fungi 96 (<1%) and viruses 11. The result uncovered that the dominant phyla wereproteobacteria has 13040 reads (39.65%) followed by terrabacteria 12653 (38.47%) and acidobacteria 2021 (6.14%), which alone constitutes approx 84.26% of total phylum count in sample (SK211). Likewise most hit classes were Actinobacteria 9436 (28.69%) followed by Alphaproteobacteria 6104 (18.56%), Betaproteobacteria 3110 (9.45) and Gammaproteobacteria 2134 (6.489).The most abundant genus in therhizospheric soil were identified as Nitrospira 1150, bradyrhizobium 1035, Solirubrobacterales 904, streptomycetaceae 713 and Nocardioidaceae 218.

Key Words: *microbial diversity, metagenomics, proteobacteria, archaea*

Integrated Nutrient Management In Soybean (Glycine Maxl.)

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Abstract

A field experiment was carried out during kharif 2020 at Instructional Farm of Bidhan Chandra Krishi Viswavidyalaya to studythe effect of INM on growth, yield, nutrient uptake and economics of soybean (var. PS24) with eight treatments viz.T1-100% recommended dose of fertilizer (RDF) (N: P2O5: K2O @ 20:60:40 kg ha-1) (control), T2-75% RDF+1.5 t ha-1 vermicompost, T3-75% RDF+3 t ha-1farmyard manure (FYM), T4-75% RDF+2 t ha-1 yeast vinasse, T5-100% RDF+0.5% ZnSO4 foliar spray, T6-75% RDF+1.5 t ha-1vermicompost+0.5% ZnSO4foliar spray, T7-75% RDF+3 t ha-1 FYM+0.5% ZnSO4 foliar spray and T8-75% RDF+2 t ha-1 yeast vinasse+0.5% ZnSO4 foliar spray replicated thrice in randomized block design. Foliar application of 0.5% ZnSO4 was done twice at 30 and 60 DAS. Results revealed that application of 1.5 t ha-1vermicompost along with 75% RDF and 0.5% foliar application of ZnSO4 (T6) exhibited maximum plant height (66.82 cm), dry matter accumulation (601.37 g m-2),

no. of nodules plant-1 (45.79), no. of pods plant-1 (33.80), 100-seed weight (14.94g), seed yield (2406kg ha-1), stover yield (5049 kg ha-1), nitrogenuptake (163.15kg ha-1) phosphorusuptake (20.63 kg ha-1), net return (Rs. 38940ha-1) and benefit cost ratio (2.12) followed by 75% RDF+2 t ha-1 yeast vinasse+0.5% ZnSO4 foliar spray (T8) which is statistically at par with T6. However, T8 showed the highest dry weight of nodules plant-1 (0.47g) and potassium(119.15 kg ha-1), and zinc (205.19 g ha-1) uptake. The no. of seeds pod-1remained statistically insignificant among the treatments.Therefore, 75% RDF along with 1.5 t ha-1vermicompost and 0.5% ZnSO4 foliar application (T6) can be recommended for profitable production of soybean.

Keywords: *Growth, Integrated nutrient management, Soyabean, Yeast vinasse, Yield, ZnSO4*

Development, Oraganoleptic Evaluation And Nutritional Analysis Of Value Added Maize Chips (nachos) Incorporated With Asparagus Racemosus (Shatavari)

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Abstract

Introduction- Asparagus racemosus is an advantageously authenticated medicinal plant regarded as "rasayana" (plant drugs promoting general wellbeing by increasing cellular vitality and resistance), due to the presence of major bioactive components namely group of steroidal saponin, flavonoids (kaempferol, quercetin, rutin) and polyphenols.The significant properties of Shatavari are anti-oxidant, anti-allergic, anti-inflammatory, anti-protozoal, anti-bacterial, anti-candidal, anti-viral, anti-parasitic, anti-malarial, anti-aflatoxigenic, cytotoxicity(plasmodium falciparum), antipyretic, immunomodulatory, anti-diabetic, diuretic, adaptogenic, antitussive, antidepressant, anti-amnesic, anti-parkinsonian, cerebro-protective, anti-neoplastic, anti-spasmodic, hepatoprotective, anti-lithiatic, cardio-protective, hypolipidemic, prokinetic, fertility activity, anti-ulcerative, antisecretory (gastric HCl), anti-diarrheal, anti-dysenteric, enzyme-inhibitory activity (cholinesterase), Anti-HIV, galactagogue effects, enhance immune responses, anti-arthritic, anti-periodic, anti-abortifacient, and analgesic.

Objectives- The present study aims on incorporating Shatavari as a dietary supplement into maize chips (nachos) to fortify the food product with enriching nutrients for boosting immunity, curing diseases and restoring health, and can further be utilized for areas unexplored .Asparagus racemosus can be proved to have potential to cure diseases.

Methods-Six Products with different concentrations of Shatavari were made (0%, 10% , 20%, 30%, 40%, 50%), 0% concentration being taken as control. All the products were assessed for their organoleptic qualities using hedonic rating scale. Best product was assessed for nutritional properties (Energy, Carb, Protein, Fat)

Results-20% Shatavari incorporated maize chips scored best in the organoleptic evaluation. Nutritional analysis of the same product revealedenergy 350 Kcal/100gm , carbohydrate 80.97gm/100gm, protein

5.94 gm/100gm, fat 0.30 g/100g of the product. Various otherfood product formulations of therapeutic efficacy can be made emphasizing on control and cure of various diseases. Asparagus racemosus is widely used for the treatment of different ailments as it contains various bioactive components.

Conclusion-Bioactive components of Asparagus racemosushave been found effective in management of manifestations of variable ailments. Elaborative comprehensive studies needs to be performed based on therapeutic intervention of Asparagus racemosus and its products.

Keywords- *Asparagus racemosus, value added product development, organoleptic evaluation, nutritional analysis.*

Horticultural Tourism: A tool for strengthening farmers' economy

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Abstract

Key words Horticultural Tourism, Entertainment Farming, Agritourism, hydroponics. soilless gardens

Tourism has since a long period of time been considered as an option to diversify and increase revenue from farms. Stemming from an increasing interest among visitors who desire to experience farm life, agritourism characterises a new tourism product for many developing and developed economies.Horticultural tourism may be seen as a segment within Agritourism.Horti-tourism is a new concept with tremendous opportunities, scope, and challenges. It combines two commercial enterprises, horticulture and tourism, in a single field or location. The most important benefit from it is that it provides a dual advantage of tourism and horticulture to the farmers.Horti-tourism is one of the newest forms of agro-tourism which precisely relates horticultural development with tourism. Horti-tourism is a promising approach that combines horticulture and tourism in a commercial enterprise. This approach is entirely new and gaining momentum. It refers to visiting horticulture farms, i.e., fruit orchards, vegetable gardens, hydroponics, soilless gardens, container gardens vertical gardens or flower gardens, for recreation, research, enjoyment, and/or involvement in cultivation practices like harvesting, planting, and so on . Horti-tourism aims to develop orchards, nurseries, pocket areas, and farms to a new touristic destination with a dual aim of increasing economic benefits from horticulture and tourism from the same work field. Horti-tourism can also be referred to as "Entertainment Farming" which requires strong public relations and skills . This approach arises due to the perception of urban people who get bored with their busy life, city pollution, and stress, and seek peace and enjoyment in a natural greenery environment. Furthermore, horticulture can be an important asset for luring domestic and international tourists subsequently leading to community development and economic upliftment of rural people. Hence Horticultural may valuable tourism concept with proper ecological balance and sustainable development of farming community.

Evaluation of different Root knot nematode management practices under Protected cultivation grown tomato at mid Himalayan region

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Abstract

Root knot nematodes (Meloidogyne incognita; RKN) cause significant damage to polyhouse grown tomato in Himalaya region. Location specific management options are limited. We evaluated the effectiveness of different practices in alone and in combination for management of RKN in mid Himalayan region (Almora). The nematicidal potential of different approaches against the root-knot nematode, Meloidogyne incognita, infecting tomato, was assessed in a polyhouse grown tomato (cultivar: Himsona). Treatment included T1 (Marigold as cover crop), T2 (FYM enriched Trichoderma), T3 (Marigold+Trichoderma in soil and seed), T4 (Carbofuran application @ 1 kg a.i./metre2) and T5 as RKN infested control. The effect of the different treatments on the growth parameters of tomato plants and nematode infection suggest T4 (Carbofuran application @ 1 kg a.i./metre2)followed by T3 (Marigold+Trichoderma in soil and seed) > T2 (FYM enriched Trichoderma) > T1 (Marigold as cover crop) were significantly observed as superior over the untreated control in reducing the root galls, J2 of the nematode in the soil and yield enhancement. Therefore, based on the obtained results these treatments may be recommended for root knot nematode management under protected structures.

Key words: Root knot nematodes (Meloidogyne incognita), Protected cultivation, Tomato, mid Himalayan region

Development of low cost in-vivo mass production system of native EPN (Heterorhabditis indica VLEPN01)

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Abstract

Entomopathogenic nematodes (EPNs) belonging to Steinernematidae and Heterorhabditidae are the potential biocontrol agent of insect pest. EPNs are mass produced using in vitro culture and Invivo method. Mass production using invitro are expensive and complex process (pre-incubation, preservation, Media development) due to requirement of symbiotic bacteria Xenorhabdusand Photorhabdus. We have streamlinedthe In vivo mass production of native EPN, Heterorhabditis indica VLEPN01 using Corcyra and Galleria larvae. A low-cost Galleria mass multiplication technique developed for mass production of EPN H. indica VLEPN01 which can be utilized for field application for soil insect pest management. The effectiveness of both the larvae assessed based on mass production cost per box, duration of life cycle, rate of IJs production and number of larvae produced. mass production cost per box, duration of life cycle, rate of IJs production were high for Galleria larvae in comparison to Corcyra.

However, the number of IJs produced by Galleria were significantly higher than the Corcyra. Therefore, developed In vivo mass production technique of EPN can be utilize for bio control programme.

Key words: *Entomopathogenic nematodes, In vivo mass production, Heterorhabditis indica VLEPN01, Corcyra and Galleria*

Effect of Nano-DAP on Growth, Yield and Economics of Rice in New Alluvial Zone of West Bengal

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Abstract

The effect of Nano-DAP, comprising of N and P nano particles was tested on growth and yield of kharif rice in 2021 at the Instructional Farm, BCKV, West Bengal, in a randomized block design with thirteen treatments and three replications. Nano DAP was applied through seed treatment (2.5 and 5 ml/kg seed), seedling root dipping (0.5%) and foliar application at @ 2ml/l at 30 DAT. The soil was sandy clay loam in texture with pH 6.65, organic carbon 5.8 g/kg, available N159.2 kg, P 44.9 kg and K 101.8 kg/kg of soil. The total rainfall during experiment was 96.64 cm. The results revealed that 50% basal N and P through DAP along with seed treatment by Nano-DAP @ 5 ml/kg seed and foliar spray of Nano-DAP @2 ml/lit at 30 DAT exhibited maximum plant height (101.03cm), LAI (2.48), dry matter accumulation (1006.38g/m2),tiller number/hill(17.67), root length/hill (27.23 cm), number of panicle/m2 (170.92), number of grains per panicle (113.48), grain yield (4250 kg/ha), straw yield (6378 kg/ha). This treatment enhanced 14.96% of grain yield over control (No Basal DAP) and also showed higher net return (Rs. 40358/ha) and benefit-cost ratio (1.93) in comparison with other treatments. The preliminary investigation shows that Nano DAP may be a potential alternative of chemical fertilizers.

Key words: *Growth, Nano-DAP, Net return, Rice, Yield*

Studies on Potential of Plannococcussp TRC1 in Decolorization and Detoxification of Indigo Carmine, a lignin mimicking dye.

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Abstract

Indigo carmine (IC) is a Lignin mimicking Dye (LMD), used to screen and analyze the microbial delignification machinery.It is used for coloring polyester fibers and denims in textile industries, when released in the effluents showed adverse toxic effect on Human health along with other severe

environmental hazards. Biological methods for eradication of dyes are preferred over physico-chemical methods for its low-cost and eco-friendly behavior. In this study we examined the decolorization and delignification potency of the bacterial isolate Planococcussp TRC1 using IC as model lignin compound. Batch treatment showed dye decolorizationof 74% for 10 ppm and 66% for 50ppm at 30?C, 120 rpm at 96h representing intensive metabolic activity with μmax of 0.2694 and 0.3161 h-1respectively. It indirectly indicates the mechanism of action of this isolate as IC is also the one of the substrate for Lignin degrading enzymes. Compared to Pseudomonas fluorescens, Plannococcussp TRC1 depicted more efficiency.This was validated using specific analytical studies. Untreated and treated IC was evaluated using Vigna radiatafor its cytotoxicity and defense-mechanism in plant system with respect to oxidative stress, antioxidant enzyme status, and protein oxidation.It signifies that the biodegraded metabolites of IC are relatively less toxic in nature.

Keywords: *Lignin mimicking Dye, Indigo- carmine, Plannococcus sp. TRC1, bioremediation Defense enzymes*

A biorefinery approach for conversion of hazardous Kraft Lignin into versatile Lignin Nanoparticles

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Abstract

Lignin being the second most abundant biopolymer in nature is very less utilized till date.During paper pulp processing it is removed from lignocellulosic biomass to enhance the quality and durability of papers. Kraft lignin (KL) is a variety of industrial lignin procured from the kraft pulp which accounts for around 85% of lignin produced globally. Effluents containing KL have various adverse effects including respiratory stress, liver damage and genotoxicity on aquatic fauna. In this study, KL was strategically exploited to synthesize versatile lignin nanopaticles (LNPs) using methanol, tetrahydrofuran (THF) and ethylene glycol as solvent. The synthesized particles were characterized using dynamic light scattering (DLS), Zeta potential, FESEM, thermogravemetric analysis (TGA), XRD and FTIR analysis along with its antioxidant activityusing DPPH assay.For its application as the drug delivery system,the synthesized LNP using ethylene glycol was selected (with size>99% below 300 nm, -18.5 mV Zeta Potential, 63.12% Yeild) for the formation and characterization of drug -Curcumin encapsulated LNPs (C-LNPs). The influence of LNPs and C-LNPson Dania rerio as a model was examined . The non-toxic effect of these LNPs studied using Vignaradiata seed assay revealed its probable applications in various field.

Keywords : *Lignin nanoparticle, Kraft Lignin, Bio-Plant Assay, Drug-Delivery, In-vivo study, Curcumin*

Effect of whey feeding on acceptability and growth performance of broiler chicks

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Abstract

A study was conducted to get the effect of whey feeding on broiler chicks growth. Whey is amilk by-product and greenish yellow liquid obtained during preparation of cheese, channa or paneer. It is highly nutritious and good for improving immunity and gastrointestinal tract disorders.With the growth of the cheese and paneer making industry, larger quantities of non-utilized whey have resulted in greater pollution hazards. In light of above facts, the study was planned for utilizing whey as poultryfeed with the objective to see its effect on growth performance. In this experiment 120 Day Old Chicks reared in four groups as T1,T2,T3 and T4 and were given as 0% (control), 5% whey, 10% whey and 15% whey in drinking water adlib.respectively upto 42 weeks of study period.The growth performance was found to be better for T4 than other treatments groups and control. Average weekly body weight and body weight gain were found to be higher for T4 group followed by T3, T2 and control.About 3% mortility was found in Control group,while zero mortality was found in all the treatments groups.It can be concluded that liquid whey canbe used for feeding broiler chickens by adding in drinking water and is acceptable upto 15% without any adverse effect.

A study on agricultural information preservation by the farm women of North Bengal

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Abstract

Farm women preserved the farm information in different mode which is influence the agricultural information network output. But few studies were found about the farm information preservation level of the farm women. keeping this in view a study was conducted to find out the information preservation level of the farm women and factor associated with this preservation of the information. The study was conducted on the farm women of North Bengal region during 2017-2020. Expost facto research design was followed and both purposive and simple random sampling were used for selection of sample respondent. It isfound from the study that majority of the farm women were very much preserved information through memorizing followed by notebook/diary, agricultural literature, newspaper cutting and soft format. It isfound from the study that majority of the farm women had low level of information preservation followed by medium and high level. It is revealedfrom the study that education, annual income and landholding were positively and significantly associated with the information preservation

level of the farm women.

Keywords: *Farm women, agricultural information network output, information preservation, memorize, notebook, diary, agricultural literature, newspaper*

Impact Of Different Treatment On Yield And Yield Attributes Of Wheat (Triticum Aestivum L.) In Central Uttar Pradesh

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Abstract

A field experiment was carried out in the pot culture of Soil Science and Agricultural Chemistry, C. S. Azad University of Agriculture & Technology, Kanpur during rabi season 2018-19. The experiment consisted 13 treatments viz,T1: Control, T2: 75 % RDF, T3: 75 % RDF + FYM, T4: 75 % RDF + FYM + S30, T5: 75 % RDF + FYM + S30 + Zn20, T6: 75 % RDF + FYM + Zn20, T7: 100 % RDF, T8: 100 % RDF + FYM and T9: 100 % RDF + FYM + S30, T10: 100 % RDF + FYM + S30 + Zn20, T11: 100 % RDF + FYM + Zn20, T12: 100 % RDF + FYM + S30 + Zn20 + Azotobacterand T13: 125 % RDF and assigned in RBDdesign with 3 replication. The wheat cv HD-2967 was used in the experiment. The soil of the experimental plot was sandy loam in texture, medium in fertility and slightly alkaline in reaction. The results indicated that application of 100 % RDF + FYM + S30 + Zn20 + Azotobacter showed that the highest grain yield (57.82 q ha-1), stover yield (61.12 q ha-1), biological yield (118.94 q ha-1) and harvest index (48.61%) and lowest in control. Application of treatments T12(100 % RDF + FYM + S30 + Zn20 + Azotobacter) gave the highest grain yield of wheat crop of the central Uttar Pradesh.

Key words: *Yield, FYM &Azotobacter.*

Potential of phytomolecules as anti-protease compounds to combat SARS-CoV-2; an In silico approach

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Abstract

SARS-CoV-2 is one of the deadly outbreaks in the present era and still showing its presence around the globe. Researchers have demonstrated various vaccines till now which may provide only protection but the cure is not possible after infection and we are seeking for efficient therapeutic leads to cure this infectious disease. In the current work, we investigated the main protease (Mpro) protein in SARS-CoV-2 which is crucial during viral particle formation andfurther, proposed five compounds of plant origin with the therapeutic potential. The 1000 compounds were screened from various plant-based resources and further physiochemical characterization and assessment of drug likeliness of phytocompounds were performed using SwissADME. Eventually, we screened 95 compounds out of 1000 molecules based on docking analysis using AutoDock Vina. Five compounds were selected having the highest affinity for Mpro, followed by the analysis of interaction using molecular dynamic (MD) simulation. Docking and MD simulation studies elucidated the promising stable interaction of selected 5 ligands with Mpro. During MD simulation of 100ns,Abacopterin F showed the lowest binding energy (-37.13 kCal/mol) with the highest affinity towards Mpro and this compound may be proposed as lead molecule for further investigation which interact and modulate the activity of the Mprorequired for viral particle formation. However, in-vitro and in-vivo experimental validation would be needed to process the selected Phytomolecules as a therapeutic lead against SARS-CoV-2.

Keywords: *SARS-CoV-2, main protease, COVID-19, phytocompunds, therapy, pandemic.*

Nutritional Profiling of Some Selected Commercially Important Fresh water and Marine Water Fishes of Bangladesh

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Abstract

The purpose of the study was to investigate the proximate composition (protein, lipid, ash, moisture and carbohydrates) and mineral content (Calcium, Ca; Magnesium, Mg; Phosphorus, P; Sodium, Na; Potassium, K; and Sulpher, S) of Bangladesh's economically important freshwater and marine water fishes.The proximate composition and mineral content were determined according to the Association of Official Agricultural Chemists (AOAC) standard method. All of the factors had a substantial variation ($p< 0.05$), according to the findings.The maximum protein content was observed in Lates calcarifer (18.673%) and minimum in Pangasius pangasius (15.616%). The content of lipid among the species varied from 0.316% to 13.396%, with Mugil cephalus having the highest lipid content and Channa striata having the lowest. The moisture content ranges from 68.343% to 81.160%. All the fishes have an average ash content of 0.850% to 4.350%.The energy content is also significantly higher ($p< 0.05$)in marine water fishes. The mineral content was highly variable in freshwater and marine water fishes. The calcium content was lowest in Pangasius pangasius (0.555%) and highest in Setipinnaphasa

(3.495%). The magnesium content ranged between 0.281% and 1.885% whereasphosphorus was lowest in Lepturacanthussavala (0.826%) and highest in Setipinnaphasa (2.114%). The amount of sodium, potassium, and sulfur was relatively less for all fish speciesbut there were substantial differences across the twelve samples. However, marine water species exhibit a good combination of proximate composition and mineral content. Moreover, the price of the marine water fishes was cheaper than the freshwater fishes of Bangladesh so that the marine water fishes can be a good food item to the people of our country in terms of economy, nutrition and could provide better health benefits.

Keywords: *Proximate composition;Mineral content;Nutritive value; Freshwater; Marine water.*

Development of sustainable low-cost aquaculture technique using Asian watergrass asfish feed

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Abstract

The price of commercial fish feed increased globally which threats aquaculture as well as food security of the poor globally and creates problem for sustainable aquaculture development. Asian watergrass contains desired amount of nutrients and is preferred food of some species of fish.An experiment was conducted usingAsian watergrassas fish feed in comparison with commercial feedfor reducing feed cost under three treatments for 5 months. In the treatment one, Asian watergrass was planted and grown as fish feed before 4 months of fish stocking and designated as T0 (T0: no commercial feed for fish); in the treatment two,Asian watergrass was planted and grown at 50% area as feed and 50% commercial feed was applied and designated as T50(T50); and in the treatment three, 100% commercial feed was supplied as control and designated asT100(T100). Large sized fingerlings of grass carp, common carp, tilapia, mrigal and rohu were stocked at similar ratio of 6:2:2:1:1 with stocking density of 15000 fish ha-1in all treatments.Important water quality parameters were measured throughout the study period those were suitable range for aquaculture. The survival, growth parameters and total production were calculated. The total productions were found significantly higher 5235.04±367.56kgha-1 in T100 followed by 4115.57±130.27 kgha-1 in T50 and 3161.82±96.24kgha-1 in T0. But, the calculated highest benefit and benefit-cost ratio (BCR) were found USD 5436.53 ha-1and 2.20 in T0 whereas the lowest benefit and benefit-cost ratio were USD1776.04 ha-1 and 0.16 in T100.The total installation costs were same in all treatments, but the total operational costs were different due to the variations inthe applyingcommercial feed cost. The operational cost was found highest USD 11191.98 ha-1 in T100that was 4.77 fold higher from the lowest one(USD 2348.44 ha-1 in T0).

Key words: Aquaculture,Asian watergrass, fish production, benefit.

Optimization of the stocking density of pabda (Ompokpabda) in cage culture system

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Abstract

Among many indigenous fishes of Bangladesh, Ompokpabda locally known as pabda, a small freshwater catfish belonging to the family Siluridae of the order Siluriformes,is an endangered freshwater fish species in Bangladesh. This small fish plays an important role in the inland fisheries catch because of its nutritive value and high market price. An experiment was conducted to observe the impact of stocking density on the growth and survival of pabda fish in cage culture systemfor a period of 90 days. Nine cages were used for this experiment having size 1.52m × 1.21m × 1 m for two experiments. The experiments were designed with three treatments containing three replications assigned into a completely randomized design with various stocking density. In experiment 1, the stocking density of different treatment was 300 (T1), 500 (T2) and 700 (T3) fry per m3, correspondingly. Mega floating koi feed was delivered at rate of 3-10% body weight twice a day. Water quality of experimental pond at cage site was found within the suitable range for fish culture. There was no significance difference among treatments for different yield parameters of pabda($p<0.05$). Survival of fish was not significantly affected by the stocking density and ranged between 90.03to 91.66%. The coefficient of determination values (r2) of length-weightrelationship (LWR) was 0.92, 0.91, and 0.93 in T1, T2, and T3, respectively indicating a goodlinear regression between length and weight.The highest fish production (kg/m3) was found in T3 (14.54kg), followed by T1 (6.94kg) and T2 (10.97kg). A simple economic analysis of the pabdacage culture showed that T3 generated the maximum net profit US$14.40/m3/3 months followed by T1(US$8.76.) and T2(US$11.42Tk.). This study revealed that highest stocking density (700/m3) of pabdais most suitable in terms of production and economics in cage culture.

Key words: *Ompokpabda, cage culture, stoking density.*

Effect of synthetic and herbal exogenous emulsifiers on performance of broiler chickens fed energy-restricted diets

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Abstract

A research trial was conducted to evaluate the effect of exogenous synthetic and herbal emulsifiers on performance of broiler chicken fed energy-restricted diet over a 35-day feeding trial. 180 one-day-old Cobb 400Y chicks were procured, weighed individually and allocatedrandomly to one of four treatment groupsviz.T1: Standard basal diet without emulsifier (Control), T2: Basal diet with 3% less metabolizable energy, Treatment T3:Basal diet with 3% less metabolizable energy + synthetic emulsifier (Brand X) @250 g/tonne of feed, and T4: Basal diet with 3% less metabolizable energy + herbal emulsifier(AV/PFE/15; Ayurvet Ltd., India) @250 g/tonne of feed, each having three replicates. Weekly body weight gain, feed conversion ratio, performance index,and economic return decreased($P<0.05$) due to reduction in dietary energy content. Supplementation of either synthetic or herbal exogenous emulsifierenhanced($P<0.05$)growth performance and economics of broiler chicken.There was no significant ($P>0.05$) effect of exogenous emulsifiers on dry matter, crude protein, calcium and phosphorus retention in broiler chickens fed energy-restricted diet, however, retention of ether extract retention improved significantly ($P<0.05$) due to supplementation of the emulsifiers. Hematological parameters viz. hemoglobin, packed cell volume, total erythrocyte count, mean corpuscular volume, and meancorpuscular haemoglobin didnot differ significantlyin energy-restricted birds supplemented with emulsifiers. The carcass characters were statistically similar ($P>0.05$) among different dietary treatments.Birds fed diet having optimum energy had highest abdominal fat content, whereas birds fed energy-restricted diet had lowest abdominal fat content. Dietary treatments didnot affect ($P>0.05$) appearance, flavor, tenderness, juiciness, and overall acceptability of the meat. Similar responses in all observed parameters indicated that herbal emulsifier was as effective as synthetic emulsifier in the utilization of dietary fat in broiler chickens. It was concluded that decrease in 3% metabolizable energy of broiler chicken diet depressed growth performance, ether extract retention, and economics of broiler chicken whereas dietary supplementation of synthetic or herbal emulsifier @ 250 gm/tonne of energy-restricted soybean oil-based broiler feed improved the growth performance, ether extract utilization, and economics without affecting the carcass quality of broiler chicken.

Key words: *Emulsifier, growth, nutrient retention, economics, carcass, broiler chicken*

Feeding Culled Carrot to Growing Rabbits: Effect on Blood Biochemical Profile

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Abstract

Carrot is a good source of dietary fibre and is having the second-highest level of ?-carotenoids among vegetables. Several studies have shown that binding of the viscous water-soluble fraction of fibre with cholesterol induces lowering of plasma cholesterol level (Fernandez et al., 1995; Mazur et al., 1990). It is rich in antioxidant vitamins such as vitamin E (513 ug/100g), vitamin C (7 mg/100g), thiamine, riboflavin, niacin and folic acid (Alasalvar et al., 2001). These antioxidant micronutrients reduce the risk of cardiovascular ailments, probably by protecting lipoproteins from peroxidation, quenching free radicals and arresting cellular damage. An experiment was conducted to study the effect of feeding

culled carrot on blood biochemical profile were studied on 21 New Zealand White (NZW) rabbits initial age 45±3 days and average body weight (711±33 g), divided into three groups of 7 animal each. Rabbits in group I were fed concentrate mixture without the carrot, whereas, rabbits in group II & III were fed concentrate mixture & culled carrot replacing 10 and 20% of concentrate mixture,respectively. Green berseem was offered ad lib. to fulfil remaining requirements of nutrients.The results showed that there were no significant difference in haemoglobin, PCV, glucose, urea and serum enzymes (ALT, AST and ALP) in experimental groups as compared to control. The serum concentration of cholesterol significantly lower ($p<0.05$), whereas glutathione peroxidase and catalase activity significantly higher ($p<0.05$) in rabbits fed culled carrot. It is therefore inferred that feeding of culled carrot have significantly reduce cholesterol level and improve antioxidant activity,however, non-significant effect on the blood biochemical profile in NZW rabbits.

Solar Energy Utilization for Extraction of Essential Oil from Medicinal Plants

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Abstract

Distillation of medicinal and aromatic plants for essential oil extraction can be done by utilising heat in a medium temperature range. This heat is supplied by various sources of energy like solar, biomass, electricity, LPG systems, and other energy sources. This study emphasis on extraction of essential oils from different medicinal and aromatic plants using solar energy with different drying treatments. A Scheffler solar concentrator with a projected area of 16m2with an automatic tracking mechanism (for daily use) and manual tracking (for seasonal use) was combined with a 50-litre capacity distillation still for the extraction of essential oils. The system could produce a 300-450°C temperature at the receiver section with corresponding beam radiation of 800-850 W/m2. The medicinal plant used for this study was Palmarosa grass (Cymbopogon Martinii). Before oil extraction, the grass was given five pre-treatments of shade drying (fresh, 12 h, 24 h, 36 h and 48 h). The research concluded that the 24 h shade-dried sample gave the maximum oil yield fordistillation systems among these pre-treatments. The energy requirement was highest for the fresh sample as compared to other shade-dried samples. Palmarosagrass oil yield percentage ranged from 0.19% (fresh) to 0.63% (24-hour shade-dried sample). The study revealed the good match between the standard chemical and physical values of extracted oil and at present energy context system was found economically viable.

Key Words - *Solar energy, distillation, essential oil*

Prospect of scientific beekeeping for agri-entrepreneurs in Meghalaya

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Beekeeping is the important rural based venture for escalation the economic status of whole society which can be practiced by anyone irrespective of sex and age.The practice of rearing bees is called apiculture or beekeeping.It is can be defined as a single job with several benefit.In fact, beekeeping is the commercial part of apiculture.Meghalaya state is known as mega biodiversity hotspot, harbor enormous number of flower plants including a wide variety of wild and cultivable plants which support enormous number ofundomesticated colonies of native honey beesin the natural forest. Moreover, Meghalaya has a long history of traditional beekeeping practices by the rural farmers. Traditional beekeeping has many disadvantage such as poor honey yield, destructive method of harvesting and unhygienic honey production. Hence, the present study was carried out to demonstrate and popularize the scientific beekeeping with Apisceranaamong the traditional beekeepers and unemployed rural youth for up scaling the hygienic honey production and entrepreneurship development in Meghalaya under Tribal Sub-Plan (TSP) programme by the ICAR Research Complex for North Eastern Hill Region, Umiam, Meghalaya. Study revealed that adoption rate of scientific beekeeping was more than 90% among the intervened farmers/beekeepers with increased honey yield (4-5kg honey/hive/year) from modern bee hive as compared to traditional one (2-3kg honey/hive/year). Therefore, scientific beekeeping may be popularized among the progressive and traditional beekeepers for entrepreneurship development in Meghalaya.

Keywords: Agro- entrepreneurs, apiculture, Meghalaya, scientific beekeeping

Diversity in Paddy Genotypes deciphered by Multivariate Clustering Analysis

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Abstract

Rice is one of the major staple food crops all over the world. There is an urgent need to enhance the production of rice to meet out the demand of growing population and also for ensuring food security. The yield of rice may be increased by selecting for the yield &attributes. Further, yield and component traits are also essential to run a successful breeding program. The present investigation to study the diversity of thirty two rice genotypesfor grain yield &attributes by multivariate cluster analysis was carried out (Kharif 2018-19; 2019-20) at Rice Research Station, Kaul, CCS HAU. The experimental material was sown in three replications with plot size of 5 x 3 m in a randomized block design (RBD). Data was recorded for yield (kg/ha) andcontributing traits.Highly significant differences among genotypes

for yield and contributing traits were observed for both years of respective study (ANOVA analysis). Principal component analysis revealed that panicles per meter square, plant height, days to fifty percent flowering and yieldduring first year while chaff per panicle, thousand grain weight, panicles per meter square & panicle length for second year; were found as most prevalent traits and both principal components accounted total of 57.3% with 35.6% and 21.6% respective contributions in the first year and total variation of 50.1% with 29.8 % and 20.4% respectivecontributions in second year.The variations in days to fifty percent flowering, thousand grain weight, chaffs per panicle and yield;contributed more in first component whereas traits such as panicle length, chaffs per panicle contributed more to second. The yield depicted significant positive correlation coefficient values (both) with days to fifty percent flowering along with negative values for panicle lengthand chaffs per panicle during first year. Thousand grain weight expressed significant negative value with chaffs per panicle and number of grains per panicle while positive for days to fifty percent flowering and plant height.During second year,mostly indirect relationships were depicted by yield for days to fifty percent flowering, plant height, panicles per meter square, panicle length, chaffs per panicle, thousand grain weight and direct with grains per panicle only. Contrary to the yield; mostly, positive values were expressed by thousand grain weight with days to fifty percent flowering, plant height, panicle length, panicles per meter square, chaffs per panicle along with negative values for grains per panicle only. Cluster analysis based on Euclidian distance among the genotypes as per considered traits, observed 4 distinct clusters of genotypes for the first year. Second year of study represented that Govind, HKR 17-44, PAU-7555-1-4 genotypes from last cluster would be more divergent as compared to HSD-1, PR-127 that formed first cluster of genotypes. Genotypes from the distinct clustersmay be used for obtaining diverse combatants in segregating generations to and broaden the genetic base. The present study indicated that morphological traits were useful for preliminary evaluation and can be used as a general approach for assessing genetic diversity among morphologically distinguishable scented and non scented rice cultivars.

Keywords: *Biplot analysis, correlation coefficient, Diversity descriptive, Multivariate clustering*

Understanding and validating the traditional rainfall forecasting system with its implication to agriculture under changing climate in Kalimpong Hills

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Abstract

The farmers in Kalimpong and Darjeeling hills mainly depend on agriculture for their livelihood and live in difficult geographic terrain. They devised their own weather and rainfall classification system based on local indicators. Their acquired knowledge base often helps them in prediction of forthcoming weather conditions and increases their farming resiliency through adaptation and mitigation options for minimizing the impact of any weather aberrations on standing crop. Despite the presence of modern

meteorological weather advisory services, the local people in Kalimpong still rely on their traditional weather classification system for taking up any farm activities. People in the region predicted the weather for a very long time through phenology of certain plants and behavior of certain animals as an indicator for the advent of wet or dry year. However, their acquired knowledge is still not documented and validated with sufficient climatic or metrological observations. The present study was conducted in Kalimpong hill over a period of four years from 2015-2019 to understand the traditional wisdom of weather prediction and its implication in hill agriculture. Numerous surveys were conducted at villages namely, Ichey Gaon, Bong basti, Algarah, Sangsey Basti, Lava, Loley, Kafer, Tindhurey and Gorubathan. The people classified the rainfall as Sawney Jhari, Bhadurey Jhari, Sohrasaradey jhari, Bonsho jhari, Titey jhari, Sisney Jhari, Naurathey Jhari, Chuia jhari, Faprey jhari, Bhangera jhari, Makurey jhari, Kartikey jhari, Maghe jhari, Ashwina based on time of rainfall. It was found that the knowledge of this traditional rainfall helped them to take different farming decisions especially in scheduling irrigation for major crops. The traditional knowledge has been reviewed with 50 years IMD climatic data and it was found that in most cases it conformed with their traditional belief.

Utilization of goat rumen meat as functional food

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Abstract

A study was conducted to develop functional food from goat rument meat. Goat rumen is obtained as by-product during dressing of goat and meat processing. Goat rumen generally remains unutilized due to unpleasant odour and flavour because of ingesta. So, it is either thrown away or sold at very cheaper rate in most of the developing or under developed countries. However following cleaning with potable water and deodorization, it can be efficiently utilized for value added product preparation because it contain good amount of nutrient viz. protein, minerals, vitamins specially Zinc and Selenium in good proportion required by our body. Its flavour and taste can be improved by addition of jamun seed powder and beet root . So jamun seed powder and beetroot were added separately during preparation of petties from goat rumen meat. It was found that in terms of physico-chemical and proximate qualities jamun added patties were better in performance but in terms of sensory qualities beet root added patties were preferred. Shelf life of jamun based patties was found to be better followed by beetroot based and control. It can be concluded that by addition of these functional ingedients during preparation of patties from goat rumen meat, its value addition can be done.

Ta.petang: Bloodfruit from Garo Hills

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Garo Hills of Meghalaya is a treasure house of many unknown plants which have a potential to shine in the nutraceutical sectors. But unfortunately, only few such plants have been discovered and the traditional knowledge associated with them are getting lost. One such plant that attracted the researcher's attention recently is Bloodfruit i.e., Haematocarpusvalidus. It is known by the Garo's as Ta.petang. While other researchers studied its composition and nutraceutical properties, we tried to explore the untouched part of the traditional knowledge associated with it. For that, we did a semi-structured interview with 50 locals belonging to the Garo tribe. We tried to analyze how much information is passed on from the older generation to the newer generation, and how the locals used it as their food and medicine. After the study it was realized that most of the younger generations were not aware of the goodness of the fruit. They consumed it only for its taste. Our major findings were its use as a medicine for skin diseases and blood production during pregnancy. The locals consumed it raw and also prepared juice of it. However, once the season of the fruit gets over, the fruit would disappear and appear in the next season. There were no reports of preservation technique of the fruit by the locals. But a fruit which is so beneficial should be available for the whole year, therefore work needs to be done on this aspect. The awareness and spread of the traditional knowledge associated with the plant is also needed, so that its not lost and society can get benefit from it.

Keywords: Ta.petang, Bloodfruit, Traditional knowledge, medicine, skin infections, blood

Effect of Dietary Inclusion of Cauliflower (Brassica OleraceaVar Botrytis) Leaf Meal on the Performance of Broiler Chicken

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Abstract

This study was taken up with the aim to find the optimum level of inclusion and to explore the functional propertyi.e., immunity and antioxidant property of cauliflower leaf meal in broiler chicken.Total of 240 birds were randomly allotted to 6 groups, each containing 5 replicates and 8 birds in each replicate.Cauliflower leaf meal was included by partial replacement of maize and soya in graded levels from0, 5,7.5, 10, 12.5 and 15%. BIS 2007 specifications were followed to fulfil the nutrient requirement. Experimental diets were fed from a day-old chick for a total duration of 42 days.No significant difference was noticed in terms of body weight gain, feed intake and feed conversion ratio between the groups. No change in haematological values, cell mediated immunity was observed. Meat quality parameters like pH, Extract release volume (ERV), Water holding capacity(WHC) and Thiobarbituric acid reactive substances were comparable(TBARS), between the treatment groups. The findings of the study showed that cauliflower leaf meal can be included upto 15% in broiler chicken diet without compromise in the

production performance of birds.

Keywords: Antioxidant, WHC, ERV and TBARS

Impact of Socio-cultural Attributes of Pulse Farmers on Resource Management Practices in Nayagarh District of Odisha

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Abstract

A study entitled "Management System of Pulse Farmers in Nayagarh District of Odisha" was conducted by employing an ex-post-facto research design during 2020. 256 respondents covering 8 villages from 4 blocks of Nayagarh district were selected as sample respondents. The data were collected by personal interview using a well-structured questionnaire. The data were tabulated and analyzed by using correlation coefficients and multiple regressions. The study results showed that age, education, and annual family income influenced resource management of the pulse farmers to a greater extent than any other socio-economic variables. Family type, family size, tenancy status, extension participation, and source of information were not significantly impacted the resource management of the pulse farmers. Family type, housing pattern, and annual family income had contributed higher variance to the subsequent variable resource management of the pulse farmers. The R square value being 0.5279 reveals that the conglomeration of the causal factors together has contributed to 52.79 percent.

Keywords: *Management, Pulse farmers, Resource, Socio-cultural attributes*

Assessment of Integrated Management of Nutrient for sustainable production of Betel vine (*Piper betle L.*)

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Abstract

An on farm trial was conducted during the year 2021-22 in sandy loam soil of Darbhangadistrict, Bihar to assess the effect of Integrated Nutrient Management forsustainableproduction of betelvine. The field experiment conducted in farmers field at Krishi Vigyan Kendra,Darbhanga under Dr.Rajendra Prasad Central Agricultural University,Bihar,Pusa.The results indicated that RDF(200:100:100 kg NPK/ha)in 4 split dozesand soil drenching with solution of non -edible oil cake @ 1.0 ton/ha significantly increasedthe no.of leaves /vine and fresh weight of 100 leaves.This also resulted increase in self life of leaves as well as increase in marketable leaves/ha.Whereas,50 %RDF+ vermi-compost@ 3.0 ton/ha enriched with Azotobacter and PSB+ soil drenching with solution of non-edible oil cake@ 1.0 ton/ha significantly increased the fresh weight of 100 leaves.This treatment also increased mean no. of leaves /vine(37.0),mean no. of marketable leaves/ha (64.38 lakh/ha) and highest B:C ratio(3.84).The Organoleptic test showed that the treatments had marked influence on the quality of betel leaf. Among the treatments, 40 % respondents felt the test very crispy and very pungent in Farmers practice:(150:250:60 kg NPK/ha)+Mustard cake @ 0.5 t/ha,whereas,40 % respondents found the leaves crispy and 60% found it pungent in the treatment RDF+ Soil drenching with solution of non-edible oil cake @ 1.0 ton/ha and 30 % respondents defined thetest moderate in crispy and 50% respondent observed pungent in the treatment having 50% RDF+ vermi-compost@ 3.0 ton/ha enriched with Azotobacter and PSB+ soil drenching with solution of non-edible oil cake@ 1.0 ton/ha.Thus.50% RDF+ vermi-compost@ 3.0 ton/ha enriched with Azotobacter and PSB+ soil drenching with solution of non-edible oil cake@ 1.0 ton/ha. Is a viable and sustainable option to increase fresh weight,net return,B:C ratio and increasing the quality of betelvine leaf.

Keywords:*Integrated Nutrient Management,Vermicompost, Azotobacter, PSB, Betelvine, Organoleptic test*

Morpho-molecular Charaterization OF Sarocladium oryzae causing Sheath Rot Disease in Rice

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Abstract

Rice sheath rot was thought to be a minor and geographically restricted disease. It recently gained momentum and spread, lowering the quality and amount of rice yield. It is a disease complex caused by a variety of fungal and bacterial infections, the most common of which being Sarocladium oryzae. Rice plant samples were collected from several rice growing locations of Odisha from which 50 isolates were isolated from infected rice leaf sheath and maintained in Potato Dextrose Agar Medium (PDA). S.

oryzae was identified using cultural and morphological characteristics which appeared as compact and showed restricted growth. The aerial mycelium appeared sparse and cottony white, with orange discoloration on the bottom of the plate corresponding to the culture on the upper side. The colony colour of the isolates varied between white, pinkish white and orange. The mycelium growth varied from powdery to wet aerial. All isolates formed powdery, dark or pale orange colonies on PDA, and some isolates produced a deep yellow diffusible pigment. Sectors were formed in the culture, which differed in their growth rate and colour whereas some isolates had no sector

formation. Microscopic identification was done to obtain the spore and mycelium structures which was found to be cylindrical to slightly fusiform, often somewhat curved, hyaline, smooth and single-celled. It was further confirmed at molecular level by sequencing ITS region (amplicon size 700bp) with primers ITS 1 and ITS 4 and the sequence results showed that the similarity of 97-99% with existing S.oryzae DNA sequences available in National Centre for Biotechnology information (NCBI).

Keywords: *Sarocladium oryzae; Rice; Sheath rot; Morphology; Molecular characterization; ITS*

Potential of novel fruit crops in Indian scenario

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Abstract

In biodiversity rich India, apart from indigenous fruits like mango, banana and jackfruit, many universally important tropical fruits like guava, pineapple and papaya were domesticated since 16th century. New exotic fruits which are popular in other environments are gaining popularity in India recently. Some of the exotic fruit crops which has the potential of becoming our future fruit crops are discussed here. The fruits which are gaining popularity includes mangosteen, miracle fruit, chempedak,dragon fruit, avocado, rambutan, durian, snake fruit etc. Having more nutrition than any other fruit, avocado, also known as butter fruit, has the highest energy value among fruits. Durian fruit is reported to possess different phytochemicals which enhance its nutraceutical value. Pitaya or Dragon fruit is gaining popularity with consumers due to its unique shape and colour. Dragon fruit peel constitutes 22% of the whole fruit, which is presently discarded. It contains considerable amount of pectin, betacyanin pigment and total dietary fibre. Hence, its peel could be utilized as a good source of fibre, pectin and natural colorant. There is a lot more fruits which can become promising in the future like pulasan, passion fruit, longan, milk fruit, etc. In the present era, due to the change in dietary habits imposed by the widely prevalent lifestyle disease like obesity, diabetes and cancer, these high value fruit crops with specific nutraceutical value can be adopted as a viable supplement to traditional fruit crops. Currently there is an ever growing demand in the metros for these fruits. But present production is insufficient to support even one-third of the demand. So, a timely government intervention to support cultivation, marketing and export of high value fruit crops can serve to solve the problems of financial, employment, food as well as nutritional insecurity in our country.

Scope of rumen manipulation using Eastern Himalayan Forest tree leaves to reduce ciliate protozoal population for improving animal productivity

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Abstract

Rumen protozoa posses strong proteolytic activity and contribute to intraruminal recycling of microbial nitrogen which should be avoided or minimized for efficient utilization of dietary protein. In fact, 75 to 85 % of the nitrogen consumed by ruminants is lost in faeces and urine. Rumen ciliate protozoa are predators of rumen bacteria and decrease the intestinal flow of amino acids, mainly those of bacterial origin by 20-30%. Hence, elimination of protozoa from the rumen is desirable for efficient utilization of dietary protein.Eastern Himalayan tree leaves were not yet tested for their anti rumen protozoal activity. Therefore, present experiment was conducted to study the effect of some Eastern Himalaya tree leaves on rumen protozoal population in vitro.Three tree leaves e.g., Nevaro (Ficus roxburghii), Lutekhanew (Ficus clavata) and Thotne (Aconogonummolle) were collected in the month of November from Sikkim to observe their effect as feed additive on rumen prozoal population by in vitro gas production technique using cattle rumen liquor.200 + 10 mg of substrate comprising of air dried milled (<1.0 mm) paddy straw and concentrate mixture in 60:40 ratio was used as control. In experimental syringes, parts of the substrate was replaced by 00, 25, 50 and 100 mg of each tested tree leaves as feed additive. 30 ml inoculums/incubation media (rumen liquor and buffer in 1:2 ratio) inoculated in each 100 ml glass syringe and were incubated at 39 °C for 24 h. At the end of incubation (24 h), the contents of the syringes were mixed properly and processed for counting the rumen protozoa.

Rumen protozoa present in the collected rumen liquor and incubation medium was B type population due to presence of Epidiniumsp. and the absence of Polyplastronmultivesiculatum. The holotrich protozoa had an average cell size of 149 x 76 ?m (range 106 - 174 ?m x 48 - 104 ?m) to 63 x 26 ?m (range 41 - 95 ?m x 20 - 34 ?m) while spirotrich protozoa had an average cell size of 139 x 74 ?m (range 91 - 171 ?m x 48 - 103 ?m) to 44 x 26 ?m (range 28 - 71 ?m x 15 -36 ?m). Numerically spirotrich protozoa comprised of on an average 96.7 % of total protozoal population. The total rumen protozoal numbers varied from 45.7 to 60.8 (x 103) whereas holotrich protozoa varied from 0.5 to 1.5 (x 103) and spirotrich protozoa varied from 45.1 to 54.8 (x 103) per ml incubation mediadue to incubation of different tested tree leaves. There is decrease ($P<0.01$) in total, holotrich and spirotrich protozoal count as level of Nevaro (Ficus roxburghii) tree leaves in control diet increases. Rumen ciliate protozoal number was not influenced by the supplementation of Lute khamewand Thotne tree leaves in the paddy straw based diet/substrate in vitro.

It was concluded from the study that Nevaro (Ficus roxburghii) tree leaves may be used as a feed additive in the paddy straw based ruminant's diet to manipulate rumen microbes for efficient utilization dietary protein to enhance productivity of ruminant animals.

Key words: *In vitro gas production technique, plant secondary metabolites, rumen protozoa, tree leaves*

Weed density and weed control efficiency affected bydifferent weed management practices in Apple nursery plants

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Abstract

The present study was aimed to evaluate the influence of different weed management approaches on weed density and weed control efficiency in apple cv. Silver Spur grafted on M-9 T337 under nursery conditions in the experimental farm of Division of Fruit Science, FOH, SKUAST-Kashmir, Shalimar Campus, Srinagar (J & K) during the year 2020. The experimental was laid out in Randomized Complete Block Design with seven treatments (manual weeding, pendimethalin @ 1 kg a.i. ha-1, pendimethalin @ 1 kg a.i. ha-1 + manual weeding, paddy straw mulch (6 cm thick), black polyethylene mulch (200 micron), weed-free and weedy check) replicated thrice.Weed flora, density, dry weight, and weed control efficiency were all observed and recorded. Results showed that among different weed management approaches tested, black polyethylene mulch (200 micron) resulted in the lowest weed density and weed dry weight, and the highest weed control efficiency followed by paddy straw mulch (6 cm thick) and pendimethalin @ 1 kg a.i. ha-1 + manual weeding. In apple nurseries on clonal rootstock M9-T337, black polyethylene (200 micron) was determined to be the most effective weed control strategy for reducing weed density while increasing overall control efficiency.

Influence of clonal rootstocks on fruit quality of exotic apple varieties under ambient storage conditions

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Abstract

Investigation was carried out to study the effect of clonal rootstock on storage behavior on two exotic apple (Vance Delicious and Silver Spur) varieties grafted on three clonal rootstocks (M-9, M-4, MM-106) planted in the experimental orchard of Division of Fruit Science, SKUAST-Kashmir, Shalimar campus, Srinagar during 2015. The experiment was laid out in Randomized Block Design with four replications having two plants in each replication. Thirty fruits from each cultivar were stored under ambient conditions for 90 days and observations on quality parameters were taken at 15 days intervals. Results revealed that cultivars grafted on dwarfing rootstock M-9 stood best in terms of minimum physiological loss in weight (19.0 %), spoilage (22.44 %), acidity (0.27 %) whereas maximum TSS (17.50oB) and fruit firmness (11.00 lb/inch2) was recorded in semi-dwarfing rootstock MM-106 after 90 days of storage. Among cultivars, Silver Spur registered minimum physiological loss in weight (19.2 %), spoilage (21.55 %), acidity (0.42 %) and maximum total soluble solids (17.91oB) and fruit firmness (11.13 lb/inch2) as compared to Vance Delicious. From the present study it was concluded

that under ambient conditions fruits of Silver Spur grafted on M-9 clonal rootstock performed best.

Survey on fungal diseases of medicinal and aromatic plants of Kalimpong district of West Bengal, India

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Abstract

The extensive field survey was undertaken during 2019-2021 on plant diseases of medicinal and aromatic plants (MAPs) in the block of Kalimpong district (27.066° N, 88.28° E) of West Bengal, India. As per many scholar, the name "kalimpong" was derived in due course of time, from the distorted original Lepcha name "Kalenpung" which in the Lepcha language means "hillock of assemblage". The Geographical area of the district is 1075.92 km². The annual temperature is 18°C, minimum temperature is around 8°C and maximum 25. 5°C.The Hill areas of this district are located within the lesser and Sub - Himalayan belts of the Eastern Himalayas. The area is bounded by the Sikkim Himalaya in the north, the Bhutan Himalaya in the east and Darjeeling district in the west and Jalpaiguri district in the south. The elevation varies from 100 m. above sea level to the mighty Kanchanjungha. There are different climatic zones with distinctive attributes along with endangered MAPs are available in this hilly region. Swertia chirayita, Valeriana jatamansi, Berginia ciliata, Cinchona ledgeriana are the major medicinal and aromatic crops. Like other field crops, Medicinal plants are also attacked by fungi and lead to epidemics under favorable environmental conditions. Rainy seasons are the best time to assess the prevalence and incidence of diseases affecting medicinal and aromatic crops. Diseases incidence on 46 different species medicinal and aromatic plants from 03 different blocks of this district have been investigated and analyzed which revealed that 21 medicinal plants (like Swertia chirayita, Centella asiatica, Cymbopogon flexuosus, Costus speciosus, Aloe vera, Gloriosa superba, Mentha arvensis etc. by Alternaria alternata) were infected with leaf spot, 14 with leaf blight(Curcuma caesia, Aristolochia indica,Valeriana jatamansi etc. by Rhizoctonia solani), 7 with stem rot (Valeriana jatamansi, Withania somnifera etc. by Sclerotinia sclerotiarum). Whereas, symptoms of powdery mildew, downy mildew, basal rot, stem lesion, wilt, seedling blight were reported in some plant species. Most prevalent causal agent of leaf spot and blight was Alternaria alternata followed by Colletotrichum gleosporides. Besides these pathogens, Fusarium sp, Sclerotinia rolfsii, Macrophomina phaseolina, Erysiphe sp. Colletotrichum capsici, Cercospora sp., Curvularia sp., were frequent in occurrence among these high value endangered medicinal plants.

Keywords: *Medicinal and aromatic plants, Disease, survey, Fungus, Kalimpong district*

Construction of guide RNA in CRISPR/cas9 vactor using golden gate cloning: Targeting CYP71A1 gene to increase Brown plant hopper (BPH) resistance in rice (Oryza sativa L.)

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Abstract

Rice (Oryza sativa) is an important food crop as well as a model cereal for genetic research. Rice production is severely hampered by insect infestations and adversely impact global food security. Brown plant hopper (Nilaparvata lugens) is one of the serious pests of rice and is a common vascular feeder that feeds predominantly on phloem sap, causing hopper burn. BPH is susceptible to rice plant due to presence of serotonin which is synthesized by CYP71A1 gene. Serotonin functions as neurotrasmitter in humans and is essential for normal physiological activities in brain and digestive system. In insects, serotonin regulates the feeding behavior and digestive process. In plants, phytoserotonin (5-hydroxytrptamine) is present in multiple tissues and functions in many aspects of plant growth and development including maturity. Additionally, amino acid tryptophan based pathway is highly conserved and unique in plants for the biosynthesis of serotonins. Thus, changes in the serotonin biosynthesis pathway may also affect the other aspects of plant development. One such recent example is the mutation (loss-of-function) in the tryptamine-5-hydroxylase gene (cyp71a1) involved in serotonin biosynthesis resulted in brown plant hopper (BPH) and stem borer resistance in rice by affecting the feeding behavior of pests. 'Swarna' is one of the most popular varieties in eastern India. Swarna cultivar was used for editing CYP71A1 gene which is susceptible to brown plant hopper (Bph). The CRISPR primer for sgRNA were designed using CRISPR-GE toolkit using PYLsgRNA_OsU6a vector: Addgene, USA. To construct gRNA expression cassette CYP71A1 CRISPR primers were used for overlapping PCR. The target guide RNA was then cloned into the cas9 vector (PYLCRISPR/Cas9Pubi-H: Addgene, USA) using the Golden Gate assembly method. Furthermore, the cloned gRNA:cas9 will be transformed into the swarna plant via agrobacterium-mediated transformation for BPH resistance in the swarna cultivar.

Keywords: *Swarna, CYP71A1, Brown plant hopper, Golden gate cloning, CRISPR/CAS9, Agrobacterium*

Insecticide resistance of black inch worm Hyposidratalaca (Lepidoptera: Geometridae) in Eastern Himalayan tea growing zone of India

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Abstract

Management of the black looper Hyposidratalaca (Walker), the most demolishing foliage feeder of tea in Himalayan foothills, is based on the use of chemical insecticides, though poor field efficacy of various commercially formulated products has recently been reported. In the present study, insecticide resistance of H. talaca to some traditional and newer insecticides was evaluated from north-eastern tea growing belt of India. Six populations of H. talaca were collected in three consecutive years, 2018 to 2020, from five locations (Dooars, Kalimpong, Sikkim, Assam, and Darjeeling). These areas represent the major and commercially exportable best-quality Indian tea production belts. The Darjeeling and Assam populations showed low to very high levels of resistance (16.67-fold to 140.32-fold, respectively) to bifenthrin, deltamethrin and diflubenzuron while, highest resistance to quinalphos was observed in the Dooars population (119.81-fold). Similarly, very low to extremely high levels of resistance to emamectin benzoate and flubendiamide (4.00 to 65.25-fold and 16.43 to 148.94-fold, respectively) were observed in all six populations. However, pyridalyl (?77.09-fold) and spinetoram (?82.03-fold) showed higher toxicity than that of cyantraniliprole (?120.98-fold) to field populations of H. talaca, irrespective of locations. The pairwise correlation coefficients of log LC50 values revealed that emamectin benzoate was significant but negatively correlated with bifenthrin. Resistance ratios to the tested insecticides were heterogeneous and highly variable among locations and years. Specific resistance management strategies should be established, especially in locations where H. talaca has developed very high levels of resistance to newer chemistry insecticides.

Keywords: *Black looper, Insecticide resistance, Organophosphate, Pyrethroids, New molecules, Cross resistance*

Training need assessment and designing strategy for increasing pineapple productivity in Darjeeling district of West Bengal

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Abstract

Training is a critical input for the rapid transfer of the technology. It builds up the professional competency

of the farmer and extension personnel too and helping each individual by way of increased knowledge, improved skill and changed attitude enabling to perform his/her job with better consequences. A study was conducted in Phansidewa block of Darjeeling District, West Bengal to assess the training needs of the pineapple growers and extension personnel and designing strategies to increase the productivity. It was found that training for integrated nutrient management got highest average choice score by marginal, small, medium farmers and extension personnel too. This study also assessed the rank order correlation between perceived training need by extension personnel for different categories of farmer and farmers' perceived training need regarding scientific pineapple cultivation. It can be clearly illustrated that there is a strong degree of agreement between the extension personnel and the three categories of the farmers in terms of ranking pattern. To make the best use of emerging technologies, it is vital that farmers must receive continuous training. Here strategic agricultural extension systems could greatly improve the welfare of the farmers.

Keywords: *Pineapple, Scientific cultivation, Training, Training Need, Extension Strategy.*

Identification of Strigolactone analogues of microbial origin through computational approaches: Possible candidates for improving mycorrhizal root colonization

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Abstract

Strigolactoneproduced by plantplays major role in signalling of arbuscular mycorrhizal fungi (AMF) colonisation. Many bacteria have also been implicated as helper bacteria improving the AMF colonization in plants. In this study, using computational approaches we attempted to understand the interaction of strigolactone with mycorrhizal ?/? hydrolase which is important for colonization. Further, we tried to identify structural analogues of strigolactone with microbial origin which can aid AMF in colonization. The interaction of strigolactone and the ?/? hydrolase of two AMFs (Gigaspora margarita and Glomus cerebriforme) showedhigh binding affinity in the range of -7.9 to -9.8 kcal/mol. Using NPASS natural product database, 223 analogues of strigolactone were obtainedand out of these, only three viz.7-O-methylcryptochinone A, cryptotanshinone and dihydrotanshinoneI were from bacterial origin.Cryptochinone which is flavonoid was found to be more similar to strigolactone as per the used parameters and showed high interaction (binding affinity -9.7 kcal/mol) with ?/? hydrolase indicating a possibility that it can work similarly as strigolactone. Additionally, naringin and quercetin (these flavonoids have been reported to be produced by actinobacteria) were also checked for interaction with ?/? hydrolase. Naringin showed significant binding affinityof -9.3kcal/mol and -8.7 kcal/mol with G.cerebriforme and G. margaritarespectively whereas quercetin had binding affinity of -8.7 kcal/mol and -9.2 kcal/mol with G.cerebriformeandG. margarita respectively. Therefore, such flavonoids can be used to improve the AMF colonization in plants and especially the bacteria/actinobacteria producing such compounds can be used as helper bacteriafor AMF.

Keywords:*Strigolactone, AMF, Gigaspora sp., Glomus,Actinobacteria*

Coping strategies adopted by farmfamilies of Uttarakhandto combatclimate change

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Abstract

Climate change is a major global environmental concern all over the world affecting livelihood security. Adverse impact of climate change includes extreme weather, floods, droughts, submergence of coastal areas due to rise in sea level and extreme climate variability. Hill regions are considered to be the most vulnerable to climate change. Majority of the people in Uttarakhand live in rural areas and practice terraced farming on hilly slopes that is mainly rain fed. The impact of climate change on hill agriculture include receding glaciers, reduced availability of water for irrigation, erratic and irregular rains, hail storms leading, reduction in snow fall, rise in temperature, landslides,drying up of natural streams, advancing cropping seasons, increased insect-pest manifestation, decline in crop yield, shortening of maturity periods of crops and so on. Adaptation of coping strategies with climate change requires awareness of climate change, its causes and knowledge of improved agricultural practices, perception of how biodiversity and climate change are linked in terms of adaptation solutions. Present study was conducted to know the awareness of farm women on indicators, effects and causes of climate change and to know the situation specific adaptation strategies practiced by them. Study reveals that majority of the rural women were aware of increase in temperature (91.00%), changes in water level (77.00%), irregular and erratic rainfall (69.0%), decline in soil productivity (56.00%), frequent flood (54.00%) and heavy fog (50.00%). Farm women perceived that summer temperature has increased whereas rainfall has decreased over the years. Farm families had adopted diversification of crop type and crop varieties, switching from mono cropping to integrated farming as the major coping strategies. Rest of the practices was adopted by a few farm women only. Thus, there is need to create awareness and motivate farm families to adapt climate smart agricultural practices.

Keywords: *climate change, hill farming, awareness, adaptation strategies*

Diversity of Odonatesof three selected sites of Kota, Rajasthan (India)

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Abstract

Odonates are the insects that are commonly seen in and around water bodies. Kota region is a semi-arid zone with many ponds and canals of Rajasthan, India. Among them Chatra Vilas Garden (near a pond) as S1, Umed Ganj (near a canal) as S2 and Abheda Mahal (near a large pond & adjacent to the palace) as S3 were selected for the present study on the basis of their location. The study was carried out during 2018 to 2021.The study revealed a total number of 20 species of Odonates belonging to 2 families, out of which 15 species were dragonflies of family Libellulidae and 5 species were damselflies of family

Coenagrionidae.

S.No	Family: Species	S1	S2	S3
Libellulidae				
1	Acisomapanorpoides	+	+	+
2	Bradinopygagerminata	+	+	-
3	Branchydiplexsobrina	+	+	-
4	Branchythemiscontaminata	+	+	+
5	Crocothemisservilia	+	+	+
6	Diplacodeslefevrii	+	+	+
7	Diplacodestrivialis	+	+	-
8	Neurothemistullia	+	+	+
9	Orthetrumluzonicum	+	+	+
10	Orthetrumpruinosum	+	+	+
11	Orthetrumsabina	+	+	+
12	Rhyothemisvariegata	+	+	+
13	Tholymistillarga	+	+	+
14	Trithemispallidinervis	+	+	-
15	Urothemissignata	-	-	+
Coenagrionidae				
16	Agriocnemis pygmaea	+	+	+
17	Ceriagrion coromandelianum	+	+	+
18	Ischnura aurora	+	-	+
19	Ischnura senegalensis	+	+	-
20	Pseudogrion sp.	+	+	+

S1- Chatra Vilas Garden,S2- Ummed Ganj, S3- Abheda Mahal, +Present, -Absent

dragonflies were more dominant than damselflies and Libellulidae and Coenagrionidae were the dominant families of sub-order Anisoptera and Zygoptera respectively.This study also provide basline data for further investigations and also a small contribution for maintaining data of Odonates of hadotti region, Kota, Rajasthan.

Keywords: *Abheda Mahal, Chatra Vilas Garden, Damselfly, Dragonfly, Kota, Umed Ganj*

Impact of Nano Selenium Supplementation on Growth Performance of Broiler Chicken

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Abstract

Minerals play an important role in various forcibly functions that are necessary to sustain life and maintain optimal health and thus are essential nutrients. The amount of minerals present in the body

and their metabolic roles varies considerably. Minerals are required for a number of functions like normal body maintenance and function, growth, production and reproduction. Minerals added into the animals feed are 20-30 times higher than the normal requirement of animals due to the bioavailability of minerals from its inorganic sources is quite low which can lead to excess excretion of these minerals in the faeces resulting in environmental pollution and it may affect the balance of other minerals. Bioavailability of the minerals can be enhanced by increasing the surface area for which nano technology are used. So these nano minerals are used for enhancing the bioavailability of minerals in livestock which is helpful in improving growth, production and health status of animals. Among the micro minerals, selenium (Se) is one of the essential trace mineral for animal and human health. Supplementation of Se usually in livestock diet has been proved as effective element. However, studies explaining the role of nano selenium as a dietary supplement on the performance of the broiler chicken.

Keywords: *Minerals, Bioavailability, Nutrient, Nano Selenium, Broiler Chicken, Production.*

Efficacy of herbicides on weed control, rhizospheric micro-organisms, soil properties in groundnut and their residual impact on succeeding crop

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Abstract

The experiment was carried out at Research Farm, College of Agriculture, RVSKVV, Gwalior wheregroundnut variety ICHG-00440 (Mallika) was sown on well prepared land in randomized block design and replicated thrice with approved package of practices. The treatments Imazethapyr 35% + Imazamox 35% WG @ 75, 100 and 200 g/ha, Quizalofop ethyl 5% EC @ 1000 ml/ha and Imazethapyr 10% SL @ 1500 ml/ha were applied at 2-4 leaf stage of weeds (20 days after crop sowing) during early morning hours. MSO adjuvant @ 2 ml/ lit water was also used with the treatment of Imazethapyr 35% + Imazamox 35% WG. Imazethapyr 10% SL application was done along with Ammonium sulphate and surfactant @ 2 g and 2 ml/lit water, respectively.One was control and in the plots of hand weeding, hand weeding was done twice at 20 and 40 days after crop sowing. The application of treatments was done by knapsack sprayer fitted with flat fan nozzle and sprays solution @ 500 lit water/ha was used. The wheat crop was sown after harvesting of main groundnut crop in same experimental plots without disturbing original lay out plan.

The most prevalent weed species in the experimental plots were Echinochloacolona, Echinochloacrusgalli, Cynodondactylon, Digera arvensis, Commelinabenghalensis, Trianthemaportulacastrum and Cyperus rotundus etc.The experiment conducted for the bioefficacy evaluation of Imazethapyr 35% + Imazamox 35% WG @ 100 g/ha resulted in effective control of weeds in groundnut crop. The yield was also recorded higher with the application of Imazethapyr 35% + Imazamox 35% WG @ 100 g/ha with no phytotoxicity to groundnut crop and no adverse impact on soil physicochemical properties, rhizospheric micro-organisms and on succeeding wheat crop. The use

of Imazethapyr 35% + Imazamox 35% WG @ 100 g/ha is suggested for the effective control of weeds in groundnut crop.

Keywords: *Bioefficacy, Groundnut, Herbicides, Rhizospheric microflora,Phytotoxicity, Soil physicochemical properties.*

Communication skill of the farm women for agricultural information network output: An empirical study

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Abstract

Communication skill is an important component of human being. There are many studies was found on communication skill level of rural women but limited study was found on influence of this communication skill on agricultural information network output. In this study farm women communication skill were find out and a further study was done on influence of the communication skill on knowledge development. Ex-post facto research design and both purposive and random sampling method were used for selection of the sample respondent. It is found from the study that communication skill of the farm women was high followed by medium and low. It is concluded from the study that reception skill, processing skill, expression skill and feedbackorientation were positively and significantly influence on knowledge of the farm women.

Keywords: *Communication skill, farm women, reception skill, processing skill, expression skill, feedback orientation, knowledge*

Impact of land use and altitudinal variation on some chemical properties in Eastern Himalayan region of West Bengal

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Abstract

The experiment was conducted at Himalayan region comprising Kalimpong and Darjeeling district

adopting three (3) factor factorial experiments. We studied more than 15 years old five (5) major land use systems (LUS) 1. open cropped 2. mandarin based system, 3. large cardamom based system, 4. ginger based system and 5. tea plantation. Four (4) altitudinal gradient (A) of 400-500 m, 900-1000 m, 1400-1500 m and 1900-2000 m in such a way that LUS falls in each and every altitudinal gradient; and three (3) distinct soil depth (D) of 0-15 cm, 15-30 cm and 30-45 cm respectively. The soils of the experimental site found moderate to strong acidic in reaction with high organic carbon (%) and permissible EC at surface as well as sub-surface soil. The mean value of surface soil combining altitude and depth to find land use as a factor and there were significant difference. Furnishing the result in a 3 factor factorial design with DMRT analysis, there were significant variation among the five major land use systems, tea plantation registered the lowest mean value of soil pH (4.73) and EC (0.048 dSm-1), whereas the highest mean value of pH (5.31) and EC (0.091 dSm-1) was associated with open cropped area. However, the organic carbon showed the reverse result, showing highest associated with tea plantation and lowest with open cropped area. The natural trend for soil pH and EC accordance to the land use system are as follows, open cropped > mandarin > large cardamom > ginger > tea plantation respectively. The reverse trend was observed in OC. When we investigated at the mean pH, EC, and OC values in relation to altitude, we found that the pH value falls as the height gradient increases. However, OC had reverse trend of decreasing value with increase in altitude.

Keywords: *altitude, soil depth, land use system and soil chemical properties*

Golden gate based cloning of AAP3 gene for increasing rice tillering

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Abstract

Rice (Oryza sativa L.) is a major staple food and is now the model crop plant for genetic research. Manipulation of genetic resources has made a significant contribution to addressing rising food demand for the world's ever-increasing population. Rice production is influenced by a variety of agronomical traits, one of which is tillering. Rice tiller is a specialised grain-bearing branch that grows independently of the mother stem (culm) via adventitious roots. Tillering is also a model system for studying monocotyledonous plant branching. Although the morphology and histology of rice tillering as well as several mutations of rice tillering, have been fully documented, the molecular mechanism of rice tillering is still unknown. Although there are many genes that control rice tillering, one of them is the amino acid permease 3 (AAP3) gene. AAP transporters are involved in the loading of amino acids into the nitrogen sink and supply, as well as nutrient allocation during plant development. Increased OsAAP3 expression in transgenic plants will show considerably greater Lys, Arg, His, Asp, Ala, Gln, Gly, Thr, and Tyr amino acid concentrations, as well as reduced bud outgrowth and induce rice tillering. However, suppressing the expression of OsAAP3 leads to reduce Arg, Lys, Asp, and Thr concentrations to a modest level, promoting bud outgrowth, increasing tiller numbers and effective panicle numbers per

plant, and improving grain yield and nitrogen usage efficiency (NUE). Thus the knockout of AAP3 gene using CRISPR-cas9 genome editing tool will show higher number of tillers. sgRNA construct were prepared targeting first exon of AAP3 gene using gRNA primers and then overlapping PCR were performed for constructing sgRNA expression cassettes. Further, golden gate assay cloning was done for Cas9: gRNA binary vector cloning (PYLCRISPR/Cas9Pubi-H). Then the cloned gRNA:Cas9 vector will be transformed to the target rice variety through Agrobacterium mediated transformation.

Keywords: *Oryza sativa, tillers, AAP3, CRISPR-Cas9, sgRNA, golden gate assay.*

Seasonal incidence of ginger shoot borer (Conogethes punctiferalis) and its correlation with abiotic factors

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Abstract

A field experiment was carried out in the Experimental farm, Department of Entomology, School of Agricultural Sciences and Rural Development (SASRD), Nagaland University, Medziphema campus during 2018 and 2019 to study the seasonal incidence of ginger shoot borer (Conogethes punctiferalis) and its correlation with abiotic factors. The experiment was laid out in Split Plot Design with 3 replications. The results revealed that the incidence of C. punctiferalis was observed from 120 DAP (Days after planting) in D1 (15th February planting) which falls in the second week of June and for D2 (17th March planting) the incidence of C. punctiferalis was observed from the second week of July and for D3 (16th April planting) the incidence of C. punctiferalis was observed from the second week of August for both the years. Considering the whole experimental period from June to December the highest incidence of C. punctiferalis was observed at 210 DAP in D3 which falls in the second week of November whereas the lowest incidence was recorded at 120 DAP in D1 which falls in the second week of June respectively. Among the weather parameters, maximum temperature and rainfall showed negative correlation whereas maximum relative humidity (RH) showed positive correlation on the incidence of C. punctiferalis for both the years.

Keywords: *Conogethes punctiferalis, seasonal incidence, abiotic factors*

Effect of Organic Liquid Fertilizers on The Soil Fertility Status and Plant Nutrition Behaviour of Gladiolus

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Abstract

The present experiment was conducted during the year 2021 in the Research farm of Horticulture

Department, NU:SASRD to find out the effect of organic liquid fertilizers viz., Effective micro-organisms (EM), Indigenous Effective micro-organisms (IEM) and Jeevamruthato study the effect of organic liquid fertilizers on the soil fertility status and plant nutrition behaviour of gladiolus (Gladiolus grandiflora L.). The experiment was planned in a Randomized block Design (RBD) with 8 treatments. The results revealed that nitrogen and phosphorus content (4.4% and 0.011%) in index leaves was highest in T2 (EM) and T3 (IEM) respectively. In corms, highest nitrogen content (3.13%) was in RDF and phosphorus content (0.015%) was in T3 (IEM). Highest available N (982.6 kg ha-1), available P (62.72 kg ha-1) and available K (522.67 kg ha-1) in soil after harvest was obtained with T2 (EM). The highest organic carbon content (2.83%) was recorded in T5 i.e., 50% RDF + 50% EM.

Keywords: *Effective micro-organisms, Gladiolus, Indigenous, Jeevamrutha, Organic*

Optimization Of Puffing Condition Of Rte Puffed Garlic Slices Using Response Surface Methodology

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Abstract:

The processing condition puffing temperature (140, 150, 160, 170 and 180ºC) and moisture content (5, 7, 9, 11 and 30 % d.b) of puffed garlic slices were optimizes by response surface methodology (RSM). A central composite rotatable experimental design with two factors and five levels was used. Thirteen experimental trials with five central points were performed. The relationship between the dependent and independent variables were determined by fitted second order polynomial equation. The result revealed colour ((L*value), hardness, crispiness and expansion ratio decreased with increase in roasting temperature and moisture content. The values obtained for colour (L*value), hardness, crispiness (+ve peak) and expansion ratio ranged from 51.17-59.25, 1142-1689 g, 5-8 and 1.6-2.05, respectively. There was significant difference ($p<0.05$) in the values obtained for quality parameter and these showed a decreasing trend with increasing puffing temperature and moisture content. The optimum puffing temperature and moisture content recorded were 160ºC and 5 %. The desirability value for all the responses was approximately 59.23 colour L* value, 1055 hardness, 8 crispiness and 1.984 expansion ratio. This implies that temperature and moisture content combination and varying these processing condition have strong tendency to affect the general properties of RTE puffed garlic slices. The impact of puffing temperature and moisture content were significantly indicated on the parameter analyzed.

Keywords: *RTE puffedgarlic slices, Puffing temperature, Response Surface Methodology*

Scope and Prospects of Fisheries towards Livelihood Security in Uttar Pradesh

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Abstract

Uttar Pradesh, the most populated state of India harbors many water reservoirs, ponds, lakes and rivers like Ganga, Yamuna, Ramganga, Gomti, Ghagra and its tributaries. The state has about 9% of total land area out of which 464840 ha.are water bodies. Fifteen districts of Uttar Pradesh harbors 60 major reservoirs and Sonbhadra has the largest area (52000 ha.) as water reservoir. The fish biodiversity is very high in the state and it occupies about 15% of total freshwater fish diversity of the country. The indigenous fish species like carps Lobeorohita, L. calbasu, Catlacatla, Cirrhnusmrigala and catfishes viz: Silurusaor, S. seenghala, Mystuscavasius, the snake heads Channa. marulius and C. striatus are the major source of livelihood security of fishing communities in the state. In addition to the large reservoirs and wetlands, the ponds including community and private ponds has a huge potential of development for aquaculture and fisheries activities. As per the data of State Fisheries Department, the current production of 746,000 metric tonnes of inland fishes in the state contributes toward approximately 10% of total freshwater fish production of the country. Various anthropogenic activities and urbanization are major threat to water bodies of Uttar Pradesh and the freshwater resources of the state are currently experiencing significant decline in fish biodiversity. However, the potential of fisheries is under exploit and needs to be intensified to increase the income of farming communities.A comprehensive and participatory approach is required to encourage the fisheries vis a vis conservation of indigenous species in the state.

Key words: *Fisheries, water reservoirs, Uttar Pradesh*

Efficacy Of Fenoxaprop-P-Ethyl 69EC On Direct Seeded Rice (Oryza sativa L.) In New Alluvial Zone of West Bengal

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Abstract

A field experiment was conducted during kharif 2021 to study "Efficacy of fenoxaprop-p-ethyl 69EC on direct seeded rice (cv. IET 4786)" at the Instructional Farm, BCKV, West Bengal with nine treatments viz. T1- Weedy check, T2- Fenoxaprop-p-ethyl 69EC @ 51.75 g a.i. ha-1, T3- Fenoxaprop-p-ethyl 69EC @ 69 g a.i. ha-1, T4- Cyhalofop-butyl 10% EC @ 80 g a.i. ha-1, T5-Pretilachlor @ 0.75 kg a.i. ha-1+ Fenoxaprop-p-ethyl 69EC @ 51.75 g a.i. ha-1, T6- Pretilachlor @ 0.75 kg a.i. ha-1+ Fenoxaprop-p-ethyl 69EC @ 69 g a.i. ha-1 and T7- Pretilachlor @ 0.75 kg a.i. ha-1+ Cyhalofop-butyl 10% EC @ 80 g a.i. ha-1, T8- Hand weeding at 20 and 40 DAS and T9- Weed free (hand weeding at 15 days

interval) replicated thrice in randomized block design. The Pretilachlor, Fenoxaprop-p-ethyl and Cyhalofop-butyl were applied at 3,15 and 15 days after sowing respectively. The results revealed that the weed free treatment (T9) exhibited best in terms of weed control and yields, but lower BCR (1.36) due to highest labour cost. Therefore, T6treatment was superior inweed control efficiency (54.82%), weed index (11.34%), grain yield (3.05 t ha-1), straw yield (4.11 t ha-1), BCR (1.90) among herbicidal treatments.Hence, the application of Pretilachlor @ 0.75 kg a.i. ha-1+ Fenoxaprop-p-ethyl 69EC @ 69 g a.i. ha-1(T6) showed satisfactory performance as remunerative weed control in direct seeded kharif rice.

Keywords: *BCR, Direct seeded rice, Fenoxaprop-p-ethyl 69EC, Weed control, Yield*

Agronomic Innovations and Interventions for Precise and Mechanized Direct-Seeded Rice

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Abstract

Rice is the major food staple for nearly half of the global population and about three-fourth of the Indian population. Farmers are continuously facing numerous challenges to enhance rice production and their income levels due to rising cultivation costs, escalating labor wages, growing labor shortages, climatic vulnerabilities, COVID-19 pandemic, etc. Direct-seeded rice (DSR) has been proving to be a more input-efficient, climate-resilient, and cost-effective alternative to puddled transplanted rice (PTR). Although direct-seeding offers exhilarating opportunities for improving water and environmental sustainability, many studies have raised concerns due to early flooding, poor germination under anaerobic condition, uneven crop stand, intense weed problem, soil sickness, yield decline, etc. Appropriate rice genotypes along with robust crop establishment methods (dry-, wet-, or water-seeding) and scale-appropriate mechanization are critical to the success of direct seeding practices that require less water and less labor. Anaerobic germination (AG)-tolerant rice genotypes provide a ray of hope for the popularization of DSR in rainfed lowland environments. Weeds are considered as one of the major obstacles in attaining full genotypic yield potentials in DSR systems that greatly rely on chemical weed management. Deployment of weed-competitive inbreds or hybrids along with their better bet agronomy is an innovative strategy for precise DSR. Herbicide-tolerant rice genotypes can be a game changer in improving the crop performance and facilitating wider adoption of DSR. Proper land selection and preparation (including precise levelling), sowing attributes (right seed rate, seed invigoration, seeding depth, spacing, sowing time), integrated weed management (stale seed bed, pre- and/or post-emergence herbicides, manual or mechanical weeding), precision nutrient management (site-specific nutrient management, including micronutrients, especially zinc, boron and/or iron), precise water management (particularly during crop emergence and establishment phases), and integrated pest and disease management practices are the major interventions for achieving higher productivity and profitability with DSR. Compared to the PTR, DSR can save cost (20-30%), irrigation water (20-50%) and labor (30-40%), and reduce methane emissions (20-50%).

Key words: *Crop establishment, Direct-seeding, Integrated weed management, Mechanization, Precise water management, Rice genotypes*

Extraction of carrageenan from Kappaphcus sp from Gujarat, India

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Abstract

Red seaweed is an important resource since it is the main source of carrageenan. Carrageenan is polysaccharides composed of D-galactose and 3,6-anhydrogalactose units which is linked by ?-1,3 and ?-1,4 glycosidic. Carrageenan has multiple usages in food and others industries. In food industries it is use as thickening and gelling agent or clearing agents for industrial effluents. Several extraction processes are followed by researcher to extract carrageenan from red seaweed. In the present study, six different extraction protocols were employed to find best method for the particular species based on yield and gel strength. Proximate composition of the seaweed was analyzed and the results showed the total carbohydrates, ash, protein and lipid content were 59.6 g%, 22.6 g%, 14.7 g% and 3.1 g% on dry weight basis respectively. Further, carrageenan extracted from the seaweed was analyzed for the yield and gel strength. The highest yield and gel strength was found to be 30 (g%, dry weight basis) and 334 (g) respectively. There is a scope for improvement of yield and/or gel strength from this species by optimizing the extraction parameters.

Keywords: *carrageenan, red seaweed, extraction, gel strength*

Studies of Nano fertilizers on Yield, Economics and Water Use Efficiency in Potato (Solanum tuberosum L.) Under Various Irrigation Schedules

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Abstract

To quantify the effect of nano fertilizers(N, P, K and Zn) combining with irrigation on potato (var.KufriHimalini), a field experiment was conductedat Instructional farm, BCKVduring rabi seasons of 2019-20 and 2020-21insplit plot design thrice replicated with three irrigation schedules at 15, 30 and 45 CPEkept as main plot factor and five nutrient management practiceslike 100% RDF (200:150:150 kg/ha of N: P2O5: K2O), 75% RDF+ nano fertilizers (N, P, K at 80:40:40 ppm), 100% RDF+ Nano-Zn (10 ppm), 75% RDF+ nano fertilizers (N, P, K and Zn at 80:40:40:10 ppm) and Nano-fertilizers (N, P, K at 80:40:40 ppm) as subplot factors. All nano fertilizers were applied as foliar spray at 25 and 50 DAP. Pooled results of the experiment revealed that irrigation at 15 CPE along with100% RDF and

Nano-Zn (10 ppm) treatment significantly produced higher yield (22.54 t ha-1) and economic returns (Rs.174052 net return ha-1and 2.62 benefit-cost ratio) than others. However, irrigation at 45 CPE along with 100% RDF and Nano-Zn (10 ppm) treatment recordedhigher water use efficiency (92.01 kg/ha-mm). Therefore, irrigation at 15 CPE and 100% RDF along with Nano-Zn (10 ppm) can be recommended for higher productivity and profitability in potato.

Keywords: *Economics, Irrigation, Nano fertilizers, Potato, Water use efficiency, Yield*

Genetic analysis of lentil with reproductive stage P deficiency tolerance

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Abstract

Identification of P-deficiency tolerance lentil will be useful in expansion and enhancing productivity in vast rice-fallow areaswhere limitation of plant-available P is common. Under limited P, wide variation of shoot P-content observed ranging from 20-89% of the P-acquired in sufficient condition with 70% habitability.To identify the P deficiency tolerance lentil genotype, 80 genotypes were screened for consecutive three years following augmented design. They were sown in 15th November in each year (normal sown, NS) with three popular cultivars as check in P deficient soil of Regional research substation Sekhampur. Physiological traits like shoot biomass, root biomass, pre-flowering biomass, days to flowering etc was measured at reproductive stage at the onset of flowering. Shoot phosphate uptake was measured based on acid digestion method and absorbance was measured. Significant positive correlation (0.55) was observed between shoot phosphorous uptake (mg./g dw) and yield per plant (g.). Mean seed weight/plant (g) varied from 1.04 to 3.5 in P supplemented soil whereas it varied from 0.04 to 1.78 without any external Phosphate supplementation.Five genotypes, acquired 30 mg/plant in P-limited condition where mean acquisition was 14.4 mg/plant only. As compared to PS-grown plants, 4-6 times high intercellular acid phosphatase activity detected in roots of the tolerant genotypes in P-limited condition. Identified top three tolerant genotypes showed 30% reduced seed-yield on P-deficient field as compared to 60% or more reduction in no tolerant genotypes. SSR based diversity analysis identified Precoz and ILL6002 as most diverse genotypes compared to the rest. High PIC value was observed by SSR107 and ALD41; recommended for variety-specific banding pattern in lentil. Identified heat tolerance lentil line showed 30% yield advantage over popular cultivar WBL77.

Evaluation of suitable herbicides for controlling weeds in rabi transplanted rice in old alluvial zone of West Bengal through OFT

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Abstract

A field experiment was conducted as On Farm Trial (OFT) during rabi 2018-19 to 2019-20 at the different Farmers' Fields of Kumarganj Block by the DakshinDinajpurKrishiVigyan Kendra, Uttar BangaKrishiViswavidyalaya, Majhian, Patiram, DakshinDinajpur, West Bengal to evaluate theeffect of herbicides in controlling weeds inboro rice involving different herbicides. In OFTs the treatments were kept minimal to avoid multicollinearity effect which would also evoke better understanding of the study by the farming community. The experiment was laid out in a Randomised Block Design consisting of fourtreatments T1 = hand weeding at 21 DAT and 35 DAT as farmers' practice (derived from the Farmer's Participatory survey), T2 = application of butachlor 50% EC @ 1.25 kg a.i. ha-1 within 4 days after transplanting, T3 = application of pyrazosulfuron ethyl 10 % WP @ 160 g a.i./ ha within 4 DAT and T4 = application of bispyribac sodium 10% SC @25 g a.i./ ha 15-20 DAT. Each treatment was replicated by using different farmers' field(having similar soil fertility status and also receiving similar package of practices) be fitting the statistical design. The results of the experiment revealed that the Treatment T4i.e.application of Bispyribac sodium 10% SC @25 g a.i./ ha 15-20 DATin rice fields gave better weed control in respect of weed control efficiency by 24%. The highest value of growth attributes viz plant height, number of tiller per plant and dry matter accumulation as well as yield attributes viz number of panicles m-2 (438), 1000 grain weight (23.2 g) and grain yield (5.97 t ha-1) and straw yield (6.48 t ha-1) of boro rice was also noticed the above mentioned treatment which was statistically significant when compared with the other treatments.

Physical and biochemical attributes of fruit of different banana germplasms found in Sikkim

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Abstract

The diverse local germplasms of banana are found cultivating in the state of Sikkim, North East India, which are not commercially exploited. The proper study on the physical and biochemical attributes of any unexplored germplasms is prerequisite for their commercial exploitation. The fruit quality and the price realization have direct bearing on the physical and biochemical analysis. Further such study will help in identifying the genotype for improving the crops. There are scanty literatures on study of physical and biochemical attributes of the local banana germplasms cultivating in Sikkim. Several germplasms with distinct local names are found cultivating viz.Hajarey, Dhusrey, Bihula, Chini Champa, Kabuli, Kalo Jhapari, Jhaji, Nepali, Sarkhari and Ghew Kera.Therefore, this study envisaged to determine

different fruit attributes.Physical and biochemical analysis such as number of hands per bunch, number of fruit(finger) per hand, fruit weight, fruit length, fruit diameter, fruit peel weight, fruit pulp weight, titratable acidity, ascorbic acid (vit C), reducing sugar, non reducing sugar and total sugar were determined.The present findings of the fruit showed variations amongst different cultivars. The studied parameters during the investigation can be used as the physical and biochemical markers for identification of selected banana germplasms.

Keyword: *banana, gemplasms, local, fruit, physical, biochemical*

Livelihood Resilience of Fishers: A Case Study of Bargi Reservoir, Madhya Pradesh

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Abstract

The study was conducted in 6 fishing villages of the Bargi reservoir of Madhya Pradesh, focusing on the livelihood profile of fishing communities,Focus group discussion with representatives of Fisheries Cooperative Societies & Fisheries Federation officials and interview of 180 fishers were used for data collection.Livelihood resilience of fishers' was evaluated by assessing the five livelihood capitals of the DFID's Sustainable Livelihood Approach using 42 attributes that enable or constrain fishers' livelihoods. These attributes were grouped into five "capitals" viz natural, physical, social, financial and human.Five attributes used to assess the natural capital were distance to the nearest town & nearest resource, sources of drinking water, possession of land and loss due to natural disaster. Six attributes used to assess the physical capital werepossession of boat, availability of fishing gears, ownership of assets, housing conditionvalue addition and marketing of the catch. Twelve attributes used to assess the social capital were leadership capabilities, desire to be a leader, participation in social meetings&social works, social relationships with neighbors&others fishers, women participation in fisheries work, contact with Government and Non- government institutions, women's contribution in decision making, attitude of working together, trustworthiness and helping behavior of community leaders.Seven attributes used to assess the financial capital were money saving habit/ability, credit access, repayment capacity, arrangement of money, supplementary livelihood source besides fishing, change in catch, over the last 20 years and change in revenue generated over the last 20 years.Twelve attributes were used to assess the human capital including fisheries skill, fisheries knowledge, fisheries information, awareness about Govt. fisheries Schemes, desire to learn new tasks related to fisheries, participation in fisheries training programme, attitude towards fisheries department, availability of labour for fisheries work, availability of time & potential to do extra/supplementary work, entrepreneurial behaviour, occupational diversity and activities done by the women of the household.The results showed financial capital was lowest(0.40), followed by social capital(0.45), physical capital(0.45), human capital(0.46) while natural capital was the highest(0.57).Alternative livelihood options preferred by fishers such as aquaculture in village ponds,

eco-tourism and ornamental fish culture needs to be prioritized by Fisheries Federation to improve the financial capital of fishers.

Keywords:*Livelihood capitals, Fishers, Sustainable Livelihood Approach, Attributes, Participation and Fisheries*

Performance of Newly Introduced Fodder Crops in Rice -wheat Cropping System in Adopted Villages of Bareilly District in North Western U.P.

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Abstract

Two demonstrations were conducted in the adopted villages of IVRI for transfer of technology from lab to land programme.Trials were conducted in the project villages viz Mohanpur,Kalapurin 2003-4 and khata, Bhansar during 2013-14 after ten years.Napier Hybrid NB 21,multi cut Bajra(Ganga kaveri,Pearl millet)as new crops were introduced in the study area .Forage maize (Sweta) was grown for comparative studyas a controlforage crop.The growth of napier Hybrid NB 21 was found to be fast growing crop over the other forage crop during summer and rainy seasons.Napier Hybrid raised wih scientific package of practices on farmers field.This crop gave 825.1 q/ha green fodder.the crop was harvested 4-5 times by the farmers.Maize cultivar Sweta was harvested at 45-75 days after sowing.This maize provided for one month fodder while, NB hybrid gave green fodder round the year.Maize gave 525.4 q/ha green fodder.Forage liking of animal feeding or palatability was maximumfor forage maize. Pealmillet multi cut cultivar Ganga Kaveri harvested 3-4 times by September and produced 445.7 q/ha leafy,succulent fodder to milch animals during summer and rainy seasons. This was the second choice of animals. This was found to be good for feeding dairy animals long with wheat straw in 50:50 ratio of green and dry feeding balanced diet.However,palatability of NBH was after MultiCut Bajra.After ten years area under forage crops was increased 2-3 times. NBH from zero to 20 ha and MCB 3 ha and Maize from 2 ha to 7 ha in the adopted villages. Some farmers started green fodder for sale in Rithoura to get more profits per acer of land. Technology adoption rate was higher in adopted villages than the nearbynon-adopted villages.

Keywords*- fodder crop,maize,cropping system,yield,Napier hybrid*

Evaluation of Yield Potential of CO5 BN Napier Bajra Hybrid Crop Under Irrigated Condition in Rohilkhand Region of UP

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Abstract

A field trial was conducted at ICAR-IVRI,Izatnagar during 2013-14 to 2017-18 to study of effect months on green fodder yield ,dry mater yield,and morphological charactersand effect of ratooning of Co5

Napier hybrid Bajra for five years .The crop was planted in March in a one acer of area and harvested to feed the livestock farm. Crop forage yield was increased from first year to third year 2015-16 and was stable in forth year.Fourth year and first year forage yield were at par. Stem size , girth, leaf length ,and width were maximum during first and second year. Fifth year yield of Co5 declined as compare to previous years. Plant height was found higher more than 60 cm during rainy season . Number of tillers per clump more than 15 were counted in fourth year. Number of leaves,length,width and weight was observed maximum in July-August-Septemberharvesting months. The growth was stunted during December- January-February. This lean period can be utilised for short duration crops like Berseem,Annual Rye Grass, Barley or Mustard to boost the forage yield in winter season.Surplus fodder may be utilised for Hey making or Silage making for lean period of supply.Dry mater content was also higher during summer season. All para meters might be affected by climatic factors viz rainfall, minimum-maximum temperature,and plant nutrition management every year along with good agronomic practices. Sixth years old ratooning of Co5 is under observations.Economics of Co 5 BN is more profitable then annual forage crops.The maximum yield 1735.4q/ha green fodder was recorded inthird year,while 1412.8 q/ha and 1522.5 q/ha was recorded in 2013-14 and 2017-18, respectively.

Keywords:*Napier, Fodder, yield, Dry matter, Harvest, Climate*

Evaluation of some plant extracts and Jatropha oil against pulse beeltle (Callosobruchus chinensis L.) infesting ricebean (Vigna umbellata) seeds

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Abstract

Experiments were conducted to evaluate the efficacy of some botanical plant extracts and Jatropha oil against pulse beetle (Callosobruchus chinensis) infesting ricebean (Vigna umbellata) during 2019 and 2020.The botanicalstested wereAzadirachta indica, Piper nigrum, Ocimumtenuiflorum, Eucalyptus globules, Allium sativum, Pongamia pinnata,Litseacitrataand Jatropha oil.The experiment was conducted in a Completely Randomized Design with 3 replications.The efficacy was evaluated on the basis of toxicity, oviposition reduction, adult emergence, infestation and weight loss.Among the different botanicals tested, the order of toxicity was found in the following order: P. nigrum> Jatropha oil >L. citrata>A. indica>E. globules>O. tenuiflorum> P. pinnata >A. sativum.Jatropha oil @ 3% concentration showed the highest reduction in oviposition (82.30%) followed by L. citrata @ 3% (35.82%) andP. nigrum @ 2% (22.18%).The adult emergence varied from 15.78 to 70.31%. The lowest adult emergence was from Jatropha oil treatment (15.78%) followed by L. citrata (56.08%).The observations on per cent infestation and weight loss wererecorded at 2, 4 and 6 months of storage. Jatropha oil was the most effective with minimum seed infestation (1.40, 2.11 and 4.65%) and weight loss (2.36, 2.91 and 3.23%) at 2, 4 and 6 months of storage which was at par with the standard check Malathion 50EC up to 4 months of storage. L. citrata seed extract provided effective protection up to 2 months of storage with an infestation of 17.61% and weight loss of 4.10% followed by P. nigrum seed extract with an infestation

of 26.18% and weight loss of 5.60%.The treatments did not show any adverse effect on the seed germinability.

Keywords: *Botanicals,efficacy, pulse beetle, ricebean, treatments*

Ecological survey of Nardostachys grandiflora DC. found in higher elevations of Sikkim

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Abstract

Nardostachys grandiflora DC. [Family Valerianaceae] commonly known as Jatamansi/ Indian Spikenard is a perennial herb found in Alpine Himalayas. It is a valued medicinal plant known to use in variousfields of the medicinal system for its many therapeutic activities and aromatic properties. Due to its increasing load of demand, the unscientific harvest of rhizomes, habitat degradations, other biotic interferences, and change in natural habitat have pushed this plant in threatened to endanger plant categories in different parts of Himalayas. The present study was undertaken to document the ecological status and ethnobotany of N. grandiflora DC. in the Alpine region of East, West, and North districts of Sikkim Himalaya. In each of the study areas, a plot of 20mx150m was taken and was marked as the main plot and then it was further divided into 3subplots of 20m x 50m. Total of 15(1m x1m) random quadrants were taken from each plot. The maximum population of N. grandiflora was found in Changu Lake (East Sikkim) whichwas found to be38 in numbers per quadrant, whereas, the minimum population was recorded in Thangu (North Sikkim). During the survey, thirty six associated species were noted from different study areas.As perceived by the respondents, all the parts of the plant are used for medicinal purposes, however, the rhizome is mostly used. Decoction and juice of the plant are used as a bitter tonic, stimulant, antispasmodic, etc. Even though the plant possesses a higher degree of medicinal properties, it is more often used for spiritual purposes.Looking at all the aspects of the plant, spreading awareness about the scientific harvesting and sustainable use of the plant among the users is sought.

Seed germination and seedling growth characteristics of rice (Oryza sativa L.) landraces from Sikkim Himalaya: response to aluminum (Al) toxicity

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Abstract

Sikkim, the "valley of rice", has a wide array of uniqueindigenous landraces of rice that are adapted to diverse agro-climatic regions of the state. Quite interestingly, the soil in sizable parts of the state is acidic in nature. Indeed, the crop productivity and yield are strongly restricted on acid soils mainly due

to Aluminium(Al) toxicity all over the globe. It is likely that some of the landraces have evolved enhanced Al tolerance. It was of interest to examine the variability,if any, in the seed germination and seedling growth aspects of 15 different landraces of rice (Oryza sativa L.) from Sikkim Himalaya,together with their response to Al toxicity. Shortly after harvest, the seed germination performances as well as the seedling growth in terms of root/shoot length, seedling fresh/dry weight of the following landraces were evaluated: Brimphool, Black Tukmar, Champasare, Chinizho/Chini Dhan, Dhanasae, Dharmali, Dut Kate, Krishna Bhog, Lama Dhan, Mumpupzho, Nepalzho/Nepal Dhan, Ruduwah, Sano Attey, Tukmarzho, and Tulasi. Of the studied landraces,10 were further screened for their seed germination and root growthresponse to toxic Al concentrations (0-100 μM) at pH 4.5 for 4 d. Eleven landraces exhibited complete (100%) germination with variation in the time course pattern. In contrast, four i.e., Dhanasae, Dharmali, Dut Kate, and Brimphoolexhibited poor germination; final count remained in the range of 30-60 %.Irrespective of the germination performance, substantial differences were observed in the seedling morphology and growth parameters with organ-specific differences.Al treatment led to concentration dependent inhibition of seed germination and root growth of different genotypes. Thus, based on the magnitude of root growth inhibition, Krishna Bhogand Dhanasae proved sensitive to the toxic Al concentrationswhereas, Black Tukmarand Champasare were relatively tolerant, others being in between the two groups. Further analysis is in progress. The findings have implications for selection of Al-tolerant genotypes for cultivation in situations of elevated Al concentrations.

Keywords*:Seed Germination, Seedling Growth, Oryza sativa, Aluminium toxicity, tolerance*

Sub-acute renal toxicity study of CETP treated tannery wastewater in Swiss mouse (Mus musculus) model.

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Abstract

Tannery industries are renowned for being major sources of soil and water pollution. There are approximately 3000 tanneries in India, with the majority (nearly 80%) using the chrome tanning process. To convert hides into leather, chromium salt is used during the tanning process, and the wastewater produced contains a large amount of organic matter, phenolics, tannins, and toxic heavy metals, particularly chromium. When wastewater containing a variety of toxic pollutants is discharged into the environment, it causes severe soil and water pollution as well as serious health risks to humans, animals, and plants. In Indian scenario, there has been sparse research on the subacute toxicity impact of tannery wastewater in animal test models so far. The present study was aimed to assess biochemical and histopathological alterations in repeatedly exposed Swiss mice (Mus musculus) for 28 days with common effluent treatment plant (CETP) secondary treated tannery wastewater. According to the OECD test guidelines, the mice were divided into four groups, each with five animals. These groups were given purified water, 2.5%, 5%, and 10% tannery wastewateras a control, low dose, mid dose, and high dose

respectively. All animals were given feed and water ad libitum. Animals were euthanized after 28 days to collect the kidneys, which were then processed and stained with haematoxylin and eosin for histological analysis. Simultaneously Urea and Creatinine were analysed from plasma to look over the biochemical functioning of kidney which were found nonsignificant. Examining the cellular renal structure, no treatment related histopathological lesions were observed at low, mid and high dose concentration groups treated with tannery wastewater. The results of subacute exposure did not reveal detrimental effects on kidney. Further long-term repeated dose toxicity studies at the same dose levels are required to examine the toxicity symptoms at cellular level to establish any furthermore conclusion.

Key words: *Renal toxicity, tannery wastewater, Swiss mice, histopathological*

Colorimetric LAMP assay for detection and ecological monitoring of Sarocladium oryzae, an important seed borne pathogen of rice

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Abstract

Accurate and timely disease detection plays a critical role in achieving sustainable crop protection. Globally, rice has been a staple crop for centuries plagued by diseases that greatly hamper its productivity. Sheath rot, an emerging disease of rice caused by seed-borne pathogen Sarocladium oryzae, has reportedly caused heavy losses to agricultural produce in recent years. Our study has led to the development and validation of a LAMP assay for early detection of Sarocladium oryzae, the causal agent of sheath rot from live infected tissues, seeds, weeds, and environmental samples. The assay could detect as low as 1.6 fg/µl of the pathogen in 15 minutes. The assay was implemented to bio-surveil the presence of this pathogen by testing it on three weed species (Echinochloa colona, Echinochloa crus-galli, and Cyperus teneriffae) growing around the rice fields. The results showed the presence of pathogen in two of the weed species viz. E. colona and E. crus-galli. The assay was used to test 13 different rice varieties for the presence of S. oryzae in seeds. Three of the varieties did not show the presence of S. oryzae in their seeds while the rest were found to harbor the pathogen. The developed assay can effectively be used to detect and screen the presence of S. oryzae in live samples including seeds and field soil.

Keywords: *Sarocladium oryzae; Sheath rot; Weeds; Isothermal amplification; Bio-surveillance*

Therapeutic Potential of Betel Leaf Against Digestive Disorders

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Abstract

Modern world is characterized by the excessive consumption ofjunk foods. Digestion of energy dense junk food is very low accounting for the accumulation of the undigested food. It leads toindigestion and the accumulated food becomes toxin resulting in food poisoning and other relateddigestive ailments causing discomfort.Piper betel belonging to the family of Piperaceae, commonly known as 'Paan' or 'Nagvalli' in India is an evergreen perennial creeper with many pharmacologically active constituents. It possessantimicrobial, analgesic, anti-inflammatory, antioxidant and antidiabetic activity. The phytochemicals of betelbetel plant constitutes saponins, flavonoids, polyphenols and essential oils (consisting of chavicol, chavibetol, eugenol). Chewing betel leaf post meal is an ancient food tradition in India.Accordingto Ayurveda chewing Paan after meals eases digestion, by stimulating the release of saliva which is thefirst step in digestion and increase the secretion of digestive enzymes. Although betel leaf is claimed toaid digestion, studies on the effect of the betel leaf on digestion are lacking. Therefore, this study was made to elicit information on the positive effect of betel leaf on the digestion thereby treating digestive illness and enhancing digestion.

Keywords: *Digestive disorders, Piper betel, analgesic, antioxidant*

Nano delivery of biocontrol agents against phytopathogens

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Abstract

Bacterial wilt caused by Ralstonia solanacearum is one of the most devastating plant diseases of economically important crops such as tomato, potato, pepper and eggplant. These crops play a significant role primarily as sources of income and food security for the small scale farming community. Control of phytopathogens by chemicals have negative impact on environment and the residues accumulates in food products. To sustain agricultural productivity, it is essential to control phytopathogens effectively with low inputs. Adverse effects of chemical agents can be alleviated by the use of biocontrol agents. Avirulent strains like Pseudomonas spp., Bacillus spp., and Streptomyces spp. suppress bacterial wilt. These biocontrol agents control phytopathogens through various strategies like production of antimicrobials and they induce systemic resistance in plants. This review addresses the mechanism of action of biocontrol agents againstR. solanacearum. Nanocarriersoffers advantage over conventional carriers in terms of longitivity, efficiency, wettability and dispersibility. This review provides the recent advancements in the nano bioformulation of biocontrol agents.

Keywords: *Bacillus, bacterial wilt, nanoparticles, nano delivery, volatile oils*

Screening of Endophytes for Promoting the Growth of Host Plant

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Abstract

Endophytes are an endosymbiotic group of bacteria or fungi which colonize the intercellular and intracellular locations of perennial plants. These endophytes are not phytopathogens even though they are in close association with plants. Endophytes contribute to plant nutrient-use efficiency (NUE) by several mechanisms including formation of extra-root hyphae for nutrient absorption, stimulating root growth, altering plant metabolism to promote nitrogen and phosphate uptake, nitrogen fixation, and modifying soil directly or altering root exudates. They also involved in phytohormones production,modulation of 1-aminocyclopropane-1-carboxylic acid (ACC) deaminase expression, production of siderophores, and biocontrol.The siderophore production by endophytes helps the plants in iron sequestration and increases the concentration of bio available iron to inner tissues. They act as reservoirs of novel bioactive secondary metabolites, such as alkaloids, phenolic acids, quinones, steroids, saponins, tannins, and terpenoids that serve as a potential candidate for antimicrobial and anti-insect properties. Endophytes increase resistance, tolerance and accumulation of heavy metals in host plants. This review gives an insight into the mechanism of inducing plant growth and combating biotic and abiotic stress in the successful establishment of holobiont.

Keywords: *Endophytes, plant growth promoting rhizobacteria, siderophores, secondary metabolites*

Application of Natural Biopolymer Based Hydrogel in Agriculture

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Abstract

Water is one of the limiting factors that determineagricultural productivity. Sustainable supply of water to roots of plants through hydrogel is a technological solution to combat drought stress. Hydrogel absorbs more than 100 times its weight of water without being dissolved. Hydrogels are natural or synthetic in their origin. Natural biopolymers are eco-friendly and are biodegradable. Natural polymers based hydrogels are polysaccharide based, protein based or the derivatives of natural tissues. Hydrogels are used as a water reservoir, delivery vehicle for fertilizers, pesticides and other agrochemicals. They absorb and release water based on availability. Hydrogel increase the seed germination rate, improve plant growth and yield.They increase water holding capacity of soil, water permeability and infiltration rate. Reduces irrigation frequency and leaching of nutrients from soil. Polysaccharide based hydrogel are widely available from plants, microbes, algae, fungi, yeast and animals. Polysaccharide based biopolymers gels through internal gelation, external gelation, inverse gelation, interfacial gelation and multiple step gelation. The review article address the methods of preparation, mechanism of gelation

and their application in the delivery of plant growth promoting bacteria, rhizobiome, fertilizers and pesticides.

Keywords: *Microbiome, rhizosphere, and super sorbent gel, smart release*

Genotype x Environment Interactions and Yield stability of Butternut genotypes of Pumpkin (Cucurbita moschata Duch. ex. Poir).

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Abstract

Pumpkin (Cucurbita moschata Duch. ex. Poir) is an important vegetable belonging Cucurbitaceae family. It is a good source of phytonutrients and functional components (carotenoids, zeaxanthin, vitamin E, ascorbic acids, phytosterols), which act as an antioxidant in human nutrition. In addition to its culinary value, has a vast potential on processing (jam, jelly, marmalades, puree, sauces, chutney, pickle and halwa, cookies and weaning mix, pies and beverage) and industrial values (seed oil). Though, pumpkin can be grown round the year in lowland subtropics, the yield stability is great concern. To identify a superior genotype by assessing yield stability (xi), yield regression (bi) and yield distance statistics (di), 10 butternut genotypes of pumpkin were evaluated at four diversified seasons under RBD with three replications during 2020-21 and 2021-22 at ICAR-IIHR, Bengaluru. The eight quantitative traits assessed for its phenotypic stability indicated that the analysis of variance for genotype (G) and environments (E) main effect were highly significant for all characters studied. Similarly, the interaction effects of G x E, E+(G x E), E (Linear) and pooled deviation also showed significant values for all the characters. Among the genotypes studied, BN-2-3-1 followed by BN-8-2 had higher mean value (Xi = 55.51t/ha, Xi = 51.74t/ha respectively) as compared to general mean (45.77t/ha), regression coefficient close unity (bi = 1.087, bi = 1.032, respectively) with non-significant deviation from regression line (S2d) strongly indicated their yield stability and adaptable to wider environments. However, BN-23, BN-13 (favourable environments) and BN-10 (poor environments) were also identified for contrasting environments. Hence, BN-2-3-1 (fruit with long neck) and BN-8-2 (with short neck) can be recommended for commercial cultivation to exploit for processing and culinary value.

Key words: *Adaptability, Genotypes x Environments, Phenotypic stability, Yield, Pumpkin*

Bioprospecting cyanobacteria for plant growth promotion ability in wheat

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Abstract

Cyanobacteria, being ubiquitous organisms show a dynamic role in the field of agriculture to improve plant growth. With little information, a lot has to be studied about PGP (plant growth promoting) activity of blue green algae in crops other than rice. In this study, 60 isolates of different species of cyanobacteria were collected from NAIMCC, ICAR-NBAIM. Seed germination assay was conducted with different cultures using wheat seeds. On the basisof the result ofpercent germination rate and physiological parametersof plant,25 promising cultures were selected for further PGP activity. Plant growth promotion analysis (IAA estimation, Phosphorus solubilization, and Ammonia production) wasconducted alongwith phycobilins, protein and chlorophyll estimation. The result depicted that eightcultures (Scytonema sp. (NAIMCC-C-00225), Phormidiumsp. (NAIMCC-C-00184),Phormidiumsp.(NAIMCC-C-00240), Scytonematolypothrichoides (NAIMCC-C-00226),Lyngbyahier onymusii(NAIMCC-C-00330), Anabaena sp.(NAIMCC-C-00149),Nostoc sp.(NAIMCC-C-00165), Nostoc sp.(NAIMCC-C-00179), Westiellopsissp.(NAIMCC-C-00132) hadthe highest activity for all three plant growth promoting traits. Phormidiumsp. (NAIMCC-C-00184),showed highest IAA production (41.2µg/ml), Scytonema sp. (NAIMCC-C-00225),and Scytone matolypothrichoides(NAIMCC-C-00226), showed maximum phosphorus solubilization of 509 µg/ml and 427 µg/ml respectively whereas Anabaena sp. (NAIMCC-C-00149),recordedhighest ammonia production (6.23 µg/ml). These cultures also showed high phycobilin content which ranged between 133-530 µg/ml, 193-450µg/ml, 388-870µg/ml for allophycocyanin, phycocyanin and phycoerythrin respectively.Comparatively, Phormidiumsp. (NAIMCC-C-00184),(270 µg/ml) and Lyng by ahieronymusii(NAIMCC-C-00330)(13 µg/ml) reported better chlorophyll a and carotenoid activity. Further, these cultures would be evaluated for their positive attributes in pot and field trials.

Single Bud Transplanting Technique of Turmeric to Reduce Seed Cost

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Abstract

Turmeric is one of the most important spice crops of Tamenglong district of Manipur. Due to high seed requirement (15-20 q/ha) of turmeric the cost of production increases rapidly. Around 40-45% of total cost of cultivation is incurred for procurement of seed and this is one of the major constraints for large scale cultivation of Turmeric. To overcome the disadvantages of conventional planting system of seed rhizomes and to produce good quality planting material with reduced cost, rapid multiplication of turmeric, single bud transplanting technology was introduced to the resource poor farmers of Noney/ Tamenglong District. ICAR - KVK Tamenglong organized different capacity building programmes on Single bud transplanting of turmeric. Disease-free seed rhizomes of turmeric (variety Lakadong) were cut into small pieces of 5-6 gm containing a single bud. These buds were treated with Trichoderma viridae @ 2g/litre, sown in pro-trays using suitable growing media prepared by mixing sand: soil: FYM @ 1:1:1 in the month of March. After 30-40 days, the germinated and well-developed seedlings were

transplanted in main field in the month of April -May with a spacing of 25 cm x 30 cm. Single bud transplanting technique of turmeric produced healthy crop. single bud transplanting technique of turmeric reduced the day required for tillering (51 days) and rhizome development (190 - 220 days) whereas in conventional planting method it took 85 days for tillering and 210 to 260 days for rhizome development. Single bud transplanting technique of turmeric recorded a higher yield of 220 q/ ha within a shorter period with a BC ratio of 4.8:1 as compare to 170q/ha in conventional planting method with a BC ratio of 2.3:1 and eventually reduced the cost of cultivation by 34.5%.

Key word:*Turmeric, Single bud transplanting, rhizome*

Role of stingless bee, Tetragonulairidipennis Smith in pollination of cucumber

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Abstract

The role of stingless bee, Tetragonulairidipennis in pollination of cucumber was carried out at Medziphema, Nagaland. The treatments that were evaluated include pollination with stingless bee TetragonulairidipennisSmith, open pollination and control (pollinator exclusion). Pollination Efficiency Index (PEI) was worked out based on the foraging activity, relative abundance and loose pollen grains adhering to the body of the insect pollinators. Their impact on fruit quantity and quality were also assessed. Results revealed Tetragonulairidipennis and Apis mellifera as the most efficient pollinator of cucumber with PEI of 15 and 40, respectively. Data revealed that T. iridipennisbee pollination resulted in more uniform fruits. Per cent increase of 36.36% in cucumber fruit length and an increase of 53.27% in cucumber fruit weight was obtained with stingless bee pollination over control. Similarly, an increase of 150.38% and 27.98% was obtained in the number of seeds/fruit and test weighed of seeds in stingless bee pollination over control.

Keywords: *Stingless bee, Pollination Efficiency Index, Tetragonulairidipennis, foraging activity, loose pollen grains, fruit parameters*

Introduction of Avacado (Persia americana) fruits in eastern Himalaya of India: A review

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Abstract

Avacado (Persia americana) or locally called Phamfal is a subtropical, dicotyledonous, evergreen tree belonging to the family Lauraceae and order Ranales. The avocado tree is originated in Central America and Southern Mexico and it has been determined that the centre of origin of this fruit is the central part of Mexico which is passing through Guatemala to the Central America. High demand for information on avocado indicates that there is considerable interest in this crop in various parts of India as well as Eastern India. Moreover, avocado can be grown in Darjeeling hilly region and adjoining states of India as the soil and climatic condition is favourable for their growth and development. However, in this region avocado cultivation is very negligible in homestead garden, small and marginal orchard due to lack of scientific knowledge of farmers. So that in this context to identify and conservation of wild and farmers cultivated species of avocado is the major concern for all avocado growers and scientist.

Keyword: *avocado, flower, fruits, importance, uses*

Potential And Advantages of Mustard Based Intercropping Systems Under Eastern Himalayan Foothill

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Abstract

Success of intercropping system depends on selection of crops as crop compatibility in intercropping is the most crucial factor. Yield advantages might be expected in intercropping over sole cropping for variation in their canopy architectures. On this background a field experiment was conducted to compare additive and replacement series of intercropping of mustard with linseed and lentil during rabi seasons of 2019 and 2020 at the instructional farm of Uttar Banga Krishi Viswavidyalaya, Pundibari, Cooch Behar, West Bengal. The experiment was laid out in randomized block design with nine (9) treatments including three sowing ratios (1:1, 1:2 and 2:1) and pure stand crop replicated thrice. Mustard variety 'Kesari 5111', linseed variety 'JRF-2' and lentil variety 'HUL -57' were used during experiment. Mustard + lentil intercropping produced 6.7-26.2% and 3.6-18.5% higher siliqua per plant compared to mustard + linseed and maximum seed yield was recorded in sole cropping of mustard which was 6.9-36.6% and 5.3-35.4% higher compared to other treatments in 2019 and 2020 respectively. 0.2-35.6% higher equivalent yield achieved in mustard + lentil (1:1) intercropping compared to other ratios. Assessment of competition functions suggest mustard + lentil additive series intercropping was superior over others. Intercropping of mustard with linseed and lentil affects yield of individual species and economics of the cropping system. Mustard + lentil intercropping indicated a significant advantage which was attributed to better economics and land use efficiency than the other row ratios. It can be concluded that lentil with

mustard in additive series were found to be better for profitable production.

Keywords: *Mustard, intercropping, sowing ratio, LER, land use efficiency*

Ghost fishing by lost set gillnets: A simulation study from Indian waters

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Abstract

Fishing gear may get lost into seas due to various reasons such as adverse weather during operation, bottom obstacles, gear conflict, strong underwater currents etc. Once these nets or their parts are left in the sea or swept away, they do not bio-degrade since most of the fishing gears are made of synthetic materials and they retain functionality for a long period of time. These lost gears have been addressed internationally as a matter of serious concern due to various challenges as they catch targeted and non-targeted organismssuch as turtles, mammals, sea birds etcleading to their mortality referred to as ghost fishing. Other impacts include damage to sensitive bottom habitats, hazards to navigation, safety at sea, financial loss to fishers due to gear loss/damages etc. Information regarding the ghost fishing of lost nets are lacking from Indian waters. First time in the country,fishing capacity of simulated lost gillnets was attempted. Present study investigates the ghost fishing capacityof lost gillnets usingdeliberately lost experimental set gillnets at Vembanad lake, Kerala, India. Simulation studies with shrimp gillnets (32 mm mesh size) were conducted to assess the ghost fishing capacity oflost gillnets in monsoon (June-August)and post-monsoon (September- December) seasons as two set of experiments. A total of 251 individuals comprising of 27species of fish and shellfish were caught from both the setsof experiments.Catches showed a negative exponential decreasing trend over time in both the experiments. The gillnets retained their catching capacity till 15th day during first experiment (monsoon) and extended upto 50th day in the second experiment (post monsoon).The data generated on ghost fishing capacity of lost set gillnets from the present study will be beneficial for developing measures to reduce the impacts of lost nets on aquatic ecosystem and for suggesting better management strategies.

Keywords: *ghost fishing, catching capacity, gillnet, simulation*

A Quick Analysis Method for Protein Quantification in Oilseed Crops: Improvement over Standard Protocol

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Abstract

Protein is one of the most abundant substances in plants and plays a major role in human health hence standardization of its analytical quantification method is essential. Various methods for protein quantification exist, such as Kjeldahl, Bradford, Lowry, bicinchoninic acid assay (BCA), Biuret, and total amino acid content methods. These methods are widely applied; however, the development of the rapid and efficient method is the need of the time hence the objective of this research was to analyse and comparing compare the modification of the Kjeldahl method for the determination of protein content in oilseed crops. The study was performed to improve the sample preparation method (processing and digestion) for protein quantification. Generally, the method initially requires homogenization of grains to a fine flour, which involves time and increases the risk of sample cross-contamination and partial loss of oil from the sample during grinding. Moreover, at times, it becomes challenging to homogenize oil seeds to fine flour due to high oil content. However, in the present research, the whole grain was digested in place of grounded flour to accomplish quick protein quantification and compared it with the flour matrix of different oil seeds. To further reduce the digestion time and avoid frothing, we have used the modified digestion mixture. The developed method was statistically validated using analysis of variance (ANOVA), Pearson correlation reliability test, paired T-test, and different types of plot analysis. The validation of the sample preparation method in protein quantification demonstrated non-significant differences that the protein content from whole grain of all the five oilseed crops shows 100% non-significant results compared with the flour matrix in both the digestion mixtures. The developed novel method could be used to prepare the sample for protein analysis and reduces the overall analysis time while ensuring the accuracy of the results.

Keywords:*Oilseed crops, protein quantification, Kjeldahl method, processing time, modified digestion mixture*

Elicitation of trigonelline, a hypoglycemic component in fenugreek sprouts by calcium and nitric oxide priming

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Abstract

Calcium ion and nitric oxide are considered as key signal transducer in plants which is involved in various physiological processes. The aim of the present study was to evaluate the effect of priming with exogenous sources of calcium ion and nitric oxide on the antidiabetic activity and the alkaloid contents of fenugreek sprouts along with isolation and identification of trigonelline, a bioactive alkaloid responsible for hypoglycemic property of fenugreek. The fenugreek seeds were pre-treated with calcium chloride (CC), lanthanum chloride (LC) a calcium channel blocker; ethylene glycol-bis (2-aminoethylether) -N, N, N´, N tetra acetic acid (EG) a calcium chelator; sodium nitroprusside (SNP)

and 2-(4-carboxyphenyl) -4,4,5,5-tetramethylimidazoline-1-oxyl-3-oxide (CP) a nitric oxide scavenger and germinated for 72 hrs. The sprout extracts were evaluated for their in vitro antidiabetic potential by ?-amylase and ?-glucosidase inhibition along with their trigonelline content. Trigonelline was isolated from fenugreek sprouts and identified by Infrared analysis and nuclear magnetic resonance (NMR) spectroscopy. The results revealed that sprouts pre-treated with CC and SNP exhibited enhanced antidiabetic potential as well as alkaloid content over control; on the other hand, their action was reversed by their antagonists, EG, LC, and CP. The sprouts pre-treated with 2mM CC showed the best elicitation of alkaloid content and antidiabetic activity followed by SNP-20 mM. The study suggests probable involvement of the signaling molecules, calcium ion, and nitric oxide in pathways associated with biosynthesis of bioactive compounds responsible for hypoglycemic activity of fenugreek sprouts one of which being trigonelline.

Keywords: *Antidiabetic, Calcium, Fenugreek sprouts, Nitric oxide, Trigonelline, Nuclear magnetic resonance.*

A New Avenue to the Synthesis of Dibarbiturate of Oxindole and Arylidene Barbituric acid Derivatives under Visible Light Irradiation

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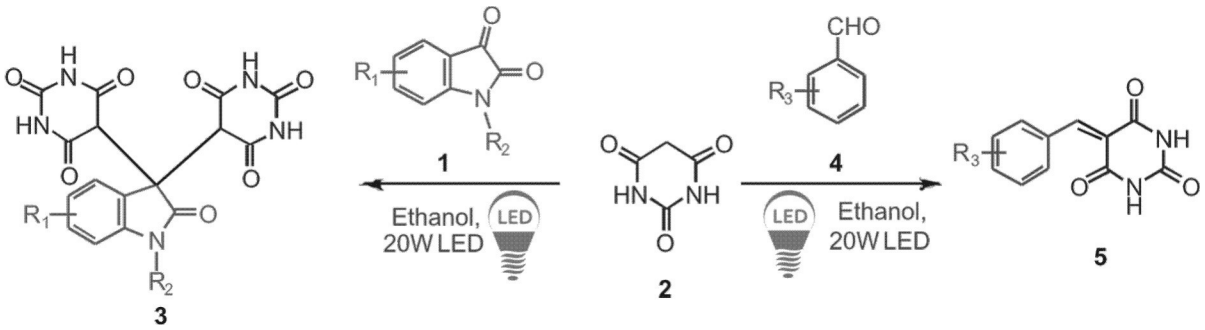
Abstract

An inexpensive and resourceful method for the synthesis of dibarbiturates of oxindole and arylidene barbituric acid derivatives has been developed by condensation of of isatin/aryl aldehyde with barbituric acid, via irradiation of visible light. Under the similar circumstances two molecules of barbituric acid react with one molecule of isatin whereas only one molecule of barbituric acid reacts with one molecule of aldehyde. This transformation involves a catalyst-free approach to produce desired products under moderate reaction conditions. Additional green aspects of this procedure include excellent product yield, metal-free reaction conditions, and the absence of by-products.



Scheme: Synthesis of dibarbiturates of oxindole (3) and arylidene barbituric acid derivatives (5)

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Effect of natural preservative on various quality attributes of omega-3 and carotenoid-rich table spread during storage

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Abstract

Demand of convenience foods and foods containing natural ingredients over synthetic ones have increased in last decade due to changes in lifestyle and increasing the awareness of consumers about their health.Milk fat is used as important food ingredient in diet from the ancient time due to unique flavor, pleasing mouth-feel, affirmative perception and being a rich source of energy.Table spreads or fat spreads are the products that are plastic in nature, that is, they are able to spread into a thin layer on food articles such as a bread slice.In the present work, the major source of fat was cow milk butter and flaxseed oil. The natural colourant were extracted from carrot pomace (which is a bio-waste from carrot processing industry) using flaxseed oil as extraction medium; making the spread rich in carotenoids and omega-3 fatty acids. As a natural preservative, essentialoil of ThymeandMicroGARDTM-100 were used as natural preservative. Essential thyme oil possesses strongest antimicrobial activity against Gram-positive bacteria due to the presence of highpercentage of phenolic compounds such as eugenol, carvacrol and thymol, while MicroGARDTM-100 inhibit the growth of Gram-negative bacteria and some yeast & mold. An optimized combination of both the preservatives i.e. essential oil and bacteriocin was selected based on 42 factorial experiment and two-way ANOVA using Proc GLM of SAS 9.3 based on sensory, physicochemical, antimicrobial and antioxidant activity. For the estimation of shelf life of optimized table spread, physicochemical, antioxidant,textural and sensorial parameterswere analyzed throughout the storageperiod of 2 months by applying one-way andtwo-way ANOVA by using IBM SPSS Statistics 25 software.The results revealed that during the storage positive control and developed table spread werenon-significantly ($p>0.05$) different than each other in terms of a*, b*, acidity, DPPH, work of shear, and for all sensorial parameters (colour and appearance, flavor, body and texture, spreadability and overall acceptability). However, these were significantly different ($p<0.05$) in terms of L*, pH, water activity,ABTS, FRAP, firmness (decreased), work of adhesion and stickiness (increased).

Awareness about the use of Agrochemicalsby the farmers in rural areas of Solan (H.P.) India

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Abstract

As per the World Bank, the current rural population of India accounts for 65% and agriculture is the predominant sector in ruraleconomy.Solan, one of the major vegetable grower, is situated at South of Northern Hill state of Himachal Pradesh. People residing in rural areas cultivate tomatoes and other vegetables such as peas, capsicum,ginger etc. In order to get a larger yield from lesser aagrian land area, farmers use different type of fertilizers and/or manure and pesticides for increasing the yield as well as for the protection of crops. Pesticides are the toxic chemicals used against pests while fertilizers are the agrochemicals used to increase the fertility of soil and productivity. The study was undertaken in rural areas surrounding Solan town to know about common agricultural practices and use of pesticides and fertilizers by the farmers. We selected 118 rural households at random to generate quantitative and qualitative data on selected parameters and indicators. A questionnaire was designed to gather information. Relevant information was collected from households to evaluate the impact of agrochemical-use on environment, whether chemical farming improved the farmer's economic status, awareness about health hazards caused by their use. We report here that tomato is the main cash crop in the area of study. During this study, 72.88% of the farmers were reported to be small land holders who used pesticides and chemical fertilizers in order to generate more income. Further, 33.89% of the farmers invested 5-10% of money on pesticides and manure. Most of the agriculturists (94.9%) used pesticides to protect the crops while 63.56% used varied measures to increase soil fertility. Furthermore, 73.73% of the pesticide users used pesticides more than four times per season and 73% reported inorganic farming to be more profitable in comparison to organic farming. Many of the farmers were not aware about disposing off the bags or containers properly as per manufacturer's instructions, thus affecting the environment. It was revealed that 42.53% agrochemical users did not use any precautions while applying these chemicals. These results can be used to develop a policy for safe and effective use of agrochemicals in order to address low yield problem and to suggest ways and means to minimize adverse effects on human health and the environment.

Keywords: *agriculture, fertilizers, pesticides, fertilizers, health hazard, environment*

Colorimetric LAMP assay for the detection of Fusarium oxysporum f. sp. ciceri- wilt pathogen of chickpea using FGB1 gene

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Abstract

Accurate and timely disease detection plays a critical role in achieving a sustainable agriculture. Fusarium oxysporum f. sp. ciceri, the causal agent of Fusarium wilt is a devastating pathogen of chickpea has reportedly caused heavy losses to agricultural produce in recent years. Various soil born pathogens produces similar symptoms in chickpea, therefore cannot be distinguished easily at field level at early stages. There is real need of a rapid, inexpensive and easy to operate and maintain genotyping tool to facilitate accurate disease diagnosis and surveillance for better management of Fusarium wilt outbreaks. In this study, we developed a loop-mediated isothermal amplification (LAMP) assay targeting the ? glucan binding lectin (FGB1) gene for early and visual detection of Fusarium oxysporum f. sp. ciceri. The LAMP reaction was optimized at 65 ? for 30 min. The specificity of the F. oxysporum f. sp. ciceri LAMP primers with close fungal reference cultures such as: F. clamydosporium; F. oxysporum; F. solani; F. oxysporum isolate F44; F. oxysporum f. sp. lycopersici; Macrophomina phaseolina; Trichoderma asperellum; Sclerotinia sclerotium; Alternaria alternata; Curvularia lunata; R. solani isolate; Sarocladium oryzae isolate CABI 339944 was also validated. The assay could detect as low as 4.7 pg DNA/µl of the pathogenic fungi in 30 min. The presented LAMP method provides a specific, sensitive and rapid diagnostic tool for the detection of Fusarium oxysporum f. sp. ciceri, with the potential to be standardized as a detection tool in the endemic areas and will be very useful for monitoring the disease complex in the field further suggesting the management strategies.

Keywords: *LAMP assay; Fusarium oxysporum f. sp. ciceri; FGB1 gene; Chickpea; Fusarium wilt*

Enzymes attributed root knot nematode (Meloidogyne incognita) resistance in brinjal species

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Abstract

Root-knot nematodes (Meloidogyne spp.; RKN) are the most damaging plant-parasitic nematodes in vegetable production. Yield loss in vegetable crop is estimated to be 22-30% and even up to 90% in some specialized varieties. Though the nematicides are effective against nematodes, they are hazardous for health, soil and environment. Hence, plant resistance is the eco-friendly options and plants producing more reactive oxygen species (ROS) leads to horizontal resistance in plant cells. Antioxidant enzymes such as SOD, POD and CAT are considered to be the main protective enzymes engaged in the removal of free radicals and activated oxygen species. Among the five species tested, S. torvum had the highest phenols (17.05mg g1), Ortho dihydroxy phenol (12.95mg g-1), Peroxidase (3.12 OD min-1 g-1), Polyphenol oxidase (3.18 OD min-1 g-1), Phenylalanine ammonium lyase (15.39 nmol of trans cinnmic acid min-1 g-1), Acid phosphatase (117.15 mmoles p-nitrophenol min-1 mg-1) as against S. incanum scoring lowest mean value of 120hrs of inoculation of RKN proved that S. torvum found ideal for host plant resistance for brinjal breeding. It is further confirmed by grafting with superior hybrids and advanced

breeding lines of brinjal based on the enzymes higher values over control.

Keywords: *Brinjal, wild Solanum species, root knot nematode, screening, host plant resistance*

Covid - 19 and Medicinal Plants

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Abstract

At the end of December 2019, a pneumonia patient in Wuhan, China was detected positive with unidentified viral strain.It was called as Coronavirus disease 2019 (COVID-19) and the new virus was termed SARS-CoV-2. It is transmitted generally, by virus carrying droplets and aerosols produced by the infected person with whom an unprotected person comes in contact. No immune system is found in human body to counter the effect of the new virus. Large no. of Covid cases have been reported throughout the world. The threat has not yet gone despite the development of vaccine for the deadly disease. Mutant varieties of the virus are still coming and are infecting even vaccinated persons. Relying on the traditional knowledge of medicinal plants, various formulations of such plants and the plant as such or its specific part were in frequent use by the coronavirus infected patients.The ministry of AYUSH of India has recommended herbal decoctions of Ocimumsanctum.Piper nigrum, Zingiber officinale, Cinnamomum verum., Vitis vinifera to improve the immunity in COVID-19 patients. The various properties of herbal products such as its broad-spectrum antiviral activity, inhibitory effect in viral infection, immune boosting effect, and anti-inflammatory effect have been reported. The present work has been conducted in order to document the plants being used by the Covid patients of the town area of Chapra (Bihar) and to collect information from the relevant research papers in order to add knowledge for development of herbal drugs to combat the deadly disease forwhich till date no specific medicine is available.

Keywords: *SARS-CoV-2,AYUSH, Decoctions, Ocimum sanctum, Piper nigrum, Zingiber officinale, Cinnamomum verum, Vitis vinifera.*

Nanotechnology-An Emerging Warrior against Cancer

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Abstract

Cancer is one of the leading causes of death and morbidity. Conventional therapeutic approaches are often linked with acute side effects and a high risk of recurrences. The advent of nanotechnology has revolutionized the arena of cancer treatment. Nanoparticles (1-100 nm) can be used to treat cancer due to their specific advantages such as biocompatibility, reduced toxicity, excellent stability, enhanced

permeability and retention effect, and precise targeting. Plant derived edible nanoparticles have been used as a bio-renewable, sustainable, and diversified platform for cancer therapy.Zingiber officinale (ginger)is a commonly consumed herb with applications in traditional medicines. Ginger and its bioactive compounds including alkaloids, flavonoids, zingiberene, gingerol, shogaol, paradols and zingerone have been identified for anti-inflammatory, anti-apoptotic, anti-tumour, anti-pyretic, anti-platelet, anti-tumourigenic, neuroprotective, anti-hyperglycaemic, antioxidant, anti-diabetic, anti-clotting, cardiotonic, cytotoxic and analgesic properties. Ginger rhizome extract is a potent anticancer agent. Ginger constituents have been shown to inhibit proliferation of cervical, liver, skin, colon, pancreatic, lung, prostate, nasopharyngeal, neuroblastoma, and oral cancer cell lines.The chemopreventive and therapeutic potential of ginger extract is attributed to its active polyphenol components like [6]-shogaol and [6]-gingerol. Ginger derivatives (extract or isolated compounds) exhibit relevant antiproliferative, antitumor, invasive, and anti-inflammatory activities and exert their action through important mediators and pathways of cell signalling. These compounds suppress cell cycle progression and are active against human pancreatic cancer cells, cholangiocarcinoma cells, gastrointestinal cancer cells, colorectal tumor cells, human lung adenocarcinoma cells, and human colon cancer cells. Various therapeutic implications of nanoformulations have broadened the horizon of cancer treatment.Extensive clinical studies are required to establish the anti-cancer pharmaceutical efficacy of the anticipated nanoformulations.

Biotic stresses of Apis mellifera L. in Terai zone of West Bengal

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Abstract

There is a tremendous scope of beekeeping in Sub-Himalayan West Bengal due to its diverse environment and inexhaustible floral resources obtained from natural vegetation as well as cultivated crops. Various oilseeds, pulses and other crops useful to bees are cultivated in this zone. In addition to these, this zone has a vast area under forest. Hence, farmers of this zone keep honey bee boxes for honey production and thereby to earn extra income. But their bee boxes are infested by several pests and predators causing economic damage to the colony. Therefore, identification and documentation of these pests and predators are important for their management and making the bee keeping successful and economical. Keeping these in view, an experiment was conducted in the Department of Entomology, Uttar Banga Krishi Viswavidyalaya, Pundibari to identify and document the various pests and predators of Apis mellifera L. Varoius acarine pests, birds and insect pests have been recorded during the period of experiments.

Keywords: *Bee keeping, Apis mellifera, wax moth, varroa mite, birds*

Effect of planting dates on performance of onion in old alluvial zone of West Bengal.

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Abstract

Onion (Allium cepa L.) is a bulbous biennial vegetable as well as spice herb which belongs to the family Alliaceae. It is a temperature sensitive crops which yield and quality is greatly influenced by plating dates. To study the ideal planting dates an on farm trail was conducted at eight farmer's field of old alluvial zone for five planting datesdesigned with RBD during the year of 2017-18 and 2018-19 under the supervision of Dakshin Dinajpur KVK, UBKV. The five planting dates were farmers practice (mostly after 15 December), 31st October, 15th and 30th November and 15th December. 40 days old seedling of Sug Sagar variety was planted in the main field Results showed that 30 November planting gave significantly highest leaf number (8.03), plant height (62.14 cm), bulb diameter (6.16 cm), bulb weight (84.17 g), yield (20.95 t/ha) and benefit cost ratio (3.9). Both the days to bulb initiation and bulb harvesting period were recorded minimum in 30 November.Thisplantingdate provides congeal climatic conditions for proper growth and development of onion bulb was the main cause of its better performance. The present findings concluded that the 30 November plantingincreases yield and itsattributes may be recommended for ideal planting dates of onion for this region.

Keywords: *Yield, onion, planting time, old alluvial zone.*

Commercial Beekeeping for Enhanced Livelihood Security: A Case Study in Terai Region of West Bengal

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Abstract

Beekeeping is a practice meant for alternate income generation opportunity among the rural youths as

well as increased productivity of crops through better pollination service. The Alipurduar District of West Bengal has the immense potential for commercial beekeeping due to rich biodiversity and huge forest coverage. Considering the issues, Cooch Behar Krishi Vigyan Kendra under the aegis of Uttar Banga Krishi Viswavidyalaya identified beekeeping as one of the practices by rural youths as an entrepreneurship venture through skill development training. KVK has provided about 07 no. of trainings on commercial beekeeping using European Bee (Apis mellifera) as well as Indian Bee (Apis cerana indica) to 210 rural youths during the last 3 years from 2019 to 2021. During the residential training programmes of 10 days duration, the trainees were exposed to hands on experience on different aspects of beekeeping. As a result of this effort by the KVK about 43 nos. of farmers of both the districts have started beekeeping and it has become the main source of income to maintain their livelihood. The main issue of the tribal farmers of the villages namely Nurpur, Turturi and Uttar Shibkata (Boxa Researve Forest Adjacent Villagea) of Alipurduar District was regular elephant's attack in their crop field resulting huge crop loss. Santalpur Nagoric Adhikar Suroksha Welfare Society, a home grown Tribal run NGO, is working in close contact with the farm tribal communities of Alipurduar District since 2014 showed interest, to KVK. Cooch Behar KVK provided them training and token material benefit in form of distribution of bee boxes on beekeeping training for reducing human elephant collision with A. mellifera colony. After practicing beekeeping with full enthusiasm, the issue was resolved as there is less attack of elephants in their crop field due to humming sound produced by the honeybees. Sujan Bara, Mr. James Kindo, Prodip Hansda, Mrs. Hitkari Guria and many more farmers are now practicing beekeeping in a commercial basis and they are marketing their own honey with their brand name Dooars Honey. At present they are having a total of 350 bee boxes with an annual income of rupees 5,30,000.00. Presently they are in continuous touch with Cooch Behar KVK, Uttar Banga Krishi Viswavidyalaya and Khadi and Village Industries Commission (KVIC) beside district Administration for making the venture successful to other areas of Alipurduar District also.

Keywords: *Apis mellifera, Apis cerana indica, Beekeeping, Honey, Training, KVK.*

Determination of Heterosis for Growth and Yield in Eggplant

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Abstract

Eggplant (Solanum melongena L.) is an important vegetable of India and is grown throughout the country. Being the primary center of origin of eggplant, India has a great genetic divergence that provides the great scope for crop improvement through heterosis but it is relatively unexplored when it is compared to Tomato. The present study on the evaluation of25 eggplant genotypes (F1 hybrids, parent and check variety) for yield and other quality traitswas experimented in Sikkim University, Gangtok, Sikkim, India. The F1 hybrids were produced by crossing 4 female (VR-2, IIHR-562, IIHR563, and Punjab Brinjal 67) and 4 male parents (ArkaKusumkar, Mukta Keshi, Rajendra Baigan-2, and Swarna Mani)

into line x tester mating design. Field experiment was set into Randomized Blcok design with four replications of each genotype. The results indicated that the highest yield was obtained in the cross between Punjab Brinjal 67 x Mukta Keshi and it was statistically significant (P? 0.05) among all the genotypes. Therefore, the F1 hybrid obtained from Punjab Baigan-67 x Mukta Keshi can be explored commercially.

Key words: *Brinjal; F1 hybrid; line x tester; yield*

Application of Sewage Sludge in Rice (Oryza sativa L.)-Wheat (Triticum aestivum L.) System Influences the Productivity and Heavy Metals Accumulation of Rice and Wheat cropping System

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Abstract

A major approach for a sustainable and successful agriculture production system is to employ nutrients in a balanced and integrated manner. Furthermore, substituting organic fertilizers for chemical fertilizers saves both environmental and economic expenses while also improving soil health. An experiment was undertaken to evaluate the yield and economic advantages of a rice-wheat cropping system (RWCS) as impacted by the combined application of sewage sludge (SSL) and fertilizer in order to test this hypothesis. The treatments comprised: without fertilizer or SSL; 100% recommended dose of fertilizers (RDF); 100% RDF + 20 Mg ha?1 SSL; 100% RDF + 30 Mg ha?1 SSL; 50% RDF + 20 Mg ha?1 SSL; 60% RDF + 20 Mg ha?1 SSL; 70% RDF + 20 Mg ha?1 SSL; 50% RDF + 30 Mg ha?1 SSL; 60% RDF + 30 Mg ha?1 SSL and 70% RDF + 30 Mg ha?1 SSL. The experiment was laid out in a randomized block design with three replications. The result of our study indicate that the highest percent increase in mean plant height i.e.,~14.85 and ~13.90, and grain yield i.e., ~8.10 and ~18.90 for rice and wheat, respectively, were recorded under 100% RDF + 30 Mg SSL ha?1 treatment compared to 100% RDF, while 70% RDF + 20 Mg ha?1 SSL produced a statistically equivalent grain yield of 100% RDF in RWCS. The application of 20 and 30 Mg SSL ha?1 along with recommended or reduced fertilizer dose, significantly increased the heavy metal content in plant and soil systems above that of 100% RDF, but this enhancement was found within permissible limits. In conclusion, in a rice-wheat cropping system in the middle Ganegatic alluvial plain, the application of 20 Mg ha?1 SSL combined with 70% RDF offered a safer, more lucrative, and long-term choice.

Evaluation of the antidiabeticpotential of nanoformulation of curcumin andepigallocatechin gallate (EGCG) in diabetic nephropathy

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Abstract

Objective:Diabetic nephropathy is the major cause of kidney damage among individuals undergoing renal replacement treatment, affecting about 40% of diabetic patients. Chronic hyperglycemia causes an excess of free radicals, which may contribute to the development of diabetic nephropathy.Curcumin, found in the rhizomes of Curcuma longa L., and epigallocatechin gallate (EGCG)found in the leaves of Camilla sinensis, are both known to have antioxidant properties.The current study aims to investigate the effect of a nanoformulation of curcumin and EGCG on diabetic nephropathy in streptozotocin-induced diabetic mice.

Method: A single intraperitoneal dose of STZ (80mg/kg) was used to induce diabetes in mice. Mice were split into seven groups following STZ injection: normal control, disease control, standard control (Glibenclamide) (1 mg/kg), free drug-treated(100 mg/kg), curcumin nanoparticles treated (20 mg/kg), EGCG nanoparticles treated (20 mg/kg), and combination nanoparticles treated (20 mg/kg). To monitor the diabetes status of mice, fasting blood glucose levels were recorded every seventh day using a glucometer.

Result: We obtained the following results where percent inhibition of blood glucose levels wasdetermined for 30 days and DL at the same dose level for free drug:Glibenclamide(1mg/kg)-67%,Free drug(Cur+EGCG) (100mg/kg)- 35%,NP(Cur+EGCG) (20mg/kg)- 87%,NP(Cur)(20mg/kg)- 90% and NP(EGCG)(20mg/kg)- 85%.

Conclusion: The percent inhibition of NP-(Cur + EGCG) blood glucose level is 6.2 folds higher when compared to free-(Cur+EGCG) blood glucose level. These findings support the capacity of combined curcumin and EGCGnanoformulation to reduce blood glucose levels and indicate their potential against diabetic nephropathy.

Keywords: *Diabetic nephropathy, blood glucose level, renal function, curcumin, EGCG, nanoformulation.*

Effect of organic inputs and land configuration on yield and quality of rice bean

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Abstract

Rice bean is an important traditional crop in Sikkim hills. It is a good source of protein and other nutrients, vitamins (especially B- group) and mineral elements. As Sikkim is an organic state, there was need to have improved production technology for organic cultivation of important crops. In this regard, an experiment was undertaken to understand the effect of different organic inputs under various methods of land configurationon growth, yield and quality parameters of rice bean [Vigna umbellate (Thunb.) Ohwi & H. Ohashi] in Sikkim hills. The experiment had been designed with locally available organic inputs and inclusion of different methods of land configuration by understanding the high rainfall conditions of the hills. Among the organic input treatments,OM4 (¼ RDN through FYM + ¼ RDN through mixed compost+ ¼ RDN through vermicompost+ ¼ RDN through poultry manure) showed the best results in growth parameters as well as yield parameters and followed byOM3 (1/3RDN through FYM + 1/3RDN through mixed compost+ 1/3RDN through vermicompost) as compared to other treatments. Highest seed yieldof 21.4 q/ha was obtained followed by 19.9 q/ha. While observing the effect of land configuration methods, the crop under ridge and furrow method had achieved higher growth, yield and essential qualities followed by broad bed and furrow method. Outcome of the present investigation has practical utility in promotion of organic production of rice bean in Sikkim hills.

Keywords: *Rice bean, Organic farming, land configuration, Sikkim, hills, traditional*

Seasonal influence of water quality parameters on fish diversity and assemblage pattern in Kailash Khal, a tropical coastal wetland, Sundarbans, India

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Abstract

In the present study, the fish diversity and assemblage pattern in relation to environmental variables were studied in a tropical coastal wetland of Indian Sundarbans. A total of 27 species belonging to 13 orders, 18 families and 23 genera from Kailash Khal wetland 44 species belonging to 39 genera, 30 families and 16 orders were recorded with Cyprinidae (5 species) as the apex contributor. Permutational MANOVA revealed a significant spatial ($F = 3.411$; $p = 0.005$) and temporal ($F = 1.677$; $p = 0.034$) variation of fish species composition. Fish species richness (SRp) varied noticeably across the seasons with the highest number of taxa was observed during the monsoon (25) than pre?monsoon (24) and post?monsoon (18) seasons. Of the total fish species recorded, the long whiskered catfish,Mystusgulio was found dominating in all the seasons with the share of 33.74% to the total catch composition. The fish assemblages pattern exhibited three distinct clusters with the maximum similarity attained (76%)

between the stations S1 and S4 during monsoon season. The ANOSIM test further substantiated the significant (R = 0.588; p 0.01%) difference in fish species composition among seasons. SIMPER routine analysis revealed that the fish species M. gulio, Oryziasdancena, Amblypharyngodon mola,Parambasisranga and Puntiussophore were the major contributors across the seasons, and with their percentage contribution, the species makes them discriminating species in the fish assemblage pattern. The calculated value of Margalef richness (d?) and Shannon diversity (H?) indices (2.069±0.84 and 1.786±0.18 for d? and H?, respectively) indicate a moderate fish diversity in the wetland. The water variables such as temperature, turbidity, salinity, transparency, water depth, pH, dissolved oxygen, and total dissolved solids play important role in structuring the fish assemblages and abundance in the studied wetland which were evident from the Karl Pearson's Correlation matrix, and the Canonical Correspondence Analysis.

Keywords: *Coastal wetland, fish diversity, assemblage, Indian Sundarban*

Field evaluation of various methods of organic manure preparation from paddy agro-waste using bioaugmentation strategy

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Abstract

Organic manure is prepared using various methods but comparative efficiency is not reported yet. Bioaugmentation strategy was used to enhance natural attenuation and shorten time period for manure preparation. The present study aims to evaluate 3 methods (NADEP, structured pit, and heap) and bioaugmentation strategy for organic manure preparation from paddy waste. Parameters like nitrogen, C:N ratio, degradation rates, cellulose and lignin content, total bacterial and fungal count were monitored at 20 days interval up to 120 days. Highest degradation (53.7 %) was observed in NADEP. Lower C:N (18.06) ratio was reported in NADEP on 120 days. Lowest cellulose (17.14 %) and lignin (8.37 %) content was found in NADEP on 120 days. Factorial CRD design revealed that NADEP was found to be the best method than the structured pit and heap method. Bioaugmented methods showed significant difference in time reduction compared control. In various methods, the half-life of cellulose was lower in the structured pit (110 days) and in bioaugmented methods (113 days). Half-life of lignin was lower in structure pit on 91 days and bioaugmented methods on 96 days. Hence, NADEP method can use to prepare good quality organic manure in a short period using bioaugmentation strategy.

Keywords: *Biodegradation, Biostimulation, C:N ratio, NADEP, Organic manure*

Study The Effect Of Establishment Methods On Growth And Yield Of Lathyrus Varieties In Red And Laterite Zone Of West Bengal

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Abstract

A field experiment was conducted in a split-plot design with 3 replications comprising 3 establishment methods (Broadcasting, Line sowing and Dibbling) in main-plots and 3 varieties (Nirmal, Prateek and Ratan) in sub-plots at the Regional Research Sub-Station, Bidhan Chandra Krishi Viswavidyalaya, Raghunathpur, Purulia, to study the effect of establishment methods on growth and yield of lathyrus varieties in Red and Laterite Zone of West Bengal during rabi season of 2020-21.The results of the field trial shown dibbling method (E3) of sowing accumulated highest summed GDD (1995.00C) of total life cycle mainly due to taking more days (126.2 days) to complete life-cycle. Mean cultivar days and GDD from sowing to maturity of lathyrus where 121.7 days and 1963.00C, respectively. The lathyrus sown in line (E2) gave highest plant height (94.4 cm) and significantly highest number of branches plant-1 (7.1); whereas, the variety Nirmal (V1) produced significantly taller plant(100 cm) during the investigation period. Broadcast sowing (E1) of lathyrus led to highest number of plants m-2 (34.2) at maturity stage compared to line sowing (26.8 plants m-2) and dibbling (23.2 plants m-2) method, but, crop sown in line (E2) produced maximum number of pods plant-1 (56.1).Line-sown (E2) lathyrus yielded highest seeds (1400.6 kg ha-1), which was 11.0 and 15.6% greater over dibbling (E3) and broadcasting (E1) method. Among three varieties,Ratan had 53.9 and 83.3 kg ha-1 greater seed yield over Nirmal and Prateek, respectively. Thus, Ratan could be adopted under line-sown condition in red and laterite soil of West Bengal during rabi season for getting better yield.

Keywords: *Broadcasting, Line-sowing, Dibbling, lathyrus and variety*

Effect of low light intensity stress on physiology and yield of Indian mustard

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Abstract

Brassica juncea (Indian mustard), originally introduced from China into North-Eastern India, is predominantly cultivated (85-90%) in Rajasthan, Haryana, Punjab, M.P. and Gujarat. Indian mustard cultivation is adversely affected by low light stress causing production losses,as light plays key a role in net primary productivity and is necessary for plant growth, morphogenesis and several physiological processes. The present investigation aimed to assess the effect of low light stress on photosynthetic traits, plant water relations and yield and its attributes in Brassica juncea genotypes that can impart

tolerance to low light stressparticularly innorth India. Screening of nine elite genotypes of Indian mustard wasdone in the research farm area with standard package and practices. The crop was shaded by covering with shaded nets with30-50% shading capacity of natural sunlight from 15th December to 15th January that coincided with the onset of flowering. Data was recorded for photosynthetic parameters, chlorophyll and relative water content and membrane injury for shaded and non shaded plants after 25 days after treatment and 10 days after removal of shade netusing the standardized procedure. Yield and its attributes were recorded at maturity.Significant changes were observed among the genotypes under the light stress experiment as the all the genotypes showed stunted growth with pale appearance. Significant decrease in chlorophyll content (Chl. a, b and total chlorophyll) was observed among the genotypes and treatments, however GxE interaction was not significant.With shading treatment, chlorophyll a, total chlorophyll, chlorophyll a/b ratio, carotenoid, RWC and protein content decreased significantly while relative stress injury increased due to damages of plant cells. Significant yield losses were also observed under shaded conditions as compared to non shaded conditions. This study provides valuable information for further deciphering genetic mechanism and improving agronomic traits in Indian mustard cultivated under optimal light requirements.

Ortho silicic acid-a connecting link for mitigation of climate change and sustainable crop productivity

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Abstract

Indian agriculture system is becoming vulnerable to climatic vagaries. Due to unpredictable weather, crops are showing considerable sensitivity and are resulting into huge yield losses. Theseresponses are due to their limitation in the buffering capacity during the critical crop growth stages that are sensitive to stresses.Silicon (Si) fertilizersare considered an ecologically compatible and environmental friendly technique to stimulate plant growth, alleviate various biotic and abiotic stresses in plants, and enhance the plant resistance to multiple stresses, because Si is not harmful, corrosive, and polluting to plants even if present in excess. Silicon, one of the most abundant elements found in the soil, is becoming limiting in plants. Ortho silicic acid (OSA) is the only bioavailable form of Si, which is easily assimilated by the plants and plays a key role in regulating various physiological functions. OSA is produced naturally in soil from soil silicates and other silicon forms, but the deteriorating soil fertility and unpredictable climatic conditions are limiting the generation of OSA naturally. It is seen that although it is required in very minute quantities, it has great impact on the crop resistivity to abiotic and biotic

stresses as it maintains balanced nutritionto ensure proper growth of plants but also reduce risk of pest and disease incidence.The benefits of OSA in plants are increasingly evident in literature. These include stimulation of photosynthesis process, increased uptake of primary and secondary nutrients which results in enhanced crop yields, reduced water consumption that enhances resistance to drought, improved resistance to bacteria, insects and fungal diseases, and improved color, size, number and quality of fruits, enhanced mobilization of nutrients that results into lower consumption of fertilizers and pesticides in most of crops like wheat, brassica, rice , sugarcane , papaya , apples , grapes , onion , potatoes , chilli , wheat , sunflower , corn , tomatoes etc.Studies indicate that the external application of silicon, increased resistance to abiotic and biotic stresses as well as reduced the post harvest losses in agricultural and horticultural crops. Silicon act as a physical barrier for entry of pathogen and pest as it forms the layer in the intercellular spaces that gives the crops resistance against biotic stresses. It also helps in maintaining plant cell turgidity for normal physiological functions at optimum levels under abiotic stresses particularly drought and high temperature.Positive and significant impact of external application of OSA on crop productivity under normal and under stress conditions in Brassica's, sorghum, cowpea, wheat, apple, kinnow, etc.has been reported. Presence of silicon in the root zone also enhances the uptake of phosphorus, which further helps in better translocation of source to sinks, which probably is the reason that crops show resilience under changed weather conditions.

Assessing impact of eco-friendly iron and zinc oxide nanoparticles fabricated via green synthesis on grapevine cv. Thompson Seedless

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Abstract

Abstract: For the past few decades, meticulousresearch efforts have been made in the direction ofsynthesizing cost-effective nanoparticles for enhancing nutrient use efficiency.Considering this, eco-friendly nanoparticles of iron and zinc were fabricated through novel green route using grapevine cv. Manjari Medika pomace. The total phenol and flavanoid content was determined in pomace extract using methanol as extraction solvent. The obtained products (assumed as Fe-NPs and Zn-NPs) were subsequently characterized by Fourier Transform Infrared Spectroscopy (FTIR), UV-vis spectra, Scanning Electron Microscopy (SEM) and Particle Size Analysis techniques. The LCMS/MS was performed for the identification of biomolecules present in the grape pomace extract for formulating Fe-NPs and Zn-NPs. The FTIR peaks of Fe-NPs at 433 and 518 cm-1 indicated Fe-O vibration confirming the synthesis of iron oxide nanoparticles. The morphology of Fe-NPs was monitored by SEM analysis and particles were found in agglomerated form. The mean particle size of Fe-NPs was found to be 74.52 nm. The

FTIR peaks of Zn-NPs at 406.05, 835.18 and 879.54 cm-1 indicated Zn-O stretching vibrations; 1394.53 cm-1 corresponded to C=C, the peak at 2322.29cm-1 was ascribed to C?C stretching vibration. The morphology of Zn-NPs was mostly spherical/agglomerated in shape and the mean particle size was 90.67 nm.To assess the impact of nanoparticles on grapes, pot culture studies as well as field experiments were conducted. A significant increase in leaf Fe (+30.28% and +36.59%) and Zn content (+20.90% and +28.39%) was recorded after 14 and 28 days of application of Fe-NPs and Zn-NPs over conventional fertilizers in field studies. Similarly, a significant increase in berry Fe (+36.98%) and Zn (+30.07%) content was recorded. These findings suggested that Fe and Zn-NPs have potential applications and could be used as a promising candidate for enhancing micronutrient content in grapes.

Keywords: *Nanoparticles, iron,zinc, FTIR, SEM*

Socio-economic predictors of dependence on NTFPs and analyse the role of NTFP collectors towards forest conservation in Nagaland

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With almost 80% of the natural resources under the control of the communities which constitutes a rich biodiversity with abundant forest resources, in Nagaland (George and Yohme, 2008), the role of the community towards forest management has seen a dip in the recent years.From 2001 to 2021, Mokokchungdistrict lost 23.6kha of tree cover, equivalent to a 17% decrease in tree cover since 2000 and from 2013 to 2020 with a 100% of tree cover loss in Mokokchungdistrict occurred within natural forest (Global Forest Watch, 2022). Therefore, a study was conductedin the Mokokchung district of Nagaland under Mangkolemba block where 10 villages were interviewed using structured questionnaireto assess the role of NTFP collection by the indigenous people in influencing the need for forest conservation interviews. Binary logistic regression model was used involving fitting an equation. The study showed thatthree main activities had been done by localpeople towards forest conservation in the region. About 65.00% of the local people did not collect species that has low growthrate or reproduction rate, 72.34% did not collect species that has smallpopulation size and 80.41% did not collect the critical part of plant thataffect the growth or reproduction. The study also showed that income from NTFPs positively influenced forest maintenance activity of 'do not collect species that has low growth rate or reproduction rate' and 'do not collect the critical part of plant thataffect the growth or reproduction'. Both agriculture land holding and income from farming negatively influenced the forest maintenance activity of 'do not collect species that has smallpopulation size'.Thus, the study shows that, through the usage of NTFPs

in the form of income from it motivates local people's participation in forest protection which led to more effective forest conservation.

Keywords: *NTFP, forest cover loss, forest conservation, Mokokchung, Mangkolemba, Nagaland*

Economics And Marketing of Dairy Products in Cooperative Sector of Uttarakhand: A Case Study of Aanchal Plant InUdham Singh Nagar District Of Uttarakhand

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Abstract

The research was carried out in a district-level milk co-operative union, Udham Singh Nagar Dugdh Utpadak Sahakari Sangh Limited, Khatima, registered under the brand name 'AANCHAL' (U.S. Nagar). The study relied on descriptive statistical methods, financial efficiency ratios, and Garrett ranking.Financial efficiency of the dairy co-operative plant helps to explore the possibilities of lowering the cost and improving the efficiency of the plant. Procurement costs were the most significant cost component of key milk products. The key milk products whose cost and returns were calculated were curd, ghee, butter, and paneer.The operating ratio, fixed ratio and gross ratio values were observed to be less than one and the capital turnover ratio were observed to be greater than one. The milk producers experienced severe difficulties in the acquisition of milk due to price fluctuations, late and poor compensation, high feed costs and seasonal variance.

Key words:*AANCHAL Plant, Capital turnover ratio, Statistical tools, Economics, Financial efficiency, Garrett ranking*

The competent predictors for mangrove ecosystem degradation, key eco-physiological resilience trait complex specific for mangroves -A study from Indian Sundar bans

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Abstract

Abstract: Sundarbans mangrove forest, the world's largest continuous mangrove forests expanding across India and Bangladesh, inrecent times, isimmenselythreatened by degradation stress duet on atural stress orsandanthropo genic disturbances.The degradation across the19 man grove forest sin Indian Sundar bans was evaluated by eight environmental criteria typical to mangrove ecosystem. In anattempt to find competent predictors for mangrove ecosystem degradation, key eco-physiologic alresilien cetrait complex specific form angroves from 4922 individuals for physiological analyses with gene expression and 603 individuals for leaft issued istributions from16 man groves and 15 associate species was assesse dalongthe degra dationgradient.The degradation data was apparently categorize dinto four and CDFA discriminates 97% of the eco-physiological resilience data into corresponding four groups. Predictive Bayesian regression models and mixed effects models indicate osmolyteac cumulation and thickness of water storage tissue as primary predictors of each of the degradation criteria that apprais ethede gradation status of mangroveeco system. RD Aanalyses well represent edresponse variables of degradation explained by explanatory resilience variables.We hypothesize that with the help of our predictive models the policy makers could trace even the cryptic process of man groved egradation and save the respective for estsintime by proposing appropriate action plans.

Keywords: *Mudflat stabilization. Nutrient limitation. Forest cover. Salinity rise. Mangrovede gradation prediction.*

Effect of Citrus Rootstock on leaf Nutrient Acquisition of Darjeeling Mandarin

(Citrus reticulata Blanco)

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Abstract

Experiment was conducted on 1 year old seedling of citrus rootstock viz., Troyer citrange, Rough Lemon, Rangpur lime, Carrizo citrange, Soh Sarkar, Sour orange and Tawainca to understand the root morphology and to know the effect of these rootstocks on leaf nutrient acquisition. Rough lemon seedlings had higher root length (625.18 cm) , surface area (302.36cm2), volume (10.25 cm3) and the number of

forks (4213.08) . The same rootstock exhibited higher rootstock length (12.06 cm), scion length (23.01 cm), maximum number of leaves 10.33 and maximum leaf area (50.50 cm2). Rootstock Carrizo citrange had lower root morphology and vegetative characteristics. The rootstocks also imparted significant influence on leaf mineral composition. Leaf P, K, Zn,Ca amd Mg content was recorded maximum in plants grown on rough lemon seedling, while N, Fe, and Cu was higher on Rangpur lime. The rootstock rough lemon had a vigorous effect on Darjeeling mandarin with higher root morphological, vegetative characteristics. Also, the same rootstock had maximum accumulation of P, K Zn, Ca and Mg content. Based on the study, the rootstock can be recommended for Darjeeling mandarin scion in Darjeeling and Sikkim hills.

Genome mapping for the development of elite future crops

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Abstract

The advent of molecular techniques has witnessed major breakthrough towards the goal of achieving improvement in existing cultivars. It mainly targets to understand the genome architecture leading to the production of proficient crops. One of the major challenges faced by researchers worldwide is to elevate high yielding stress resistant varieties in order to mitigate hidden hunger with little recurring costs. In this regard, the employment of molecular markers for understanding the influence of various environmental conditions on crop traits, epistasis and pleiotropic interactions, and linkage drag which make the process of construction of genetic maps much more difficult is a high priority research area.Genotyping assists in parental genotype selection, screening mapping populations, genome mapping, trait mapping, germplasm diversity assessment, marker-assisted selection, linkage drag elimination in backcrossing and identi?cation of genomic re-arrangements across taxa.By observing significant association between an allele and phenotypic trait, we can infer that complex trait locus is linked to a marker in question.Further, association mapping overcomes the limitations of low mapping resolution as it detects correlations between genotypes and phenotypes in natural germplasm collection.The lines with desirable traits such as early maturity and high yield can be used for the purpose of enhancement of yield performance and may also be used for the development of biparental populations and in back cross breeding programs. Genetic maps are thus important genomic resources that are widely applicable to retrieve the genetic information thereby introducing desired traits and augmenting the productivity of crops.

Keywords: *Genome Mapping, Linkage drag, Trait loci*

Physio-chemical properties on soilsin different region Punjab

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Abstract

The Punjab region is one of the most fertile regions in the Indian subcontinent which is divided into three sub-regions; Majha, Malwa, and Doabaconsisting of soil types Ustic, Aridic and Udic. The study of soil's physical and chemical properties plays a vital role in agriculture production, water quality, and the intensity of soil degradation. Due to the extensive agriculture since the green revolution, the physicochemical properties of soil might be changed. Looking at the dynamic nature of the soil properties, the present Study was carried out to study the soil physicochemical properties of selected regions of punjab. Soil properties of the Punjab region i.eDoaba, Majha,and Malwawere collected and soil properties like pH, EC, available N, P, K, and OC were studied. The objective of this study to state the physic-chemical condition of soil of punjab region. It has been observed that the pH of Malwaranges from - 4.9 to 10, Majharanges from 5.5 to 9.36 and Doaba rangesfrom 5.0 to 9.3 respectively. Which indicates that soil is highly saline to highly alkaline in nature with high variations,whereas ECin Doabaranges from 0.2-1.9 dSm-1 which is non saline, whereasMajhais ranges from 0.7 -1.22dSm-1 which is non saline, and Malwaranges from0.2-6.42dSm-1 respectively, which is non saline to slightly saline,indicates the soil is good/normal/sensitive for the crop growth. This huge amount of variation in physical properties is due to high dependency on inorganic fertilizers.

Keywords:*NPK, pH, EC, organic carbon and soils of different region of Punjab*

Effect of irrigation and BARC hydrogel on growth and yield of isabgol in Western Rajasthan

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Abstract

A field experiment was conducted to evaluate the effect on the growth and yield of the isabgol crop in split-plot design with thrice replicationsat the research farm of Agricultural Research Station,Mandor,

Jodhpur during Rabi, 2019. The factor related to number of irrigations viz.6 irrigations (at sowing, 8 DAS, 20 DAS, 40 DAS, 55 DAS & 70 DAS), 5 irrigations (at sowing, 10 DAS, 35 DAS, 55 DAS & 70 DAS) and 4 irrigations (at sowing, 10 DAS, 35 DAS & 60 DAS) were allocated in main plots, while as factor related to dose of BARC hydrogel comprising of control (no hydrogel), 8 kg/ha hydrogel, 10 kg/ha hydrogel and 12 kg/ha hydrogel were allocated to sub-plots.

Results indicated that significantly higher plant height (40.5 cm), number of spikes (34.3plant?1), seed yield (875 kg ha?1) and productivity (6.5 kg day?1)were obtained with six irrigations/normalirrigations, but water use efficiency was statistically at par with 5 irrigations and 4 irrigations. Maximum net returns (?56014 ha?1), benefit-costratio (2.23) and profitability (?417 day?1) of isabgol were obtained with the application of six irrigations.Different doses of BARChydrogel did not produce any significant effect on seed yield and waterproductivity of isabgol crop.

Keywords: *BARCHydrogel, Growth, Irrigation, Isabgol, Yield.*

Molecular Characterization of French Bean Associated Rhizobia found in North Bengal and Sikkim

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French bean (Phaseolus vulgaris L.) is nodulated with various fast growing Rhizobium spp., such as R. leguminosarum bv. phaseoli, R. tropici, R. etli, R. gallicum and R. giardinii. The molecular study is considered to be the most discriminating method for assessing the variability among isolates of bacteria. Hence, in this study, molecular characterization of 18 Rhizobium strains (including reference strain MTCC-99) isolated from French bean nodules collected from different regions of North Bengal and Sikkim were done. The isolates grew well in the yeast extract mannitol (YEM) medium (pH 7) at 30°C. The DNA fingerprinting techniques like RAPD and rep-PCR revealed the bacteria Rhizobium to be widely diverse genetically. A total of 133 major scorable bands were scored and the number of polymorphic bands generated by each decamer primers ranged in between 12 (OPD-03) and 21 (OPY-04). The amplification reactions with rep-PCR (REP, ERIC and BOX) primers generated a sufficient number of distinct polymorphic bands with 93.4-100% polymorphism for reliable strain discrimination.

Each rep- PCR pattern generated a unique fingerprint and no similarity was observed in clustering of the isolates nor the clusters formed according to their geographical location demonstrating the heterogeneity among the isolates. The PCR-RFLP of 16SrDNA genome with seven different restriction enzymes (Alu I, HaeIII, Hinf I, Hpa II, Mbo1, Taq I and EcoRI) separated the isolates more prominently revealing the genetic similarities as well as the differences between the 18 Rhizobium isolates. The partial 16SrDNA PCR sequenced products subjected to alignment with global partial 16S rDNA database from GenBank through BLAST program revealed a maximum similarity of 99-100% with the gene sequences of R etli, R phaseoli, R leguminosarum, R tropici and R paranaense present in the database. The dendrogram constructed with RAxML software revealed that all the Rhizobium gene sequences clubbed with all the other standard Rhizobium strains.

Keywords: *Phaseolus vulgaris, Rhizobium, yeast extract mannitol, RAPD, rep-PCR, 16SrDNA*

Need of English language Translation in Agriculture Knowledge management in India

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Abstract

Agriculture is the key income source and livelihood for around three-fourth of the India's total population especially for those who live in villages. Agriculture is the only major source which can feed the nation. As we know Knowledge is the key force for every sector including agriculture we started many initiations to manage the agriculture knowledge. When we look at the initiations in India to fulfill the knowledge and information needs of the farmers we are far behind of real expectation. In today's competitive knowledge world, translation is one of the most decisive instruments to understand, communicate and share the knowledge in every field of human activity. As the whole globe is coming together based on knowledge sharing and communicative advances, we need to give meaning for the global knowledge in all the languages to make this process more inclusive. In this juncture translation plays vital role by enabling the people of one language to understand the knowledge produced in other language. Translation is no longer just the process of translating words, but has evolved into the transformation of meaning and intentions.

India is a land of ideas and innovations it have established its own image in every field of development from beginning of human race. As compare to other nations Indian agriculture in ancient days more strategic than others but in today's development world our agriculture practices loosing competencies due lack of scientific adoptability and literacy among the farmers. Farmers of western and other developed

nations are literates and able to understand and adopt research output of the globe for the benefit of their agriculture activities. It is totally different in case of Indian farmers, Indian farmers are really hard workers than any other farmers but they are not able adopt new methods and techniques due to lack of literacy and lack of ability to comprehend the literature from other language. Illiteracy is a huge problem in scientific development of Indian farmers, but even where farmers are literate there's no guarantee that they are literate in English and any other language than their mother language. The 28 states and 7 union territories of India are home to more than 1562 languages and dialects. Despite this, research institutes, libraries, development agencies, NGOs and governments agencies frequently lack the initiations to translate agriculture knowledge material into languages of farmer's needs.Majority of the Indian farmers are non-literates, neo-literates and literates only in mother language. In this situation though there is enormous knowledge resources for agriculture majority of them are other than mother language. When we see records of best practices, research outputs and initiations in agriculture are all in English language and other foreign language. As farmers are not able to utilize the existing knowledge resources due to language barrier knowledge management initiation must give primary priority to solve this problem. Here only solution for this problem is translation. Translation is the communication of the meaning of a source-language text by means of an equivalent target-language text when we translate agriculture knowledge to every target language we can see the greater impact of that knowledge on farmers. Here we have made an attempt to discuss the importance of knowledge management in Indian agriculture and role of translation in managing and communicating knowledge to farmers.

Selection of strains with multifarious PGP traits for consortial formulation development

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Abstract

A total of 156 bacteria (fluorescent pseudomonads, Bacillus and rhizobia) isolated from the soil samples of different locations of Tamil Nadu, Uttar Pradesh and Punjab were revived on specific media. Among the 156 isolates 122 isolates were from Punjab and Uttar Pradesh and 34 Isolates were from Tamil N?du. All the 156 isolates were screened for plant growth-promoting traits viz., solubilization of phosphorus and zinc, production of siderophore, HCN, IAA, and ammonia, and an industrially important trait; lipase production. Among the 122 isolates, 16 isolates were able to solubilize phosphorus (P), 17 were able to solubilize Zinc (Zn), 73 produced IAA and 71 tested positive for ammonia production and fifteen isolates were positive for siderophore production showing a yellow zone on the CAS agar medium plate. And 11 isolates recorded positive for K solubilization. Identification is done based on sequencing 16S rRNA gene followed by BLAST search in EzBiocloud server (https://www.eztaxon.org). The isolates

were represented by fifteen different species viz., Pseudomonas asiatica (7) Pseudomona plecoglossicida (5) Pseudomonas guariconensis (7), Pseudomonas monteilii (5) and Pseudomonas taiwanensis (1). Bacillus zhangzhouensis (4) Bacillus stercoris (2) Paenibacillus polymyxa (1) Paenibacillus alvei (1) Mesorhizobium viz., M. plurifarium (11) M. silamurunense (10), M. metallidurans (4), M. helmanticense (4), M. delmotii (1) and M. ciceri (1). Results revealed that the Paenibacillus alvei TN69, M. helmanticense C7, Pseudomona plecoglossicida P34 tested positive for majority of parameters. These strains were tested for compatability amongst each other and found compatible. Hence these strains form potential candidates for formulation development as a consortium for plant growth development in different field crops.

Keywords: *Pseudomonas, Rhizobia, Plant growth promoting traits, Rhizosphere*

Effect of growing media on growth and flowering of Alstroemeria cv. Pluto

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Abstract

Alstroemeria (Alstroemeria hybrid L.) belonging to Alstroemeriaceae is a recent potential emerging bulbous flower crop of high commercial value. Investigations were carried out during 2016-2017 to standardize the growing media for growth and flowering of alstroemeria cv. Pluto in Regional Research station (Hill Zone), Kalimpong, UBKV. In this experiment different growing mediawas tested. A field experiment was laid under poly house conditions in randomized block design, consisting of eight growing substrates.Different vegetative and flowering parameters like stem length, stem thickness, number of flowers per cyme, number, size and yield of rhizome were recorded.

Keywords: *Alstroemeria, Growing media*

Innovative management practices for restoration of degraded coastal lands inthe Indian Sundarbans

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Abstract

The Sundarbans,a world heritage site is the largest mangrove ecosystem in the world. It is highly vulnerable and fragile and constitutes a major portion of the coastal West Bengal. Such coastal habitats have a wide assortment of natural resources and support a rich diversity of flora and fauna, thus providing many vital ecosystem services. However, these coastal lands are highly vulnerable to degradation processes such as coastal erosion, salinization and waterlogging. In the past few decades, these degradative processes have been further aggravated due to increased anthropogenic activities. Notwithstanding, climate change is yet another threat which renders the coastal area extremely vulnerable to sea-level rise and extreme weather events including cyclones, thus jeopardizing the lives and livelihoods of millions dependent on the ecosystem. Also at severe risk is the food system as agriculture and fishery are the major activities of the resource-poor farmers in the region.During the kharif season, there is an acute problem of waterlogging and the farmers resort to the cultivation of low yielding traditional tall rice varieties. While in the dry season, crop yields are limited due to soil salinity and lack of good quality water for irrigation. The region is also witnessing frequent cyclonic storms in recent times adding to the woes of the poor farmers as their crops get damaged due to strong winds and increased soil salinity from flooding with seawater. Therefore in several pockets, agriculture being no longer a profitable enterprise has given way to highly remunerative commercial brackish water aquaculture farms and large swathes of agricultural lands are being converted into such farms which pose severe environmental threats by increasing salinization in adjoining lands. Our biggest challenge lies in improving agricultural productivity to achieve food and livelihood security for the poor farmers while protecting our environment from degradation. Adoption of innovative land and water management practices such as land shaping technologies like farm pond, paddy cum fish, deep furrow and high ridge including crop diversification, nutrient management, use of amendments for management of acid-sulphate soil,integrated farming, conservation agriculture, agroforestry, and use of geo-textileswill help to prevent the land degradation, restore soil quality and productivity in the coastal ecosystem.

Keywords: *Coastal ecosystem, Land degradation, Land shaping, Soil salinity, Sundarbans*

Impact of Soil Organic Carbon(SOC) on Global Warming

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Abstract

Since the post-industrial revolution, global temperatures have been rising steadily, and as a result, we are losing the balance of our Earth ecosystem. We need fertile land to feed a huge population, our soil

is slowly losing its fertility due to climate change. Adequate organic carbon is required in the soil to maintain soil fertility and health.The constant rise in temperature and climate change make a profound effect on our soil organic carbon stock. The impact of soil organic carbon on climate change. The Dynamics of soil organic carbon changeby changing the climatic parameters. The estimation of soil organic carbon with climate-changingscenarios. The decomposition of SOC is microbially-mediated with an associated microbial respiration CO2 loss. Each SOC pool has specific maximum decomposition rates with the maximum being reduced by an abiotic soil decomposition factor that is controlled by the soil moisture and soil temperature. In addition, the SOC decomposition is also largely controlled by soil texture. For example, the net effect of the soil texture on active and slow SOC decomposition is to increase soil carbon stabilization for soils with low sand content and high clay content. The most terrible threat to human civilization is global warming which will profoundly affect our present and future generations.

Keywords: *Soil Organic Carbon, Co2, microorganisms etc.*

Effect of biochar and FYM on growth, yield and chemical composition of foddersorghum

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Abstract

A pot experiment was conducted during Kharif- 2018 in the net house of the department of Soil Science and Agricultural Chemistry, Anand Agricultural University, Anand to find out the effect of biochar and FYM on growth, yield and chemical composition of fodder sorghum [Sorghum bicolor (L.) Moench] grown in saline soil. The treatment comprised four levels of biochar (B0: 0 t ha-1 , B1: 2.5 t ha-1 , B2: 5.0 t ha-1 , B3: 7.5 t ha-1) and three levels of FYM (F0: 0 t ha-1 , F1: 5.0 t ha-1 , F2: 10.0 t ha-1) which were laid out in completely randomized design (factorial). The growth and yield parameters namely germination percentage, plant population, plant height, green forage yield and dry matter yield as well as uptake of nitrogen, phosphorus and potassium by fodder sorghum were significantly increased by treatment of application of biochar @5.0 t ha-1 and @7.5 t ha-1 as well as application of FYM @10.0 t ha-1 alone or in combination.

Keywords: *Biochar, FYM, growth and yield.*

Abundance of genes involved in nutrient cycling under wheat rhizosphere of middle Indo-Gangetic plane region

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Soil microorganisms, presenting one of the leading biodiversity reservoirs and sustain soil functions, playing a key role in nutrient cycling. Wheat rhizosphere soil samples were collected form 15 districts of middle Indo-Gangetic plain (eastern Uttar Pradesh and Bihar) and were analysed for organic carbon content. Highest organic carbon was found in Gaya district (0.89%) whereas lowest was detected in Mirzapur district (0.29%). We have also quantified genes involved in nutrient cycling (amoA, apsA, cbbs, nifH, nirS, nxrB, phoD, phoX and pqqc) in all the samples. Copy number of amoA gene (encoding ammonia monooxygenase) was found in the range of 4.5 × 1010 to 2.6 × 1013. Copy number of nifH (encoding the nitrogenase) and nirS genes (encoding nitrite reductases) were observed in the range of 0.7×104 to 4.2×106 and 1.2×106 to 3.3×108, respectively. The genes apsA, cbbl, nxrB, phoD, phoX and pqqc encoding sulphur metabolism, carbon fixation, nitrite oxidation, alkaline phosphatase and pyrroloquinoline quinone synthase respectively were also quantified and their copy number was found in the range of 2.3×107 to 3.29×108, 4.5×108 to 4.33×109, 1.9×106 to 6.38×1012, 1.4×109 to 1.85×1013, 1.07×108 to 2.67×108 and 2.3×107 to 3.29×108, respectively. Results represent there is large diversity in biochemical parameters of the soil collected from different region, additionally diversity at molecular level in terms of genes copy number involved in nutrient cycling.

Keywords: *Nutrient cycling gene, copy number, RT-PCR.*

Impact of timing of surface sterilant on callus development in Sandalwood(Santalum album Linn) from shoot tip explants

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Abstract

An investigation was conducted on callus regeneration and development of Santalum album Linn from shoot tip explants at the Biotechnology-cum-Commercial Tissue Culture Center, OUAT, Bhubaneswar,

during 2015-16. In shoot tip explants surface sterilization best surface sterilization was 0.1% HgCl2 for 6 minutes, where the treatment recorded a minimum percent of fungal contamination(3.33), 93.33% aseptic culture, and 43.33% survival of the explants 0.1% HgCl2 for 7 minutes reduced the days for callus initiation(9.76) with good callus spread.The IUCN Red List designated this species as "vulnerable" owing to disease, fire (which the sandalwood trees are susceptible to), and exploitation through illicit felling. Tissue culture is a revolutionary approach for rapid clonal multiplication and mass multiplication of superior true-to-type individuals free of disease and pests that is gaining traction.

Keywords: *Bacterial, contamination, fungal, sandalwood, shoot.*

Diversity of Monosporangiophyta in India with special reference to West Bengal

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Abstract

Earlier designated Bryophytes s.l. is presently referred as a new rank Superphylum Monosporangiophyta (Majumdar, 2020). A comparative graphical abstract of the diversity of Monosporangiophyta in India and West Bengal is provided here.

Keywords: *Bryophytes s.l., Monosporangiophyta, Rank, Superphylum*

Group	Family		Genera		Species/ Infraspecific Taxa		Reference
	INDIA	WB	INDIA	WB	INDIA	WB	
Marchantiophyta (Liverworts)	56	43	138	83	924	340	Singh et al., 2016; Majumdar & Dey, 2021 ; Sreenath et al., 2020; Arya et al., 2021; Chandini et al., 2021; Daniels, 2021; Rawat et al., 2021; Singh & Sing h, 2021; Manju et al., 2021; Suresh & Cargill, 2022
Anthocerotophyta (Hornworts)	3	3	6	5	38	18	Singh et al., 2016; Singh Deo & Majumdar, 2021
Bryophyta (Mosses)	57	46	342	157	1625	376	Lal, 2005; Saha et al., 2021; Sahu et al., 2022

Enrichment of intrinsically disordered residues in ohnologs facilitate abiotic stress resilience in Brassica rapa

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Abstract

Arabidopsis thaliana and Brassica rapa shared a common evolutionary clade but Brassica species experienced an extra whole genome triplication (WGT) event compared with the model plant A. thaliana. Thus, conferring B. rapa more abiotic stress resistant. The study aims to unravel how the consequences of whole genome duplication steer the variation in stress adaptation competency between the two species. Comparing the duplication status between abiotic stress resistant (ASR) genes in the two species, significant increase in the number of paralogs in ASR genes of B. rapa than A. thaliana was found. Investigating the proteomic features suggests that the ohnologs pairs are more enriched with intrinsically disordered residues (IDRs) than other duplicated pairs. IDR also show a significant positive correlation with functional divergence between the duplicated pairs. Consequently, functional enrichment analysis has confirmed that regulation for stress adaptation functions are significantly enriched in paralogs than their ancestral genes in B. rapa. In addition to that, domain ontology analysis has revealed that the new domains with stress functions are significantly enriched in B. rapa. Interestingly, majority (52%) of these stress tolerant domains are found to be present in the intrinsically disordered regions of the proteins. Based on these observations, it is not unreasonable to speculate that IDRs mediate stress adaption potentiality by enriching more stress related functions and accommodating stress specific domains in paralogs of B. rapa. Also statistical analysis confirms that IDRs could independently govern the stress resilience of B. rapa. This study will open new avenues in understanding, how duplication confers stress adaptation potentiality in B. rapa over evolutionary time.

Keywords: *Abiotic stress, Whole genome duplication, Functional divergence, Intrinsically disordered regions, Domain*

Effect of Isolation and identification of *Pseudomonas fluorescens* from the rhizosphere soil of chickpea on the yield

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Abstract

The systematic survey were conducted in 20 villages of Allahabad District to determine the root knot (Meloidogyne incognita) and Fusarium oxysporum f.sp. ciceri of chickpea (Cicer arietinum). Pseudomonas fluorescens were evaluated at three different concentrations under field conditions both as seed and soil treatment. It was observed that all the treatments restrained the fungal incidence and root knot infestation significantly lower than that of control and enhanced root growth and shoot

growth at 30,60 and 90 days after sowing. Chickpea treated with Pseudomonas fluorescens at different doses increased yield favorably.Treatments were given as per requirements that are soil and seed application. T0 (control), T1 (100g/20kg of seed), T2 (200g/20kg of seed), T3 (300g/20kg of seed). T4 (1 kg/ha),T5(2kg/ha), T6 (3kg/ha). Seed variety used was Desi variety at 70-80 kg/ha.Effect of Pseudomonas fluorescens improved plant health and root colonization. It fovoured maximum development and minimum wilt incidence. The soil treatment of Pseudomonas fluorescens 3kg/ha increased the maximum root length (22.06cm) at 90 days after sowing followed by (21.62cm) and (21.42cm) in 2kg/ha and 1kg/ha at 90 days after sowing. The maximum root weight (2.12 g) was recorded in 3kg/ha at 90 days after sowing followed by 1.88g and 1.8 g in 2kg/ha and 1kg/ha soil application of Pseudomonas fluorescens respectively.The seed treatment was highest for treatment @300g/20kg which was found to be (748.8g) and lowest was found in (control) untreated seeds which was 614g.Soil treatment of Pseudomonas fluorescens@3kg/ha showed maximum yield of 829g followed by 776.6g @2 kg/ha,729g @1kg/ha and lowest yield was found in untreated seeds(670g).

Keywords: *Chickpea,Root knot Nematode, wilt and Pseudomonas fluorescens.*

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